ANNALS
OF THE
UNIVERSITY OF ORADEA

FASCICLE OF TEXTILES-LEATHERWORK

VOLUME XI, 2010

No. 1

ANNALS
OF THE
UNIVERSITY OF ORADEA

FASCICLE OF TEXTILES-LEATHERWORK

VOLUME XI, 2010

EDITURA UNIVERSITĂŢII DIN ORADEA

No. 1

This volume includes papers presented at International Scientific Conference "Innovative solutions for sustainable development of textiles industry", 28-29 May 2010, Oradea, Romania

Contact and Editors' Address:
Liliana INDRIE,
UNIVERSITATEA DIN ORADEA,
FACULTATEA DE TEXTILE SI PIELARIE,
Str. B.St.Delavrancea nr. 4,
Oradea, 410058, Romania,
Tel.: 00-40-259-408448
E-mail : lindrie@uoradea.ro

Published by
Editura Universităţii din Oradea
Universitatea din Oradea, Str. Universităţii Nr. 1, 410087, Oradea, Bihor, Romania
P-ISSN: 1582-5590
CD-ROM-ISSN: 2068–1070

CNCSIS ACCREDITATION since 2007 "Clasa B"

EDITORS' NOTE

The Annals of University of Oradea, Fascicle of Textiles-Leatherwork was published for the first time in 2001, with the occasion of the scientific communication session, organized annually at the faculty; afterwards, the technical review publication was periodical.

The first 7 editions of the journal were edited in Romanian language with an abstract in English and the last three editions were edited entirely in English.

The articles quality increases with every issue. Apart from its improved technical contents, a special care is given to its structure. The guidelines for preparing and submitting an article were modified and developed in order to meet high quality standards requirements.

Beginning with 2007, this technical review has CNCSIS accreditation and classification "Clasa B". The format of issue involves a printed book of extended abstracts of papers and CD -ROM containing the integral papers.

Scientific papers are organized in 4 sections:

- TEXTILES PROCESS AND PRODUCTS
- LEATHER PROCESS AND PRODUCTS
- MANAGEMENT AND MARKETING
- QUALITY, ENVIRONMENT AND SAFETY STANDARDS AND TECHNIQUES

The layout, figures, tables or other wording requirements and copyrights are in charge of the authors.

Please note that the editors take no responsibility of the results, opinions and conclusion expressed in the published papers.

Board of editors

Oradea, 2010

S1. TEXTILES PROCESS AND PRODUCTS

INDEX OF PAPERS AND AUTHORS

INDEX OF PAPERS AND AUTHORS

INDEX OF PAPERS AND AUTHORS

S2. LEATHER PROCESS AND PRODUCTS

S4. QUALITY, ENVIRONMENT AND SAFETY STANDARDS AND TECHNIQUES

INDEX OF PAPERS AND AUTHORS

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE ANALYZE OF MALE POSTURE TENDENCY FOR IMPROVING GARMENTS PATTERN CONSTRUCTION

Manuela AVĂDANEI[1], Emilia FILIPESCU[2], Claudia NICULESCU[3]

[1]Technical University "Gh. Asachi", Faculty of Textile, Leather and Industrial Management, Iaşi ,ROMANIA, e-mail:mavad@tex.tuiasi.ro
[2]Technical University "Gh. Asachi", Faculty of Textile, Leather and Ind ustrial Management, Iaşi ,ROMANIA, e-mail:emfi@tex.tuiasi.ro
[3]The Research- Development National Institu te for Textile and Leather, Bucharest ,ROMANIA, e-mail:claudiacornelianiculescu@yahoo.com

Abstract: Age, lifestyle, occupation type, genetically inheritance etc are factors which influence human body shape. Among population there are persons who have the same values for perimeters, height, lengths, width, diameters etc. but different shapes of human bodies. This study has the main purpose to charac terize human body posture by several morphological indicators in order to have supplementary information for clothing pattern construction. A good pattern determines a good product for the consumer expressed by a good satisfactory degree.

Key words: balance, posture, shoulder position, waist depth, pattern making.

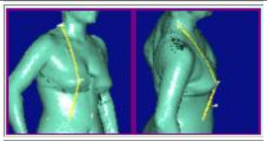
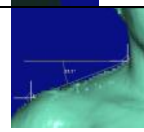
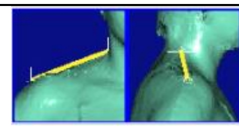
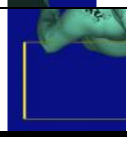
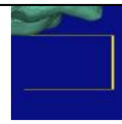
1. INTRODUCTION

In nowadays, consumers with great purchasing power are attempting to express their personality by means of individual product choice. Manufacturers are facing with an uninterr upted trend towards mass customization/ individualization. On these terms, many consumers have important problems to find proper garments, well balanced on the body, with a good fitting and comfort degree. For producers and specially garment constructers i s important to identify differences between consumers in order to conduct garment construction process to obtain a good fit and dimensional correspondence.
Among morphological indicators, which characterize human body shape, the posture is very important one, because it describes human balance in a vertical position (movement and rest).
Each posture has a determined shape for the vertebral column, shoulders, head and legs position.
The purpose of this paper is to analyze the male posture (adult population with age 20-65 years old) by some morphological indicators, in order to identify main peculiarities, which must take account in designing garment patterns. Using such information in pattern activity, the garment will have a good balance and fit on the huma n body and the consumer satisfactory degree will be good.

2. STUDYING METHOD

Many specialists from anthropometric field differentiate posture by vertebral column shape. They are analyzing following morphological indicators: cervical point depth, first and second column depth at the waist level and shoulder position (shoulder pos ition is the difference between base point neck height and shoulder point height). From a generation to another, body dimensions and morphological indicators are changing under the influence of several factors: nutrition, lifestyle, social condition, geographic area etc.
For this study, there are used information from a 3D Morpho- Body Scan (from The Research-Development National Institute for Textile and Leather) male subject s with age between 20-65 years old. Table 1 shows anthropometric dimensions used for this research.

Table 1. Some Anthropometric dimension from 3D Morpho Body - Scan

No.	Image body scan dimension	Description	No.	Image body scan dimension	Description
1		Neck to waist over bust	5		Distance waist back to vertical
2		Neck to waist center back	6		Shoulder angle right
3		Distance 7CV - vertical	7		Shoulder width
4		Distance scapula to vertical	8		Distance buttock to vertical

Morphological indicators used to describe and analyze body posture are determined as follow:

I Cervical Depth (Body position) = dim.3 – dim. 4 *(1)*

I Waist depth= dim. 5- dim. 4 *(2)*

II Waist depth= dim. 5- dim.8 *(3)*

Balance=dim.1-dim 2 *(4)*

*Shoulder position= dim7*sin(dim6, rad)* *(5)*

The tendency of mentioned morphological indicators is analyzing by statistical parameters, calculated for the whole samples 20-65 years old and the small ones made by age criteria. In the first stage is important to identify if there are any ab normal values and eliminate those values (is important to have good results for characterizing whole population).
According to the principles of statistic analyze, is necessary to calculate the test of the mean value ($T_{\bar{x}}$) and after that, compare its value with the Student Test (T_t=1,965).

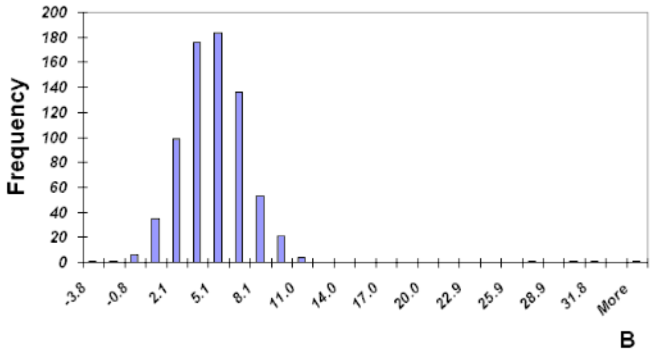
Comparing those values (table 2) is noticing that $T_{\bar{x}} > T_t$ and we can say that, the sample is significant from statistic point of view and all conclusions are real and may be ext ended to the whole population.
Final, the study focuses on a sample of 624 male subjects, split in the following age groups: 20 - 29 years old, 30-39 years old, 40-49 years old and 50-65 years old.

Table 2: Values for $T_{\bar{x}}$ and T_t

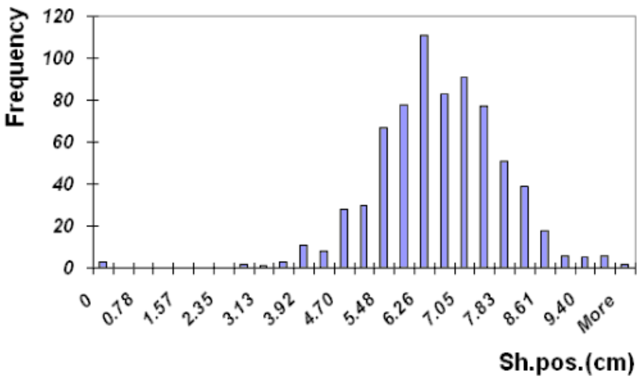
Body dimension/ indicator	$T_{\bar{x}}$	T_t
Neck to waist over bust	15,41	
Neck to waist center back	20,54	
Shoulder angle right	6,01	
Shoulder width	11,16	
Cervical Depth (Body position)	4,97	1,96
I Waist depth	2,62	
II Waist depth	2,87	
Balance (B)	1,92	
Shoulder position	5,13	

Obs.: Balance indicator has for $T_{\bar{x}}$ the smallest value, almost equal with Student Test; this indicator will have the biggest variability among population.

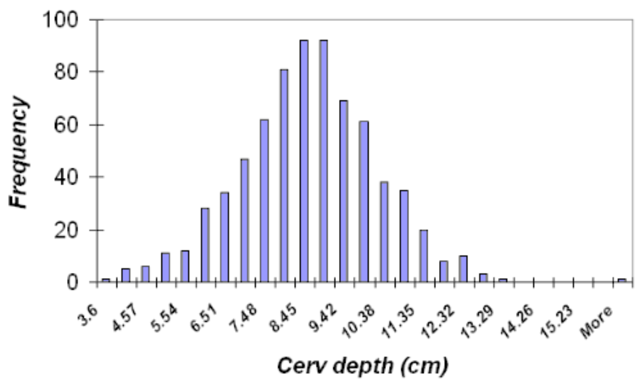
A fundamental task in many statistical analyses is to characterize the location and variability of a data set (measures of central tendency vs. measures of dispersion**).** Both measures tell us nothing about the shape of the distribution and from this reason is necessary to include skewness and kurtosis coefficient.
The histograms show skewness and kurtosis of a data set in an effective graphical technique.



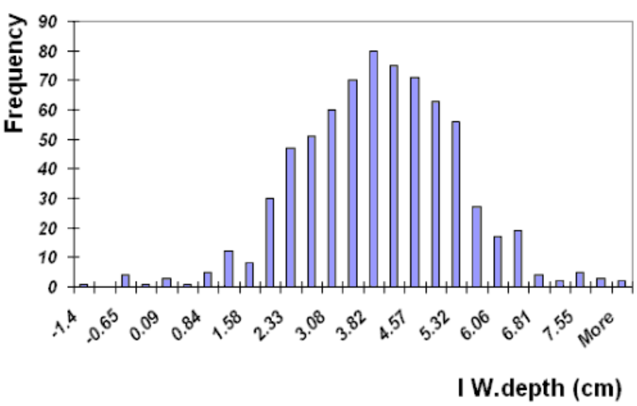
Balance indicator has many values smaller than the average one (positive skewness).
The values are scattered from the average one, which conduct to the following idea: a smaller homogeneity degree. Balance indicator is influenced by many factors and among them we can mention: adipose and muscular development degree, vertebral column shape, age, nutrition, sport etc.



Shoulder position indicator has many values bigger than the average one (the median value is bigger than the average one, negative skewness).



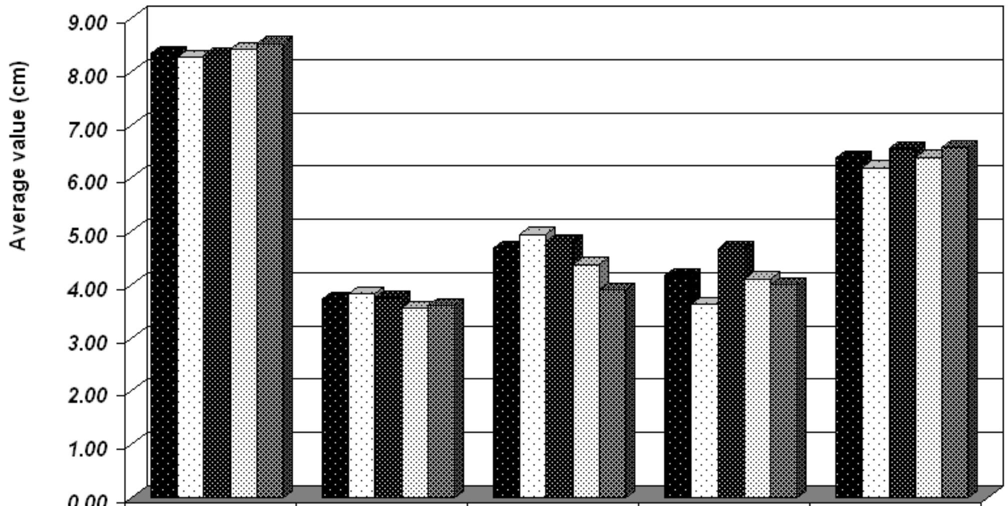
Cervical depth indicator has a normal distribution for individual values. These values are equilibrating scatter from the medium one (concentrated around the mean value).



The II waist depth indicator and I have a distribution very close to a normal one.

Figure 1. Histograms of morphological indicators used to characterize human body posture

After that, the research continues on total and small samples made after age criteria in order to identify some issues needed to know for clothing pattern construction. There are calculated the main statistic parameters and interpret them, from anthropometric point of view.

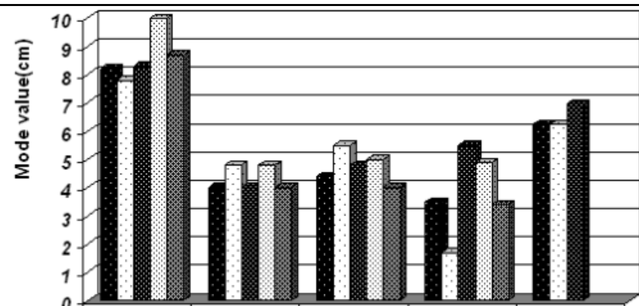


	Cervical depth	I Waist depth	II Waist depth	Balance	Shoulder position
20-65	8.33	3.73	4.69	4.16	6.37
20-29	8.27	3.83	4.94	3.62	6.19
30-39	8.3	3.75	4.8	4.67	6.55
40-49	8.41	3.55	4.38	4.11	6.39
50-65	8.52	3.6	3.9	4	6.57

Figure 2: Average values considering age criterion

Analyzing that information we jump to the following conclusions:

- *Cervical depth*- the average values are between 8.2-8.6 cm (normal posture); the biggest value for this indicator is for 50-65 age group and the small one for 20-29 age group. When a person becomes older, the backside becomes bent;
- *I Waist depth*-the average values are between 3.5-3.8cm; the biggest value for this indicator is characteristic for 20-29 age group (the persons with this age have very well pronounced scapula points, a much curved vertebral column (those persons are sitting a lot, may be at the computer). The smallest value is for the 40-49 age group, which are more attentive with body shape;
- *II Waist depth*- the biggest value is for 20-29 age group, which means that the buttock point is pronounced. For 50-65 years old, this indicator has the smallest value, because the muscular tissue is nor very well development ;
- *Balance*- the values of this indicator determine the level of the highest neck point in the front pattern related with the back, in order to design a well-balanced pattern/ garment. The biggest value for this indicator is for 30-39 years old, which means that the front part of the body is developed than the back one. The smallest value for this indicator register s 20-29 years old; at this age, the persons are slim, the bust is nor very well pronounced compared with the back side;
- *Shoulder position*- the average value for the whole sample is close with the one for 40-49 years old. The smallest values are for the 20 - 29 years old and the biggest one for the 50 - 65 years old. Those values are determined by the lifestyle, ageing, activity type, genetically inheritance etc.



	Cerv depth	I Waist depth	II Waist depth	Balance	Sh. Position
20-65	8.2	4	4.4	3.5	6.23
20-29	7.8	4.8	5.5	1.7	6.23
30-39	8.30	4.00	4.80	5.50	6.97
40-49	10.00	4.80	5.00	4.90	
50-65	8.70	4.00	4.00	3.40	

Figure 3 Mode values

Analyzing mode values for morphological indicators, which describe body posture, the conclusions are:

-the persons with 20-29 years have a trunk with a pronounced curve on the backside, expressed by the value for the I Waist depth. In addition, this age group has the buttock point almost at the same vertical line with the scapula points. Shoulder position is normal and balance value is small- we can say that there are small difference between front and backside development degree (persons are slim, with a poor muscular and adipose tissue);

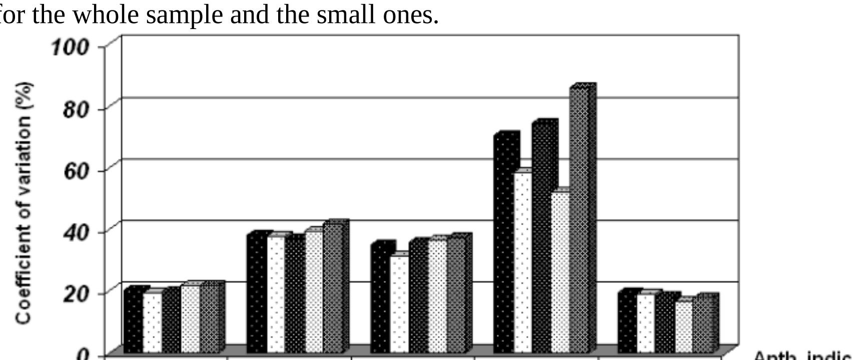
-the persons with age 30-39 years old have a normal cervical depth, normal shoulder position and a normal buttock point position compared with the scapula point (the I waist depth values are bigger so we can say that the backside of the trunk has a pronounced curve at this level). The values for balance indicate that the front side of the trunk is strong defining than the backside (muscular and adipose tissue at bust level);

-the persons with age 40-49 years old have a pronounced cervical depth, waist depth and a normal value for the balance indicator;

-the persons with age 50-65 years old have a normal cervical depth, the buttock and scapula pint on the same vertical line (the I waist depth and II are the same) and a smaller balance value.

Knowing the level of the mean values and mode one, we establish supplementary information for pattern garment construction (balance level, shoulder position, darts distribution etc.) to obtain a good fit and correspondence degree. That information are very useful for modeling pattern according to the body shape and computerizing garment pattern construction for different body posture and age group.

For any body dimension or anthropometrical indicator is important to analyze the scatter degree of individual values, expressed by the coefficient of variation. Figure 3 shows the values of variation coefficient for the whole sample and the small ones.



	Cervical depth	I Waist depth	II Waist depth	Balance	Shoulder position
20-65	20.09	38.06	34.75	70.3	19.5
20-29	19.24	37.81	31.22	58.27	18.84
30-39	19.75	36.94	35.6	74.3	18.25
40-49	21.73	39.17	36.64	52	16.62
50-65	21.72	41.55	37.32	85.98	17.62

Figure 3: Values for coefficient of variation

Analyzing the values from figure 3, the conclusions are:

- The biggest variability degree registers the balance anthropometric indicator; this fact explains body shape variability -front side compared with back, considering age as a criterion. The biggest level for this indicator is for the 50- 65 years old (at this age, the front shape is determined by the adipose tissue- disposal and development degree). The smallest value for this indicator is characteristic for 40 - 49 years old.

- The medium variability degree registers shoulder position and after that the cervical point depth (shoulder area has the almost the same tendency for all the age groups).

As it is shown in figure 3, at the waist level, the variability degree is big (poor homogeneity degree) - at this level the adipose and muscular tissue is very different from a person to another and from an age group to another.

3. CONCLUSIONS

This research demonstrates the importance of body posture for pattern cutting activity. Those indicators, which describe body posture, must be considered in garment design process, to draw and model patterns in order to ensure a good fit degree, dimensional correspondence, comfort, a good satisfactory consumer degree in mass customization production.
This analyze must be continued by studying relations between different body dimensions and those morphological indicators in order to obtain an interactive body model, that can be altered to match individual one for a computerized pattern making activity. By making fine adjustments according to the posture, it is possible to make patterns, which result in clothing that not only fits well, but also exhibits other desirable properties. These are desirable properties, such as drape style, dart amount and optimum use, are viewable on screen before any fabric has even been cut.

4. REFERENCES

1.Avădanei, M., Filipescu, E., Pintilie, E., The analysis of male body trunk peculiarities, International Scientific Conference *Innovative solutions for sustainable development of textiles industry,* Oradea 2009.
2.Avadanei, M., Filipescu, E.: Sisteme moderne de masurare a dimensiunilor corpului uman , Lucrările celei de a XII-a Conferinta Romana de Textile- Pielarie *Cai ale viitorului in Textile Pielarie*, 17- 19 oct. 2002, Iasi
3.Brumariu, A.: *Proiectarea îmbrăcămintei*, Rotaprint, Iaşi, 1989.
4.Filipescu, E.: *Structura şi proiectarea confecţiilor*, Ed. Performantica, Iaşi, ISBN 973-7994-33-7, 2003;
5. * * * : STAS 6802-91. *Îmbrăcăminte pentru bărbaţi. Dimensiunile corpului* .
6. * * *: *ISO/TR 10652- Body dimensions*

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE COMPUTER ASSISTED TECHNOLOGIC PROJECTION OF THE SPINNING TECHNOLOGIES IN THE COTTON LIKE SPINNING MILL

I. Barbu[1], A. Popa[1]

[1] *Aurel Vlaicu University. Arad, Romania*

Corresponding author: Ionel Barbu, ionelbarbu@yahoo.com

***Abstract*: In this work we present the programs package "THE COMPUTER ASSISTED TECHNOLOGIC PROJECTION OF THE SPINNING TECHNOLOGIES IN THE COTTON LIKE SPINNING MILL ". These programs allow us to customize the experimental data, to optimize the spinning process on the ring spinning machines, the cursors acceptation, the spinnin g plans adaptation, and the calculation of the adjustment elements.
Key words: technologies design, cotton spinning, optimization

1.INTRODUCTION

One of the main reasons of informatised work introduction in production is that because the lack of great consumers, and the users atomization, the request for some range of goods is low, and this determines frequent changes in production technologies. The technologist engeneer also has to calculate things like preliminary spinning plan, adjustment elements for each machinery, and the final spinning plan for the production capacities corellation.
In this paper we present the programs package ""THE COMPUTER ASSISTED TECHNOLOGIC PROJECTION OF THE SPINNING TECHNOLOGIES IN THE COTTON LIKE SPINNING MILL ", which is formed by the following programs:

- STATTEX-the program for experimental data statistical processing;
- TURMFI-the program for spindle rotation optimization on ring spinning mills;
- CURSORI-the program for the adoption of cursors tipe and size;
- PLANFIL-the program for spinning plans organization and for adjustment elements of the machineries from the technological process calculation.

The data baze named BAZAFIL was realized for a better functioning of these programs, and is necessary for information and for do cumentation, and for exporting some technological recomandations or certain datas for technological projection from the four programs.
These programs are relized using the data base management sistem PARADOX 4.5. To evoid the use of the same program sequen ces for several programs we realized some connections between the programs, conections that enable the exportation and the importation of datas for projection and for a good programs functioning.

2. THE GENERAL PROGRAM GRAPH

The components of the program pa ckage and the connections between them are presented in the following graph (figure 1.) and the notations that were used are shown in Table 1. The graf is a grafic representation of the general relations between its objects, in this case the programs formi ng the package.

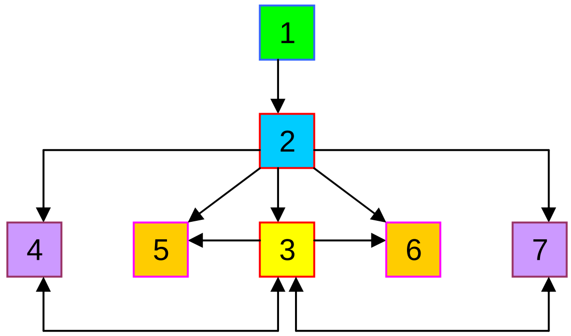


Figure 1. The projection of the technologies for cotton and cotton like yarns production program graph.

Table1:

Junction	Meaning
1	START1-general menu for informatized cotton spinning mills
2	START2-general menu for the projection of cotton spinning technologies
3	BAZAFIL-data base for cotton spinning mill
4	STATTEX-the program for statistical processing of experimental data
5	TURMFI-the program for spindle rotation optimization on ring spinning mills
6	CURSORI-the program for cursors adoption on ring spinning mills
7	PLANFIL-the program for spinning plans projection and for adjustment

The graph shown in Figure 1 is a labeled oriented graph and has junctions or tops, and arcs formed by orderd tops. The junctions are represented by the rectangles from 1 to 7 and signify the projection programs. The arcs, by the arrows between them signify the communication possibilities between programs for importing or exporting dates. Partially the tops of the pro grams (3,4,5,6,7) are also the arcs basis and tops because the programs were conceived to work in both ways.

3.PROGRAMS PRESENTATION

3.1. THE STATTEX PROGRAM

The STATTEX program is very useful for fibre phisical -mecanical characteristic determination wh en taking delivery of some new raw material, for semi -products characteristics determination, and for data processing in analysis bulletins (reports) for yarns at each 3000kg or any time needed.

The STATTEX program resolves the following problems:

- Reading of experimental data;
- Ordering investigation dates;
- The elimination of aberrant dates according to Dixon or Grubbs tests, function of samples volumes and then edits them;
- A report presentation containing the remaining dates;
- Allows the choice to print this report;
- The calculation of the valid values and their selection on classes;
- Testing of experimental and normal repartition concordance, using the χ^2 or Kolmogorov – Smirnov tests, function of sample volume;
- Allows to print a report with the helping table for the concordance tests;
- Graphic representations:
  - The histogram;
  - The relative frequency polygon;
  - The absolute frequency polygon;
  - The cumulate frequency diagram;
- Allows the choice to print the graphic representations;
- The calculation of typical investiga tion values (arithmetical mean, median line, mod value, amplitude, dispersion, square mean diversion, absolute mean diversion, linear irregularity coefficient, asymmetry coefficient, vaulting coefficient, excess)

- Allows the choice to print the “VTS” report with the typical investigation values that were calculated previously for result interpretation.

The program is a 453 kB program and is very complex considering that it resolves complicated problems, like sorting investigation dates on classes or graphic representations, and listing some reports that allow results analysis, and decisions about technological processes.
With some little modifications the program can be used for other domains too, domains where a large quantity of experimental dates must be processed (i.e. chemical labs, research etc.).
The program is “friendly” and anyone can use it because it has very clear messages, in Romanian.

3.2. THE TURMFI PROGRAM

This program allows spindle rotation optimization on rotor spinning mills. This thing is possible by calculating yarn tension in the spinning balloon, this tension depends on: spindle rotation, spindle type, spinning geometry, yarns range, cursors mass, and the presence or absence of balloon limitation rings.
When adopting the spindles we must take care so that the tensions appearing in yarns do not trespass 1/8…1/12 from the yarn breaking stress that can be find in standards for the first quality. Because the yarn breaking frequency would be over the accepted limits (for Unirea spinning mi lls is accepted a yarn breaking frequency of 50 breaks / 1000 spindles h, and for the modern machines, when spindle rotation is 1800-20000 rot/min, this frequency must be under 25 breaks / 1000 spindles h).
The equation of yarn tension in yarn guides zones -cursor, T_0 is as it follows:

$$T_0=f\,(n;\ H;\ \delta;\ G_c;\ Tt_F;\ I_l) \qquad \textbf{(1)}$$

where:

n-spindles rotation, in rot/min;

H-balloon height while spinning, in cm;

δ-the interior diameter of the pipe, in cm;

G_c-cursor`s mass, in g;

Tt_F-yarn`s range, in Tex;

I_l-coefficient that depends by the absence or presence of balloon limitation rings, and has the values 1 and 0.

Balloon’s height, H, depends on spindle type, and the spindle type is chosen function of the distance between spindles.
In case of to high number of revolutions of the spindle, the theoretic production increases, but the real production decreases because of the great number of increase yarn break frequency, and this leads to low yarn quality any break reparation brings in the yarn an irregularity.
By adopting a low number of revolutions, yarns quality will become better but the production will decrease too much.
After calculating yarn tension in the spinning balloon, we must compare the obtained value with the value given in standards for first quality, after that the program continues with two cycles in which certain spindle number of revolution are tested.
If there is a value in the first cycle that imposes the maximum number of revolutions for spindles by the condition referring to high yarn break frequency, the program passes to the following cycle where it’s checked if the previously found value isn’t to small to be satisfied by the second condition about to small theoretical production.
The program ends by editing the optimized value for the number of spindle revolution.

3.3 THE CURSORI PROGRAM

The program allows us to determine cursor’s type and size at the ring spinning machines, in cotton spinning mills.
The determination of cursor’s type is made by passing through a succession of menu’s that include the elements which they depend of:

- Flange type;
- Fibre composition of the yarn that is being realized;
- Yarn’s count range;

- The ring's flange number;
- The ring's flange profile;

By selecting successively all the conditions of the technological variant, eventually it will find a "shape" with all the cursors that are needed.
In the superior part of the "shape" there are presented the recommended cursors for the respective variant, and in the inferior part there are presented the cursors that can be used in case one of the types from the superior part is not at our disposal.
No matter what is the selected technological variant, after editing the cursor type, the p rogram continues to introduce yarns count range to determine the cursor size. The cursors manufacturers (Bracer, Kanai, Rainer+Furst etc.) recommend for the same yarn a range of sizes because the differences between cursors mass are relatively little.
The CURSORI program is connected with the programs TURMFI, PLANFIL, and BAZAFIL to import certain dates, and on to export the cursors size and the type for the determination of spindle number revolutions or for making the technological form inside PLANFIL.

3.4. THE PLANFIL PROGRAM

In the fibre transformation in textile products (yarns, weavings, confections etc.) one must follow these aspects:

- The right choice of the raw material;
- Fabrication technology optimization;
- The continuos control of the work process;
- The quality check of the products;

The PLANFIL program resolves the following problems:

- The choice of the spinning system and of the technological line, function of blend composition, yarn count range, destination and technical endowment;
- The choice to print the technologic line SF_I (i=1;10);
- The assignation of the preliminary spinning plan parameters;
- The calculation of the final spinning plan parameters;
- The choice to list the final and/or the preliminary spinning plan;
- The adoption of certain adjustmen t elements;
- The calculation of the other adjustment elements for the machines and comparing them with the possible ones;
- Editing the "technologic form" that includes all adjustment elements;
- The choice to print the "technologic form".

The PLANFIL program is easy to use because the user doesn't have to know how to use the PARADOX program but only has to type the dates on the keyboard.
To avoid the introduction of wrong dates and there for to obtain wrong results, there are some restrictions in the program according to machines limits. When one introduces other than the possible values an error message is displayed on the screen and is impossible to continue using the program unless the dates are not corrected. For the same reason, in case some values are co mpulsory for some adjustment elements, after a wheel introduction the adoption is made through the program.
For easiest using of the program when adopting some parameters (i.g. on establishing the preliminary spinning plan) on the bottom of the screen reco mmendations are displayed. The access at these determinations is made by typing *F4* and after that the search is made using the arrows ←,↑,→,↓ . Using the same F4 makes the return in the current program. In this case we used a different representation by representing in the same time two tables on the screen and by having the possibility to go from one to another.
Other interesting characteristic is the fact that it can memorize the last variant of spinning plans that was realized.

3.5. THE BAZAFIL DATABASE

The never ending growth of information volume in the cotton fibre processing domain imposes new diversified data bases for the satisfaction of the documentation needs and for exploiting valuable dates for technological processes that will lead to better semi-finished products and products.
The BAZAFIL program resolves the following problems:

- It offers technologic recommendations for computer assisted technologic projection;

- Documentation about the last researches in this domain;
- Informs the users about some problems in cotton yarn preparation.

This program is easy to use because the user doesn't has to know the PARADOX 4.5 program but only to select the domain he whishes by using the arrows (↓and↑) followed by *ENTER.*

The domains included in this database are: Raw materials; Blending receipts; Blends verification; Machines (tools); The preliminary spinning plan; The final spinning plan; Technologic loses; STAS (ISO); Relations between numbering systems of threads; The statistic control of the production; T he Uster statistics 1989; The technical quality control; Technologic recommendations; The cotton market; Cotton in the world (stock exchanges for cotton, colleges, universities, transporters, harbors, the production, the consume, the cotton import and expo rt); Bibliography;

- What's new in the textile machines production;
- What's new in the technological research.

If there are only documentation information, these are presented in "shapes", and after finish one can return in the main menu.

In case some information include only values of some technologic parameters or technologic recommendations, this data base is "linked" with the programs that resolve these problems, and after positioning the cursor on the recommended or wished values, with *F4* one can return to the main menu, and the value brought from the data base is memorized.

The following main aspects can characterize the BAZAFIL database:

- It contains strictly documentation infomations, and elements about raw material ,semifinished and yarns caracteristics;
- It containes tecnologic recomandations nedeed to run the techologic process of transforming cotton and cotton like fibres in yarns;
- It has it's own, original tree that presents a high degree of flexibility and alows an easy navigation through the data base.

4. REFERENCES

1. Rusanovschi, V., Copilu, V. (1978). *The cotton spinning mills projection*. The Technical Print House Bucharest.

2. Barbu, I., Bucevschi, A. (1997). *Cotton spinning mills*. Aurel Vlaicu Univ. Print House Arad.

3. ***"Paradox"-Borlan International Inc. SUA-1993;

4.Rau, P. (1995). Paradox (3.5, 4.0, 4.5 versions) users guide -SAH-PRESS Print House Bucharest.

5. Barbu, I. (1998). *Contributions to the computer assisted technological projection of cotton and cotton like fibers*. Doctorate thesis, Iasi, 1998

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

SEWING THREADS COMPARISON OF SEWABILITY AND TENSILE PROPERTIES AFTER ACCELERATED AGING

P. Pla-Berenguer[1], P. Díaz-García[1], Mª Angeles Bonet-Aracil[1], Ignacio Montava-Seguí[1]
[1] *Departamento de Ingeniería Textil y Papelera (DITEXPA)*
Escuela Politécnica superior de Alcoy, Universidad Politécnica de Valencia
Plaza Ferrandiz y Carbonell s/n, 03801 Alcoy (Alicante)
Corresponding author:Pablo Díaz, pdiazga@txp.upv.es

Abstract: Up to now, the ability of a thread to be sewn is measured in terms of breaking strength, regularity and finesse. However, these quality parameters do not provide information about its Sewability and the mechanical behaviour throughout his life-time as sewing conditions and exposure to climatic agents like high temperature and humidity cause a degradation in threads shown in more or less degree depending on the material it is made. A comparison of properties of threads sewn and aged by accelerated weathering using techniques based on the current regulations and adapted to this study on the most varied raw material threads on the market is discussed in this article.
Key words: Thread, Sewability, aging, weathering, climatic, accelerated, degradation, resistance

1. INTRODUCTION

Industrial sewing threads are essential to verify the final quality of the garment as they establish the link between fabric layers and also facilitate the sewing process. Fabric quality alone does not fulfil all the criteria for production of high quality garments. The conversion of a two-dimensional fabric into a three-dimensional garment involves many other interactions [5] such as selection of a suitable sewing thread, optimization of sewing parameters, ease of conversion of fabric to garment and actual performance of a sewn fabric during the wear of garment [2]. The selection of a sewing thread for a fabric depends on the dimensional and mechanical properties of the fabric and the sewing thread, their compatibility, the sewing process and the end of use of the garment [3]. In recent years, there has been an increasing interest in Sewability of sewing threads and has considerable relevance in today's advanced garment manufacturing processes. Therefore, a methodology for testing threads, capable of providing a quantitative outcome in Sewability line of work was developed by *Diaz, P. et al* [4]. The Sewability of industrial sewing threads was studied and a restrictive testing method was created to evaluate them. Consequently, threads which are able to be sewn properly without breaking or damaging the fabric will achieve a high qualification.
Garments are subjected to mechanical stresses, tensile forces; torsion and shear are the usual mechanical demands to be met. However, external climatic agents such as temperature and humidity are inevitable factors that cause deterioration of industrial sewing threads and allow the occurrence of breakage, wear and crack in them. Its effects on the threads may be sufficient to cause inefficiency in the seams over the life of the product. Sunlight, temperature, moisture, wind, dusts and pollutants are among the main variables or agents of the weather that cause degradation [6]. Due to a synergistic effect, the combined action of the afore mentioned weather components has a higher deterioration power than the sum of damages caused by them singly if they could act one at a time [7]. The influence of environmental factors on the properties of sewing threads and their fibres are examined and comparisons are drawn between their mechanical properties. Tensile tests appeared to be the most versatile method for describing ageing phenomena. Both chemical ageing and physical ageing as well

as local (initial) and global ageing effects are reflected by mechanical properties [8].
For new materials, the background data on their weathering performance is generally not known. While it is preferable to have factual information on the actual long-term outdoor performance of a material, and a reliable prediction of durability, by means of artificial weathering tests, has been recognized as a necessary substitute in most cases for a confident outdoor application of polymeric and natural materials. Within this scope, the complementary approaches to be employed are natural outdoor exposure trials, accelerated outdoor exposure trials or laboratory artificial weathering [7]. Optimizing weathering test methods in this manner, a trade-off arises between the acceleration and confidence. In going from the former method to the latter, the rate of obtaining results increases, but the confidence of reliability of such data also decreases at the same rate [1].
A comparison of properties of threads sewn and aged by accelerated weathering using techniques based on the current regulations and adapted to this study on the most varied raw material threads on the market are discussed in this article.

2. EXPERIMENTAL PART

Sewability testing is performed using the operative procedure described in a previous work [4]. The principle behind the method is to sew fabrics in as many layers as possible without the sewing thread breaking or being modified during the sewing process. The quality of threads is indicated by means of a "code" which identifies the Sewability of the thread used for sewing purposes and correlates it against the number of layers which were sewn. The proposed code consists of a number and two letters which are presented in the following order. Firstly, the letter L or P, which corresponds to the sewing machine used in the trial. If the industrial Pfaff 1183-8/31 BS sewing machine is used, the letter is L. Alternatively, the Adler 267-373 industrial sewing machine is assigned the letter P. Next there is a number, which corresponds to the maximum number of superimposed layers of fabric which it was possible to sew without the thread breaking or stitching errors. Finally, the letter A, B or C represents the division of the fabric layer into three equal areas and it corresponds to the area in which the thread breaks, the first letter being graded the highest seam achieved. If the maximum number of layers which can be sewn together is ten, then the letter R is used and means obtaining the best Sewability.
To perform accelerated artificial climate aging is followed UNE 57092-4:2002 equivalent to ISO 5630-3:1996. The air velocity is (50 ± 25) ml / min and the exposure time of 144 hours. An amendment was made to ensure degradation. These include an increase in temperature to 90 º C and an exposure time to 2540 hours (106 days). 100 meters skeins of polyamide, polyester, core-spun polyester/polyester, core-spun cotton/polyester, cotton and mercerized cotton sewing threads were introduced.
After the aging time, were derived from the climatic chamber and tensile tests were conducted following the standard UNE EN ISO 2062:2010, "Textiles. Yarns from packages. Determination of single-end breaking force and elongation break using a constant rate of extension (CRE) tester". The thread length is 500 mm and test speed 250 m / min.

3. RESULTS AND DISCUSSION

The Sewability of a sewing thread tells the thread's behaviour during the sewing process. Given that the experimental parameters are constant throughout the process and are the same, irrespective of thread composition, threads tested using the same sewing machine can be correlated.
Mercerized cotton thread and non-mercerized cotton threads attain the maximum grade because they are able to sew the maximum number of layers established for the sewing machine in the case of threads with a yarn count of less than 60 TEX. Both Core-Spun polyester/cotton and polyester/polyester threads have the same Sewability, L-7B. Polyester threads show an acceptable Sewability, L-5B. The performance of polyamide thread does not get the results it was expected as it does not withstand the sewing process, showing a deficient sewing capacity. Sewability code does not include the finesse of the thread. Therefore a ratio has to be done in order to compare each thread's Sewability. Table 1 shows the linear mass, Sewability and Sewability ratio for each type of thread as follows. Higher ratio, in cotton and cotton mercerized means a higher Sewability not depending on the linear mass.

Table 1: Sewability of sewing threads

Sewing Thread	Linear mass (tex)	Sewability	Ratio (Sewab/tex)
Cotton	39,70	L-R10	0,25
Cotton mercerized	40,20	L-R10	0,25
C-S polyester-cotton	44,20	L-7B	0,17
C-S polyester-polyester	39,10	L-7B	0,19
Polyester	39,70	L-5B	0,14
Polyamide	47,20	L-1C	0,03

After the accelerated ageing, mechanical properties of threads are tested and the results of the breaking stress can be seen in Table 2. It is preferable to use breaking stress than tensile force as linear mass is included and comparisons can be made.

Table 2: Breaking stress (cN/tex) climate weathering

	Exposure time (days)								
Sewing Thread	**0**	**14**	**31**	**46**	**58**	**78**	**94**	**106**	***LOSS (%)***
Cotton	21,56	19,47	17,42	18,74	15,85	14,08	13,15	12,22	43,32
Cotton mercerized	27,06	26,27	23,54	23,77	22,06	15,58	14,65	13,47	50,22
C-S polyester-cotton	41,65	40,27	36,83	34,21	31,03	27,26	30,45	27,57	33,81
C-S polyester-polyester	66,70	41,89	37,53	35,99	30,41	27,65	25,65	24,13	63,82
Polyester	35,93	32,88	29,67	25,40	30,22	18,48	17,78	15,50	56,86
Polyamide	47,20	47,69	45,40	46,19	45,43	44,02	39,97	36,78	22,08

Artificial climate weathering adversely affects strength properties of threads showing significant losses in even more in threads made by polyester. Losses in cotton are higher than other synthetic fibres due to the different percentage of crystalline and amorphous areas. Polyamide shows less degradation than the rest. But mercerized cotton degraded more than normal cotton because of previous chemical processes such as mercerized.

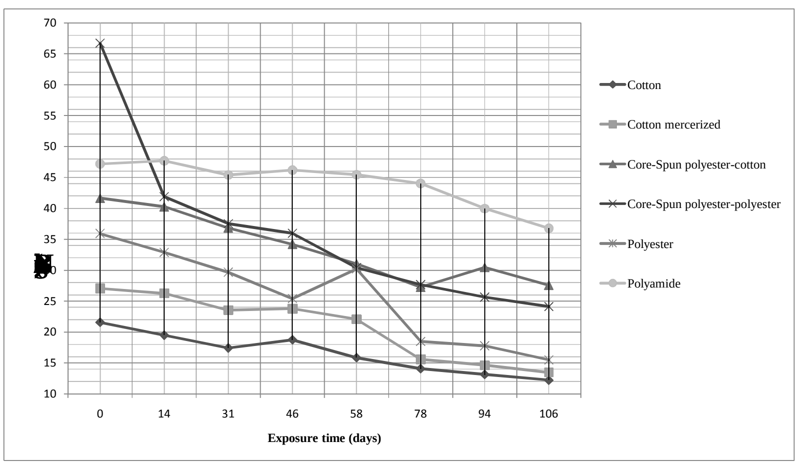


Figure 1: Loss of breaking stress

Once Sewability and mechanical behavior after accelerated ageing is know, threads can be compared and the following points can be noted.

As can be seen from Table 1, polyamide thread achieves the worst qualification in Sewability testing. However it is the less degraded after 106 days of accelerated ageing as Table 2 shows. It means this thread shows good tensile behavior during its life -time, so can be advantageous choice if Sewability can be improved. And it is possible using refrigeration devices and l ow sewing-speed. Nowadays advanced sewing machines are able to set up automatically, detect sewing faults, and self -adjust to required settings although it needs an investment in equipment.
Cotton threads have the best Sewability and conventional degradati on after accelerated ageing. They are the best choice for sewing purposes, they are able to stand high temperatures and tensile efforts but they lose nearly 50% of breaking strength.
Threads made of polyester, core-spun or yarns, are in an intermediate pos ition, as they show an average Sewability and degradation.

4. CONCLUSIONS

Cotton threads show the best sewing performance and they sew the maximum number of layers without breaking or melting but they degrade after accelerated ageing loosing 50% of the breaking stress.
Polyamide thread melts when it is sewn achieving the worst Sewability qualification. However, it is the less degraded after climate weathering so if Sewability can be improved modifying the sewing machine it is a good choice.
Polyester threads have average Sewability and degradation in ageing so they can be used for any purpose once price and quality is known.

5. ACKNOWLEDGEMENT

The authors want to thank the Polytechnic University of Valencia for the financial supported to the project PAID 06-08, ref. 003-639.

6. REFERENCES

1. ATLAS, Atlas Material Testing Tech nology, www.atlas-mts.com .
2. Behera, B.K. Chand, S. (1997). Sewability of denim. *International Journal of Clothing Science and Technology,* Vol.9, No.2, pp. 128-140.
3. Chamberlain, N.H. Seam pucker, its causes and prevention. *Technological Report,* No. 10, Clothing Institute.
4. Diaz, P. Pla, P. (2009). Assessment of the Sewability of the industrial sewing threads. *Innovative solutions for sustainable development of t extiles industry.* International Scientific Conference. Annals of the Oradea University. Fascicle of Textile -Leatherwork.
5. Dureja, S. (1992). Three dimensional engineering techniques. *Clothline.*
6. Greathouse G. A., Wessel C. J. E. (1954). Deterioration of Materials, *Reinhold Publ. Corp.*
7. Ribeiro M.C.S.. (2009). Effect of natural and artificial weathering on the long -term flexural performance of polymer mortars, *Mechanics of Composite Materials,* Vol. 45, No. 5, pp. 515-526.
8. Oreski, G., G. M. Wallner. (2009). Ageing characterization of commercial ethylene copolymer greenhouse films by analytical and mechanical methods. *Biosystems Engineering*, Vol.103, No.4, pp. 489-496.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE DESIGN AND ITS HISTORY

Demetra Lăcrămioara Bordeianu

Technical University "Gh. Asachi", Iasi, Romania

Demetra Lăcrămioara Bordeianu, E-mail address: dlb@tex.tuiasi.ro

Abstract: The history of design is interesting even for non-specialists, because it shows the diversity of the objects studied by designers, and also their opinions on the purpose of objects in the society. In this paper are exposed the principals five ages of it.
Key words: Arts and Crafts, Art nouveau, Art Deco, Bauhaus

1. INTRODUCTION

Although the importance and the necessity of design have imposed only with the industrial revolution age, it is not a fashion, or a recent discovery.
Socrates, 2400 years ago, underlined the importance of the connection between the function and shape of the objects saying that: "All things that serve man are in the same time good and beautiful as long as they are useful. A chimney can be beautiful? Yes, if it corresponds to its purpose, in the same way as a golden bracelet is ugly if it does not correspond to its destination." Marcus Vitruvius (80 – 15 A.D.) defines architecture, in the same time, as an alliance between solidity, coziness and beauty. In his viewpoint, the architecture is an imitation of nature. People build houses, like birds make their nests or bees honeycombs to have a shelter if needed. Actually, the entire artisanal art and the popular art practiced intuitively an "avant la lettre"design.
Modern history of design starts around 1900 and it is divided by Brigitte Borja de Mozota, a pioneer of design management, in 5 ages that we are going to talk about successively.

1) Forerunners (1850 – 1907)
The „pre-history" of design has its roots in Britain, in the time of the appearance of series production, a period in which the concept and manufacturing of objects belonged to a single person – the artisan.
Design was born, virtually, with the machine, which determined the passing from the manufacturing production to an industrial production, and, more precisely, the leap from sole pieces and small series to larger series. The conception work cannot outgo the project phase, model or sole piece, it ends where the machine starts its work, that of proper fabrication of objects, identical and in unlimited number.
Among the representatives of this age one can distinguish Joseph Paxton and Michael Thonet.

Joseph Paxton (1801 – 1865), an english horticulturist, whose project for the architecture of the Crystal Palace in London (Figure 1) surpassed classical projects, due to its modernity and to the type of modular construction, made from glass and steel. The building has a surface of 98.000m and was build in only 6 months. The age of the big expositional halls begins. The industrial exibition in 1851, where he was present, was named „The biggest exibition of industrial works of all times" and it accentuates one of the most important events in the evolution of esthetics inside the industry.

Michael Thonet (1796 — 1871), a pioneer in the serial furniture production, established a new method of obtaining curved furniture, through a transfer of technology, from the techniqu es used by coopers and marine carpenters. It meant softening, warming and bending the beech wood using metallic patterns.
Its first success was the stratified wood Boppard chair, made in 1836, a chair that it is used nowadays. (Figure 2a). A short while afterwards, Thonet and his sons have produced the furniture Bentwood, with unprecedented quality standards.

Arts and Crafts (1850 – 1900)
The craftsmen of this period are William Morris and John Ruskin.
William Morris (1834 – 1896), english designer interested in printed textile materials, embroideries, upholsteries, stained glass and furniture. In his fight against the break betwe en pruduction and consumption, William Morris guides the creation towards a coming back to handicrafts. The goods produced have a higher price, but their success inspires the craftsmen to modify their own designs. William Morris considered that the industry annu lled the artisanal object, he saw in every industrial mechanic production „a necessary evil", a form of „dehumanizing w ork and its products".
John Ruskin (1819 – 1860), english art critic, he is the founder of the first association of art isans „Guild of Saint George", in 1872. He was inspired by the desire to avoid a certain moral downfall of the society, he underlined the importance of the medieval style of „arts and crafts", that of coming back to the simplicity of the old days craft. He appreciated the gothic style because he saw in it a respect for nature and its natural forms; an unconstrained expression of artisans, as well as the organic relationship between the worker and corporation, between the worker and the community, the worker and the natural environment, but also between the worker and the Divinity.
He fiercely disapproved fiercely industrialisation, seen as the biggest sin of modern times, militating for the beauty and the benefit of handcrafting.
Raising against the ugly anachronical industrial forms which invaded the modern world, they pleaded against the industrial production, for a revitalisation of arti sanal production. Paradoxically, no history of design cannot avoid to remember this two opponents of industry. The opposition between industry and art seemed lost, in the last century.

Art nouveau (1890 – 1905)
The premises of the cognisant design can be found around 1900 during the artistic movement that constitutes the preface for the entire modern art and architecture. The trends named : „Art nouveau" in France and Belgium, "Jugendstil" in Germany, "Secession" in Austria, "Style liberty" in Italy searched the modern synthesis of arts, gave birth to publicitary graphics and posters (essential branch of the visual communication design), promoted the utility of the industrial systems in architecture and applied arts, underlined the rational structure of ob jects and the expression of the creation process directly into plastic values.
The basis of this current have been set up by **Henry Van der Velde** (1863 — 1957), belgian architect and designer who, surpassing the preconceived ideas of Morris şi Ruskin regar ding the dehumanized characters of the industrial production, identifies the utility and function with beauty, stipulating a „rational construction of the object, a uncompromised logic at the usage of the materials" and recommends to the planners „ to succ eed in proudly accentuating the process of fabrication."

Paul Souriau (1852 – 1925), in his work from 1904 „ The rational beauty" states that „a logic of beauty implies a stimulating fusion between beauty and usefulness, rational beauty being obtained when the form becomes the manifest expression of its function", an idea that stands at the basis of the modern functionalism and that is meant to become „form follows function". And only in the case of the industrial production, of cars, of tools, of furnitu re one can frequently find examp les of perfect and exact adjustment of the objects to the functions for which they have been intended. He also delimited a first configuration of the nowadays industrial design.
The art of the 90's, throughout its well-set goals had big contributions to the domain of the objects which create the contemporary environment. According to the synthesis idea of arts, an attempt was made for a first stylistic coherent organization of the ambient, in a new, original, contemporary, un ited light comprising : clothing fashion, painting, graphics, plastic and industrial arts and ballet. The artists of the period were versatile creators. Henry Van der Velde was an ideo logue, professor at the Eeimar School of Applied Arts (forerunner of th e Bauhaus), he created easel painting, posters, advertisement graphic, upholstery, tapestry, cutlery, table sets, clothing, furniture and in architecture : theatres, schools, villas, factories, museums, shops and later on, seafaring ships and wagons.

Art Deco (1905 - 1920) is a current long considered as an extension of the Art Nouveau Movement. It imposed itself with the Decorative Art Exhibition in Paris in 1925 and soon spread in England and United States of America. It was described as a synthesis between the geometry-shape vision and the ornamentals Bauhaus one, encountered mostly in architecture, furniture, textile, book graphic.
Deutscher Werkbund is a professional association founded in 1907 in Germany by Hermann Multhesius (also knows as „industrial spy" or „cultural ambassador" between England and Germany – former attaché of the German Embassy in London, where he got acquainted with architecture and english design, dominated by the "arts and crafts" movement).
Back in the country, he started an intense activity for the elevation of the artistic quality of the industrial products. He encountered resistance from the industrialists, artists and architects and became determined to start a professional organization Bauhaus which can comprise artists, artisans, architects, industrial craftsmen, representatives of industrialists and shop keepers. The organization had a study center which elaborated new methods and blueprints, suggestions for the industry. At the same time, the idea of hiring permanent consultants in the design field emerged.
The main idea was that of combining the beautiful with the useful, creating decorative pieces (furniture and other various decorative objects), as innovative and creative in shape and in materials, capable of being produced at an industrial scale, becoming more accessible for the beauty consumers.
The Deutscher Werkbund current is the connection bridge between Art Nouveau and the modern currents, almost futuristic after 1950.
Peter Behrens (1868 - 1940), German architect and designer, a genuine innovator in various domains of architecture and the XX century design.
In 1907 the Electricity German society AEG (Allgemeine Elektricitäts-Gessellschaft) hired Behrens its artistic consultant. Having this status, he created a totally different personality of the corporation, creating the logo, the publicity and the product line of the company, with a certain design which made Behrens the first industrial designer in history.
The first period in the activity of the Werkbund ended gloriously and dramatically in 1914 with the Industrial Art Exhibition in Köln, prematurely closed once the First World War started. She will be the spring from which the BAUHAUS will develop in the period between wars. In this period appears the first systematic study, clearly-stated and well-documented, published in 1934 by Herbert Red (1893 - 1964), named Art and Industry, later on completed by another, Future of Industrial Design, 1946.
Deutscher Werkbund encouraged the appearance of the first English organization of industrial design, entitled Design and Industries Association in 1995, the goal of the organization being „finding a balance between a good design and the effectiveness of industry".

2) Early functionalism (1910 – 1930)

The real birth of design was in 1919, in Germany, in Weimar, when Walter Gropius founded the Bauhaus School, merging old schools of arts and crafts "Deuscher Werkbund" with the Plastic Arts Institute.
The students of this school were interdisciplinary educated as architects, designers, photographs, painters, furniture and textile creators, etc. They were encouraged to use new materials, specific to mass production, having as final product of their activity buildings, mostly industrial, entirely built.
The declared purpose of Walter Gropius was the complete delivery of the building, from the initial architectural design to furnishing the rooms and their decoration. Joining their efforts, the architects, painters, pattern creators have all created the projects of some buildings, today famous, of some complete industrial installations or of some furniture projects, illuminating objects, dinner sets, textile and tapestry, which accommodate both the usage criteria and the demands of the three "universal laws" of artisanal ethos : harmony, balance and economy.
As main criteria of the expressive shape the following were accepted: simplicity, clarity and coherence, and, as principles of the designs: originality. The processing was adapted to the materials and the economy of means.
Bauhaus can be considered as the first design institute in the world in which masters as Walter Gropius and Johannes Itten formed a creative elite, having as its motto the fact that: the taste of a small number of persons must be imposed on a larger number.
The school had a big influence on the world-wide architecture and design during its existence, and especially after its abolishment by the Nazi in 1934, when there was a massive emigration of its teachers and students. The main beneficiary were the United States, where members of the BAUHAUS school created an entire network of design and architecture schools: Mohely-Nagy in

Chicago, Albers in Jale University, Gropius and Breuer at Harvard, Mies Van der Rohe at theTehnology Institute in Chicago, Kepes at the Mass achussetts Institute of Tehnology, Cambrige, etc. Besides the school, Bauhaus is also a very influent artistic current in architecture, plastic arts, furniture design, and interior decorations of the XX century. Both significations of the term Bauhaus are related to Walter Gropius, who had a very clear image on the role of design, evan before the war. In 1916 he wrote : „As long as the artist's collaboration (in industry) was not considered as necessary, the product of the machine was meant to be a simple surrogate, cheaper, of the artisanal product (…).Its collaboration (of the artist) is not a luxury, nor a voluntary supplement, but she must become a component part, indispensable in the assemblage of the modern industrial production".

3) The expansion of design (1930 – 1945)

In United States the design appeares in 1930, as an indirect consequence of the economic crisis in 1929. In the context of the crisis economy the producers understand the important role of the products shape for the commercial succes. In this period a large varirety of objects have acquired a new shape in the spirit of the industrial esthetics, prouving, through the big commercial success, the economic value of the design, which underlined the slogan of the French engineer Raymond Loew y, settled in United States in 1919 : "le laideur se vend mal", „the ugly sells badly", this being the theme of his book „Never leave will enough alone", considered to be at the origin of the industrial appearance.

The biggest success which made Loewy a legend was the 1940 "Lucky Strike" cigarette business. The firm encountered great difficulty in opening the cigarettes and the business turnover dropped drastically. The management of the firm asked Loewy to come up with a new packaging and according to the American custom, bets were set on the result of the action. The new wrapper, elegant and sobre, re-designed according to the rules of esthetics eliminated the useless data regarding the composition of tabacco, their place being taken by the initials of the firm, in a successful new shape. The simplicity and graphic elegance, the harmonious colors distinguished the package among other similar products. (The package kept the same shape until nowadays).

Although United States remain as the most active area of the design of the fourth decade, there are also European contributions. Germany, who had a good position until the Hitlerist terror in 1933 stagnates. Important contributions appeared in Italy through biennial exhibitions in Milano, the Domus magazine, the creations of the Olivetti firm – typing and calculus machines, Lancia automobiles, furniture, etc. In France, it is important to mention the activity of Jaques Vienot.

In 1927, Jaques Vienot organises the first decoration house in France, bringing togeth er 3 divisions : decoration, installations and furniture. This was the first industrial esthetics office, in its conception stage. In his work "La republique des arts" – „ The republic of art"(1940) he establishes an industrial esthetics program, which stands at the basis of the future „International Association of Industrial Esthetics - (1957) (ICSID – "International Council of Societies Industrial Design").

4) Modern functionalism –Rational Design (1950 – 1975)

In this period the design juxtaposes the different ways of practicing this occupation. The profession becomes international and more organized; „it is the age of intelligent cars", characterized by the development of atomic energy, high-performance computers, mechanization and robotisation and spatial exploration.

The product's design is an answer for those who estimate that using a neo -academic esthetics is not justified for the consumers goods, because one has to search a transit esthetics and not an eternal one, based on the symbols of the period.

After 1950 there is the international confrontation between the rational design and the coming up of the free shapes in design.

Graphic design, in this period, had developed mostly due to some prestigious international events, like the Olympic games, which stimulated the creativity of pictographs. Designers like Masura Katzumie, who created pictographs for the Olympic games in Tokyo, in 1964 and Otl Aicher, with the set of pictographs for the Olympic games in Munch en, 1972 are worth being mentioned.

5) Post modernism – Design after 1975 and in the future

The product's design invades in this period the domains of creation through works of great variety, for example in furniture. A group of Italian designers come up with the idea of the loss of functional dogma, often ordinary of the furniture objects. The product's design continues to have its successful representatives, among which :

•Andree Putman, French designer known for his minimalism and for the avant -gardism of the interior design, which brings back the patters of the great masters;

•Giorgetto Giugiaro, automobile Italian designer, with contributions in the design of the brands : Audi 80, BMW, Alfa Romeo, Cadillac, Daewoo, etc.;
•Philippe Starck, French designer, probable one of the most importa nt designer of the new current. The design and patters go from extraordinary interior patters (in 1982 he created inte rior designs for private apartments of the French president), to products and consumers goods, like teeth brushes, chairs and even houses. His most recent and important models are : an optical mouse for Microsoft, yachts, and even a new package for a beer company.
•Luigi Colani, German designer, with his drawings and patters having as main characteristics organic shapes, which he names as „biodynamics", superior in ergonomics to traditional drawings and patterns. „The Earth is round, all celestial bodies are round and travel on round, elliptic orbits. I plan to continue Galileo Galilei's philosophy : my world is also round", said Colani.
In civilised countries, the acknowledgement of design is daily, it is being considered as an act ivity connecting the user/consumer and the technical creativity.

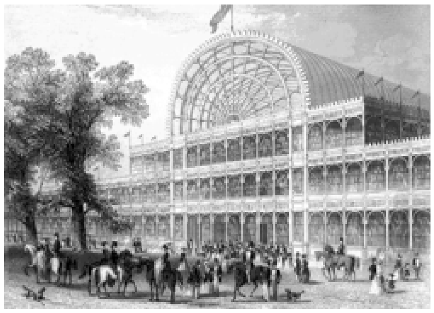


Figure 1: The original facade of the Crystal Palace in London

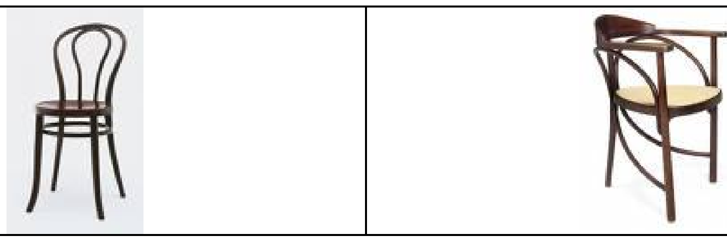


Figure 2: " Thonet Chairs"

Figure 3: Works of Henry Van der Velde

Figure 4: Accomplishments of the Art Deco period
a –Bottle for Coca – Cola created in 1915 by Earl R. Dean;
b – Electric recipient forboiling water, created by Peter Behrens for AEG;
c – Clock designed in 1909, for AEG, by Peter Behrens .

2. REFERENCES

1. Moles A., ş.a. *Les objects*, Ed. Seuil, Paris, 1969
2. Huisman D., Patrix G. *L'estetiquie industrielle*, Ed. Press Universitaires de France, Paris, 1965
3. *** Dicţionar Robert
4. Brigitte Borja de Mozota *Design et management,* Les editions d'organisation, Paris, 1990
5. *** Dicţionar de artă, Ed. Meridiane, Bucureşti, 1995

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

COLOUR DIFFERENCES ON DYEING WITH RUBIA CORDIFOLIA EXTRACTIONS

E. Bou, M. Bonet, P.Monllor, I. Montava, J. Gisbert

[1] *Universidad Politécnica de Valencia, Alcoy (Alicante), SPAIN*

Corresponding author: M. Bonet, maboar@txp.upv.es

Abstract: This work is focused on studding the influence of the extraction procedure in the colour which the cotton fibre gets when is dyed. Cotton fibres were dyed with two different kinds of extraction, one of them was made with alcohol and the other was with water. The two kinds of rubia tintorum extractions were supplied from the company Químicas del Vinalopó in Spain. A Minolta spectr ophotometer was used in order to analyse the cotton fabrics.
Key words: cotton, natural dye, colour differences, extraction.

1. INTRODUCTION

Rubia tinctorum is an atraquinonic dye from Rubiaceae family. Rubia plants contain more than 60 anthraquinone derivatives which have been used intextile fiel for dyeing since ancient times. Nowadays, synthetic derivatives are more often used.[1]
Yet, a wide interest has been increasing about natural dyes in recent decades. Mainly it is due to the importance given to exploiting renewable resources with minimum pollution to the environment in order to meet emissions regulations imposed by many countries.
Some tribes mainly the Monpas, Apatanis, Nyishis and Adis, respectively, of West Kameng, Tawang, Lower Subansiri and East and West Siang districts of Arunachal Pradesh have been engaged in extraction, processing and preparation of dyes using barks, leaves, fruits and roots of the plants from time immemorial. Apatani tribe who have traditionally settled in seven vill ages in the Ziro valley of Lower Subansiri district of Arunachal Pradesh, use Rubia cordifolia extensively. Some work has been developed to demonstrate that those dyes can be produced in large scale and could be prepeared commercially with reasonable price s. [2]
The aim of this work is to study the influence of the extraction procedure in the colour the cotton fibre gets when dyed. Cotton fibres were dyed with two different kinds of extraction and evaluated by Minlta spectophotometre.

2. EXPERIMENTAL

2.1 Materials

A fabric 50% cotton 50% flax was used. Fabric characterization was carried out applying standard UNE EN 12127 to evaluate mass per unit area. And it was 210 g/m ^{2}.

Two kinds of rubia tintorum extractions supplied from the company Químicas d el Vinalopó in Spain were used. One of them was made with alcohol ant the other was with water.

2.2 Dyeing

The extractions were used to dye cotton or wool fabrics as we show in the next table

Table 1: Dyeing procedure characterization

SAMPLE	CODE	BATH RATIO	TEMPERATURE (º C)	CONCENTRATION % owf	AUXILIARIES	TIME (min.)
COTTON	R1	1/40	90	1500	Na_2CO_3 , Na_2SO_4	30
	R2	1/40	90	4000	Na_2CO_3 , Na_2SO_4	30
	R3	1/40	90	1500	Na_2CO_3 , Na_2SO_4	30
	R4	1/40	90	1500	Na_2CO_3 , Na_2SO_4	30
WOOL	R1	1/40	90	1500	CH_3COOH	30
	R3	1/40	90	1500	CH_3COOH	30
	R4	1/40	90	1500	CH_3COOH	30

R2 is only used in cotton fabric because it has more quantity than others.

2.4 Instrumental techniques

In order to compare objectively samples color an spectrophotomer MINOLTA CM -3600d. was used, in the conditions that standards UNE-EN ISO 105 J01, J02, J03 said.

3. RESULTS AND DISCUSSION

3.1. Cellulosic fibres

Reflectance spectrum for every sample is shown in figure 1:

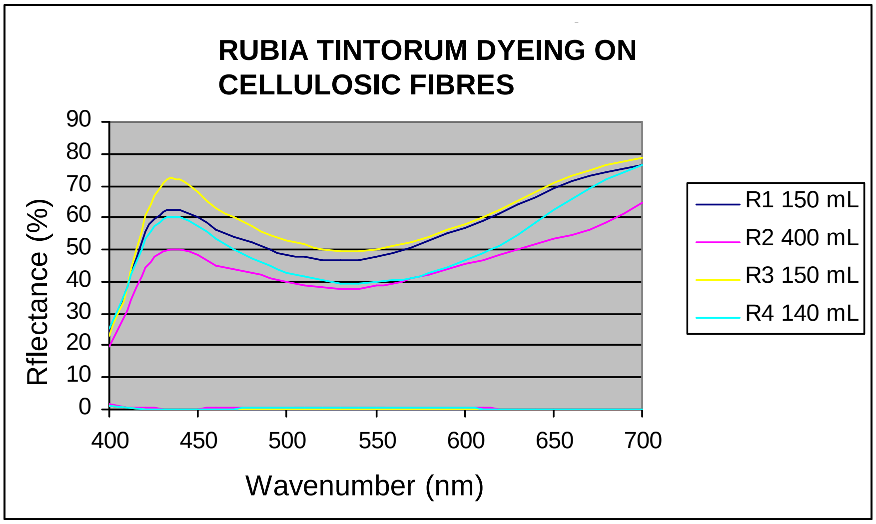


Figure 1: Reflectance on cotton dyed fabrics.

We can observe parallel curves but with different reflectance scale, what means that more colour i s on the fabric when the reflectance is lower.
If we analyze results from chromatic values we can observe results in table 2, in order to determine differences of colour we take as a reference the sample R1.

Table 2: Dyed cellulose colorimétric values.

TINTURAS SOBRE TEJIDOS DE FIBRAS CELULÓSICAS (cotton-flax)						
rubia tintorum	**L***	**a***	**b***	**DL***	**Da***	**Db***
R1 150mL	77,0562	11,1707	-5,1158	--	--	--
R2 400mL	70,5739	9,2522	-4,815	-6,4823	-1,9185	0,3008
R3 150 mL	78,5976	10,7796	-8,8778	1,5414	-0,391	-3,762
R4 150mL Alcohol	72,0148	12,1808	-10,947	-5,0414	1,0101	-5,8312

We can observe that sample R2 which contains more dye concentration shows the lower brightness (L*) values as it was supposed to be. Nevertheless, R4 which shows similar values to R2 is dyed with the same concentration as R1. Thus, can be assigned to the alcohol presence in the extraction procedure.
When we study re we can appreciate that L* value (darkness/lightness) decreases when more fibres are in sample making it darkness. When we study b* values (yellowness/blueness) it indicates that more blue colour is obtained in R4 what means that alcohol presence moves it towards blue colour. On the other hand a* values are similar what means that redness /greenness is more or lest con stant for all the treated samples.

4. CONCLUSIONS

In this work we have dyed with some natural dyes from rubia tintorum, and we dyed some cellulosic fibres as a standard recipe. We could observe some reflectance differences which were expected on the sample with higher concentration but not in the others whose dye concentration was the same.
Moreover, we could observe some differences between the procedure used in the dye extraction. Application procedure is an important factor to consider in dyeing process, but we have demonstrated in that study that the way a natural dye is obtained can influence the results we obtain. We showed how the sample dyed with alcohol presented more intensity when dyed at the same concentration that the one extracted with water. As far as we could observe, alcohol extraction deserves more or less the same colorimetric values as the one with higher concentration. Thus implies that extraction proc edure should be studied in order to save dye in dyeing process.
Furthermore, if we take into account environmental considerations, dye saving should be considered, although it should be studied consideration dyeing extraction process. We mean that dyeing can be more respectful with environment, but in case alcohol extraction does not pollute more than water one.

5. AKNOWLEDGEMENTS

The authors want to thank to the company Químicas del Vinalopó in Spain the samples from Rubia.

6. REFERENCES

1. N. Orbán, I. Boldizsar, Z. Szucs, B. Dános. Influence of different elicitors on the synthesis of anthraquinone derivatives in Rubia tinctorum L. cell suspension cultures. Dyes and pigments 77.2008.249-257
2. P. S. Vankar, R. Shanker, D. Mahanta, S. C. Tiwari. Ecofriencçdly sonicator dyeing of cotton with Rubia cordifolia Linn. Using biomordant. Dyes and pigments 76.2008.207 -212

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

TRADITIONAL EMBROIDERY EMPLOYMENT IN MODERN FASHION DESIGN

Carp Mihaela

Faculty of Textile and Leather Industrial Management "Gh.Asachi" Iasi

e-mail: mcarp@tex.tuiasi.com

Abstract: Romanian embroideries and sewing points are a form of artistic manifestation recognized as being elements of a distinguished importance in cultural traditions' preservation and are nowadays conserved in national art patrimony. This project presents the technologies and work procedures for women clothing products realization, wanting to contribute in the future for the throttling of the strictly commercial fashion costumes' addiction, worn as an uniform or lacking the necessary comfort.
Keywords: creative fashion design, hand embroidery mechanical embroideries, textile art

1. INTRODUCTION

The embroidery, utilized since ancient times, actually is a form of art with origins from China, 4500 years old and with a astonishing evolution in the course of history (there have been embroideries discovered in South America dated 2500 years ago).
This art form was included in the haute-couture techniques category because of its unprecedented and complicated realization methods. The employed materials (gold and silver filament, silk etc) and the long working time spent for the embroidery realization have both induced a high price for the embroidered products placing them in the luxury goods category.
The flourish of the decorative arts with the help of the church has facilitated the emergence of craftsman centers and new techniques of embroidery realization. Christianity, through its spirit and the relations between abbacies of the same order have facilitated the spread of techniques and models of different decorative fields (lace and embroidery realization).
Present designers have employed the embroidery in their collections by modifying the material surface aesthetics (e.g. Christian Dior, Nina Ricci, Yves Saint Laurent), though the first designer to utilize embroidery in his creations was Charles Frederick Worth, the ceremony clothes creator of Eugenia empress.
The first embroidery machine was certificated in 1923 and it was manually operated with a sewing speed of 200 skews/ minute.
In 1980, Wilcom made the first digital graphical system for embroidery.
From a structural point of view, the embroidery machines can be categorized as: modified knob machines that can execute metric embroideries, classic sewing knob machines with 1 to 12 multiple color needles and threads, with horizontal embroidery surface and loom fastening of the textile material.
These can be classified by their realization process: white or colored embroidery, contoured embroidery, applied, plain, emphasized, curly or cut out. The examples from diagrams no. 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, represent traditional sewing points, employed throughout the manual embroidery history.

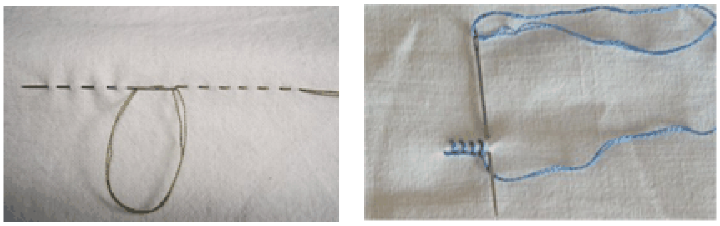
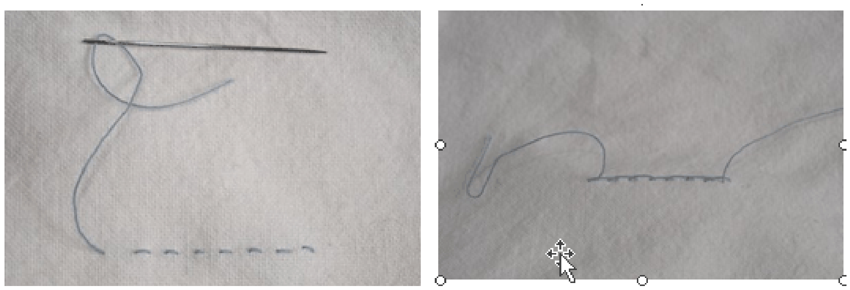


Figure. 1. 1: Before-the-needle sewing (successive steps), the festoon



Behind-the-needle sewing (front / back)

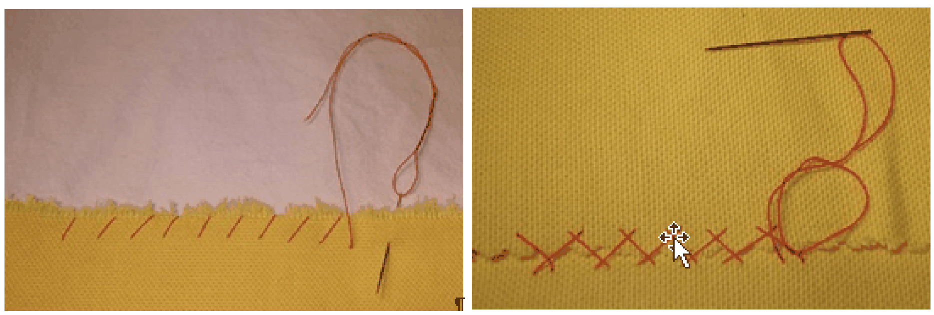


Figure. 1.3: Manual hemstitch, assembly of materials by cross sewing

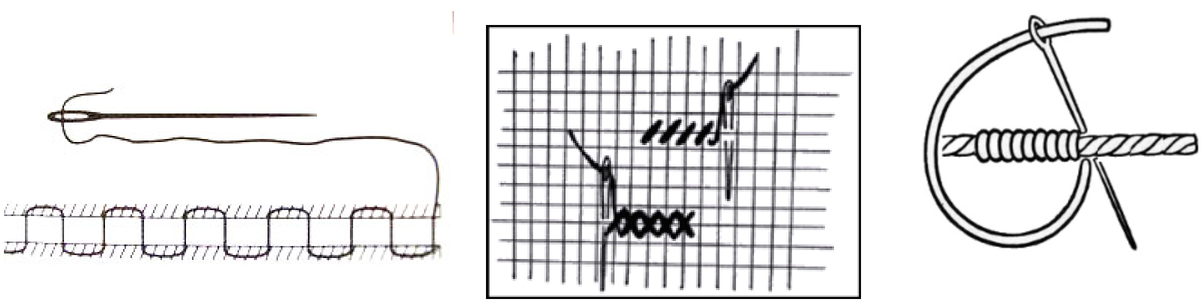


Figure. 1.4: Manual quilt point, simple cross, c ontoured embroidery with effect thread

Embroidery can be used and functional role to highlight and give extra strength seams on certain apparel products, example: pockets, collars, cuffs etc.

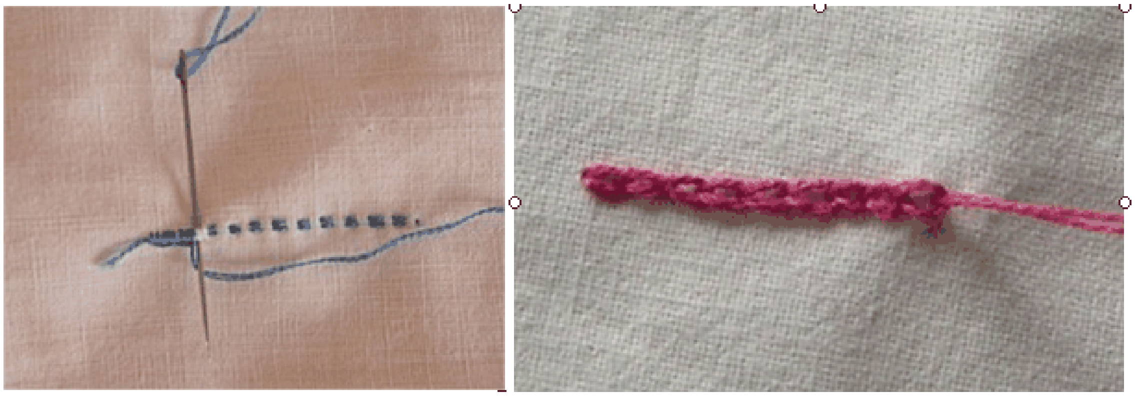


Figure. 1.5: "Ground pine" embroidery, classic emphasized embroidery, simple thread chain

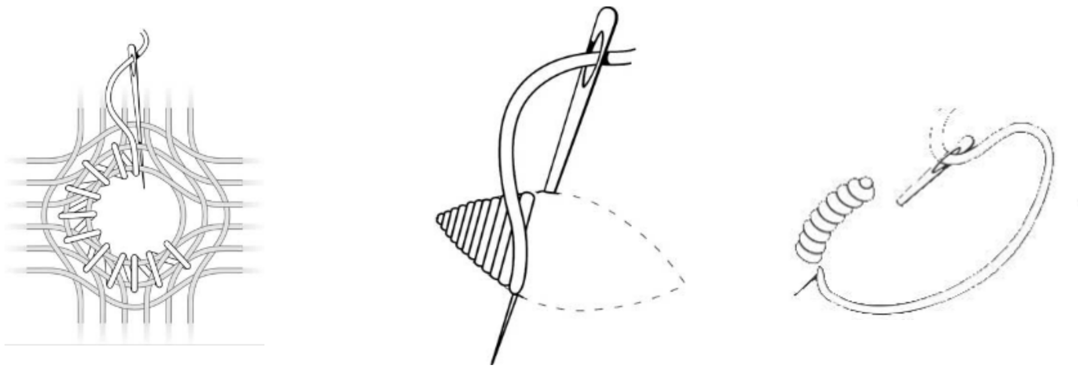


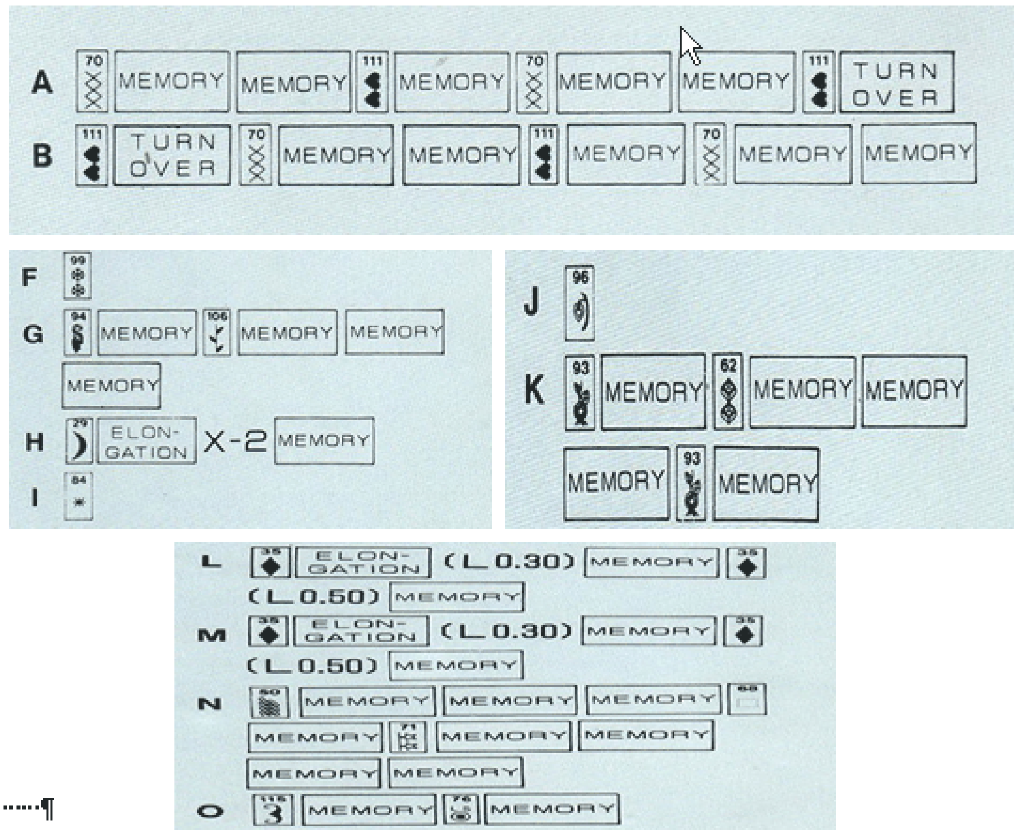
Figure . 1.6: Artistic embroidery, dashed embroidery, "node" point embroidery

Figure. 1.7: Flat artistic embroidery

However, the most utilized is the flat artistic embroidery, diagram no. 1.7, where the embroidered surface is completely filled through the sewing steps. At the same time, spangles, beads, laces or ribbons can be applied.

Nowadays, the mechanical embroideries are superior to other methods of surface and textile product enrichment, given the fact that they are more lasting when it comes to washing, confer a unique aspect to the product, a distinguished image through their employment as personalization process of clothing and textile material as in the diagram no. 2 and 2.1, where a wide scope of mechanical embroideries and their programs are illustrated.

Figure.2. Mechanical embroidery



……¶

Figure. 2.1: The mechanical embroideries programming of the semiauto matic sewing machines

The sewing machines that make the zigzag sewing, by modifying the amplitude of the sewing step, the sewing ratio and the disposition of the sewing steps, are mostly utilized in the aesthetic aspect amelioration process of the textile materials and products, in the realization of the monograms, badges, applied embroideries that have compositional elements which can be made freely, then implemented for a distinguished effect. The creation of the models can be made from drawings, initial sketches and then there is the choice of materials, threads and colors.

2. APPLICATIONS ON PERSONAL PRODUCTS AND ACHIEVEMENTS

The samples, techniques and fashion products presented in this project are personally made with a sewing and embroidery machin e, Memory Craft 8000 - which has multiple functionalities - and are illustrating types of mechanical embroidery on fashion products utilized together with manual embroidery and applied embroidery on linen materials combined with cotton lace.

This has been highlighted in this project through the personal examples that will be described in the following diagrams - number 3 and 4 - where unique products' details can be remarked.

.

Figure. 3: Embroidery deployment in the sleeve area of the product

Decorative ribbons and manually crocheted floral motives have been use in the making process of the first product, applied on the sleeve and the front of the embroidered blouse, bringing extra originality to the fashion product.

Initially, white transversal laces made out of non-conventional material have been applied with the zigzag sewing, no border processing of the semiautomatic embroidery machine.

In the second stage, various white macramé thread flowers have been freely applied, manually. The sleeve and product borders have been manually finished with the crochet.

Figure. 4. Embroidered blouse and skirt made with the semiautomatic machine and brushed up with the crochet

The second product was made with an extra curl up of the material in the sleeve area and by alternating the free zones with the embroidery area, an aesthetic enrichment of the material has been achieved.

The curl up was made freely by manual movement of the material in the mechanical sewing machine, along with the embroidery, by alternating the empty spaces with the floral motives.

A narrow seam was executed on the lower borders, sleeves and cleavage, sewed manually, necessary for the finishing area, as well as for the preparation of the decorative embroidery made with the crochet by "tootsie" embroidery point.

These are executed in "chain" stitches, the starting point in crocheted model and it's made like this: the crochet thread is braided several times on the left hand finger and at the end it forms a loop so the thread passes through from right to left while holding the loop between the index and middle finger and so the first chain stitch is created. The next stitch will be made just the same and repeating this process the needed number of stitches will be reached.

The embroideries on the sleeve are directly applied on the transversal ribbons with white thread and then the respective flowers will be embroidered stitch by stitch.

In the end, the processed surfaces are ironed with steam and a whitened calico, preferably in the thread direction, avoiding the skewing of the product.

For the realization of the second fashion product, the following materials are needed:

linen as the base material for the embroidered blouse, macramé thread 40/6 for the manually crocheted models, white thread for tacking the sleeve applications, crochet for macramé flowers creation (no. 10 - 12, preferably full metal) - procured from the retail market.
The Memory Craft 8000 sewing and embroidery machine was utilized for both the confection of the embroidered blouse and the creation of zigzag embroidered decorations for the application of the decorative ribbons on the sleeve.

3. CONCLUSIONS

In the traditional descriptions, the embroidery represents the emphasized sewing by specific compositions with an aesthetic role of certain surfaces decoration highlighted by documentation and illustrated by personal fashion products.
International tendencies in the fashion industry always dictate the embroidery in the fashion collections, so it permanently evolves as technological creation and realization.
In the present stage, there are multiple possibilities to replace the manual embroideries with mechanical ones because of the continuous technological development. The prototype products presented in the project have a high level of difficulty when it comes to their technological realization that implied mechanical and industrial embroideries, combinations of linen, cotton lace and applied or manual embroideries. The workshops produce embroideries at industrial circulation and many colors. Any image or drawing can be converted to embroidery through the programming of machines, so the ones that are part of this fascinating and boosted towards the art ranks field, will always have the creative freedom.

4. REFERENCES

1. Transdanubia, N.(1979). *Contemporary traditional ornaments*, Meridians Publishing, Bucharest,
2. Danube, N. (1986). *Needle craft and art*, Technical Publishing House, Bucharest.
3. Hasegan, M. (2005). Short History of tapestries and aesthetic implications of textiles" contemporary "Artes Publishing.
4. Mitu, S. Mitu, M., *Fundamentals of textile clothing technology, performance*, Iasi, 2005, vol.1, 2.
5. Papaghiuc, V., Cretu, M. (2007). Techniques for refining textile surfaces by sewing" Performance Publishing.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

ALGORITMS DESIGN OF THE FILTERING WOVEN FABRICS WITH SIMPLE STRUCTURE

I.Cioară[1], L.Cioară[1]

[1] *Technical University Gheorghe Asachi, Iassy, Roumania*

Corresponding author: Cioară Ioan, icioara@tex.tuiasi.ro

Abstract: The paper defines the structural and functional elements that are specific to the filtering woven fabrics, which have a structure that is simple, balanced and unbalanced in count and density. In this cas, for the surface filtering open pore filtration are used. The woven filtering media are products determined by s tructure and properties in conformity with part icularity of the process they function in. The indices of appraisingthe functionality characteristics of the filtering media are the surface indices, that is: the pore side and ar ea, theactive filtering surface and the filter fineness. For designing the fi ltering woven fabrics having a simple structure were elaborated five algorithms, which can be differentially applied depending on the initially introduced elements. A computer - assisted calculation programme was elaborated, which can be used for designing , redesigning or identifying the parameters that are specific to the filtering woven fabrics made as simple structures.
Key words: filter, woven fabrics, design, algorithm of design, the filtering process, pore side

1. INTRODUCTION

The woven textile materials meant for filter manufacturing are characterized by a determined functionality, and the value relationship of structure – properties - usage represents a criterion of designing and selecting these in a manner that corresponds to their destination (1,2,3,4).
The woven filtering media are products that can be differentiated by structure and properties in close conformity with the requirements and peculiarities of the process they function in. Necessarily, the filter structure is associated with the pr inciple by which the separation of the particles from the blend takes place (surface filtering or depth filtering).
In establishing the desinging algorithms, one had in view the degree of structure conformity with thefiltering principle according to which the process goes on and the technical dimensions by way of which one canappraise the carrying out of the filtering medium functions.
For the surface filtering, open pore filtration media are used. The open pore woven filters are made of simple woven fabrics having fundamental or derived, balanced weaves. In this case, the indices of appraisingthe functionality characteristics of the filtering media are the surface indices, that is: the pore side and area, theactive filtering surface (defined by the covering degree), the filter fineness. It is recommended that these filtering media should be woven of polyfilament yarns or yarns undermonofilament form. By means of the raw material nature and characteristics, the physical – mechanical, chemical properties and t he functional parameters of the filtering media are defined.

2.THE STRUCTURAL AND FUNCTIONAL ELEMENTS THAT ARE SPECIFIC TO THE FILTERING WOVEN FABRICS HAVING A SIMPLE STRUCTURE

By means of the calculation meant for designing a simple filtering woven fabr ic, one can achieve the dimensioning of the basic structural characteristics so that this (the filter) should correspond to the imposed functionality requirements. The basic functionality characteristics of the filtering woven fabric are taken into conside ration as: the yarn count, yarn density and weave. The filtering woven

fabric is appraised, as a level of reaching the quality indices, based on the pore side and area, the filter fineness and the active filtering surface.
The pore side and area are geometric characteristics of the woven fabric, and are determined by the basic structural charcteristics of it. From the point of view of the basic structural characteristics, the simple woven fabrics can be balanced and unbalanced in count and density, the resulted pores having a square or rectangular configuration (5,6).
In the balanced structure woven fabric, the warp and weft yarns have the same count and density, namely the same diameter **d** and the same density **P**. In the unbalanced structure woven fabric, the warp and weft yarns have different counts expressed by diameters du and db, and different densities expressed by Pu and Pb.
The elements of qualitatively appraising the woven fabric media having a simple, balanced and unbalanced structure are:
- the pore side (l, lu, lb)**,** which represents the distance between two consecutive yarns of the woven fabric, and is measured on the projection of this in a horizontal or vertical plane;
- the pore area (Ap), which is defined as being the area of the projection of the woven fabric pore in a horizontal plane;
- the active filtering surface (Sa), which represents the bareness degree or the porosity of the woven fabric and is calculated as a ratio between the pore surface and the total surface of the woven fabric element;
- The filter fineness (F) is expressed by the number of stitches per unit of length or the number of stitches per unit of surface (stitches/cm, stitches/inch, stitches/cm2).

3.ALGORITHMS OF DESIGNING THE FILTERING WOVEN FABRICS HAVING SIMPLE STRUCTURE

The diversity of the woven filtering media and of their utilization fields imposed the elaborating of certain designing algorithms that distinguish themselves by the initial data or the input data. The algorithms were elaborated by categories of woven fabrics, balanced or unbalanced in count and density. Each algorithm apart has utilization recommendations for designing, redesigning or testing. Based on the elaborated algorithms, a programme for the computer - assisted designing of the filtering woven fabrics having a simple structure was accomplished.

3.1.Algorithm I – The designing of the simple filters according to the yarn diameter and density (table 1)

In this case, the basic structural characteristics of the woven fabric are considered known, namely the yarn count and density. The programme can be used for **identifying** the specific filter characteristics: filter fineness , pore side and area, , and the active filtering surface. Based on the identified elements, one can appraise the conformity of the filter to the requirements of the filtering process for which it is used. At the same time, depending on the conclusion stated after testing, one can effect the **redesigning** of the filtering woven fabric in full conformity with the utilization requirements.

3.2.Algorithm II – The designing of the simple filters according to the yarn diameter and filter fineness (table 1)

This part of the programme is destined to the **designing** calculation of the unbalanced woven fabrics because, because a calculation function, a specific characteristic of the filters, namely the filter fineness, can be assessed. By way of the designing calculations, the yarn density, the pore side and the active filtering surface can result. The algorithm can also be used for **redesigning** the filtering woven fabrics depending on the requirements, as the filter fineness is a characteristic that does not directly determine the filtering fineness but the process efficiency. The algorithm can also be used for **testing** the pore dimensions and the filtering surface value for a given yarn count.

3.3.Algorithm III – The designing of the simple filters according to the yarn diameter and the pore side (table 1)

By means of this programme sequence, one can carry out the **designing** of the basic structural characteristics of the woven fabric according to the process characteristics. The imposing of the pore side assumes the fact that the dimension of the particles that have to be retained is known, the filter being a calibrated restriction. The basic structural characteristic of the woven fabric, the yarn density, is established. The algorithm also allows the **testing,** if, for a given filter or a designed one**,** the filtering surface ensures the needed filtering speed. It can also be used for **redesigning** to the extent in which the yarn count can be modified.

Table 1: Specific elements for algorithms I, II, III

Algorithm I	**Algorithm II**	**Algorithm III**
1. Input data: d_u, d_b, P_u, P_b	1. Input data: d_u, d_b, F_d	1. Input data: d_u, d_b, l_u, l_b
2.Yarns count: $T_{tex} = \frac{d^2}{A^2}$	2. Yarns count: $T_{tex} = \frac{d^2}{A^2}$	2. Yarns count: $T_{tex} = \frac{d^2}{A^2}$
3. Filter fineness balanced structures $F = P_u = P_b$ pore/cm $F_m = F \cdot 2{,}54$ pore/inch unbalanced structures $F_d = P_u \cdot P_b$ pore/cm^2	3. Yarn technological density $P = f(F_d)$; $P_u \cdot P_b = F_d$ $\frac{P_u}{P_b} = m$; $P_u = \sqrt{F_d \cdot m}$; $P_b = \frac{P_u}{m}$	3. Yarn technological density $P = f(l_p, d)$; $P_u = \frac{10}{l_u + d_u}$ $P_b = \frac{10}{l_b + d_b}$
4. Pore side $l_u = \frac{10}{P_u} - d_u$ $l_b = \frac{10}{P_b} - d_b$	4. Pore side $l = f(P, d)$ $l_u = \frac{10}{P_u} - d_u$ $l_b = \frac{10}{P_b} - d_b$	4. Filter fineness balanced structures $F = P_u = P_b$ pore/cm $F_m = F \cdot 2{,}54$ pore/inch unbalanced structures $F_d = P_u \cdot P_b$ pore/cm^2
5. Pore area: $A_p = f(P, d)$ $A_p = \left(\frac{10}{P_u} - d_u\right) \cdot \left(\frac{10}{P_b} - d_b\right)$	5. Pore area : $A_p = f(P, d)$ $A_p = \left(\frac{10}{P_u} - d_u\right) \cdot \left(\frac{10}{P_b} - d_b\right)$	5. Pore area: $A_p = f(P, d)$ $A_p = \left(\frac{10}{P_u} - d_u\right) \cdot \left(\frac{10}{P_b} - d_b\right)$
6. Filtering active surface $S_a = f(P, d)$ $S_a = (10 - P_u \cdot d_u) \cdot (10 - P_b \cdot d_b)$	6. Filtering active surface $S_a = f(P, d)$ $S_a = (10 - P_u \cdot d_u) \cdot (10 - P_b \cdot d_b)$	6. Filtering active surface $S_a = f(P, d)$ $S_a = (10 - P_u \cdot d_u) \cdot (10 - P_b \cdot d_b$
7. Woven fabric mass: $M = \frac{P_u \cdot T_{texu}}{10} \cdot \frac{100}{100 - a_u} + \frac{P_b \cdot T_{texb}}{10} \cdot \frac{100}{100 - a_b}$; a = 4 – 6 %		

3.4.Algorithm IV – The designing of the simple filters according to the yarn diameter and the active filtering surface (table 2)

The active filtering surface is a characteristic that determines the filtering process efficiency. By way of the algorithm, the structure estimating indices, which are specific to filters, are c alculated, namely: the filter fineness and pore dimensions. The programme will mainly be used for **designing** the basic structurasl characteristics of the woven fabric, and for **redesigning,** depending on the process requirements.

3.5.Algorithm V – The designing of the simple filters according to the pore side and the active filtering surface (table 2)

It is a part of the programme in which only the **designing** according to the process characteristics can be carried out. The pore side implies the fact that the filtrate composition is known, the filter being a calibrated restriction that retains the particles of a certain dimension. The active filtering surface is a characteristic that establishes the filtering process efficiency, the fluid flow rate being determ ined by this parameter.

In the relationships of calculating the parameters of qualitatively appraising the simple structure woven fabrics used as filtering media the significance of the employed symbols is the following: d - yarn diameter in the balanced structures (mm); d_u d_b - the warp yarn and weft yarn diameter, respectively (mm); A - tabled constant for the diameter calculating; A_p - pore area, (mm^2); A_{et} - woven fabric element area, (mm^2); T_{tex} - yarn count in the balanced structures, (g/km); T_{texu}, T_{texb} - the warp yarn and weft yarn count, respectively [g/km]; P - the yarn technological density in the balanced structures (yarns/cm); P_u ,P_b - the warp yarn, weft yarn technolog ical density, respectively, (yarns/cm);

l - square pore side, (mm); l_u, l_b - the pore side in the warp, weft direction, respectively, (mm); F - balanced structure filter fineness, (stitches/cm); F_m - balanced structure filter fineness, (stitches/inch); F_d - filter fineness, (stitches/cm^2); M - woven fabric mass, (g/m^2); a_u, a_b - yarn waving degree in the woven fabric, (%).

Table 2: Specific elements for algorithms IV, V

Algorithm IV	**Algorithm V**
1.Input data: l_u, l_b, S_a	1.Input data: l_u, l_b, S_a
2. Pore area: $A_p = l_u \cdot l_b$	2. Pore area: $A_p = l_u \cdot l_b$
3. Yarn technological density: $P = f(S_a, l_p)$; $S_a = \frac{A_p}{A_{et}} \cdot 100$; $A_{et} = \frac{A_p \cdot 100}{S_a} = \frac{10}{P_u} \cdot \frac{10}{P_b}$; $P_u \neq P_b$; $\frac{P_u}{P_b} = m$; $P_b = \sqrt{\frac{S_a}{m \cdot A_p}}$; $P_u = P_b \cdot m$	3. Yarn technological density: $P = f(S_a, l_p)$; $S_a = \frac{A_p}{A_{et}} \cdot 100$; $A_{et} = \frac{A_p \cdot 100}{S_a} = \frac{10}{P_u} \cdot \frac{10}{P_b}$; $P_u \neq P_b$; $\frac{P_u}{P_b} = m$; $P_b = \sqrt{\frac{S_a}{m \cdot A_p}}$; $P_u = P_b \cdot m$
4. Filter fineness balanced structures $F = P_u = P_b$ pore/cm $F_m = F \cdot 2{,}54$ pore/inch unbalanced structures $F_d = P_u \cdot P_b$ pore/cm^2	4. Filter fineness balanced structures $F = P_u = P_b$ pore/cm $F_m = F \cdot 2{,}54$ pore/inch unbalanced structures $F_d = P_u \cdot P_b$ pore/cm^2
5. Yarns diameter: $d_u = \frac{10}{P_u} - l_u$ $d_b = \frac{10}{P_b} - l_b$	5. Yarns diameter: $d_u = \frac{10}{P_u} - l_u$ $d_b = \frac{10}{P_b} - l_b$
6. Yarns count: $T_{tex} = \frac{d^2}{A^2}$	6. Yarn count: $T_{tex} = \frac{d^2}{A^2}$
7. Woven fabric mass: $M = \frac{P_u \cdot T_{texu}}{10} \cdot \frac{100}{100 - a_u} + \frac{P_b \cdot T_{texb}}{10} \cdot \frac{100}{100 - a_b}$; $a = 4 - 6\ \%$	

4.THE UTILISATION MODE OF THE DESIGNING PROGRAMME

From the main menu of the programme, the possibili ty of selecting the simple structure type for which the application is done can be: the balanced or unbalanced structure (fig ure 1).

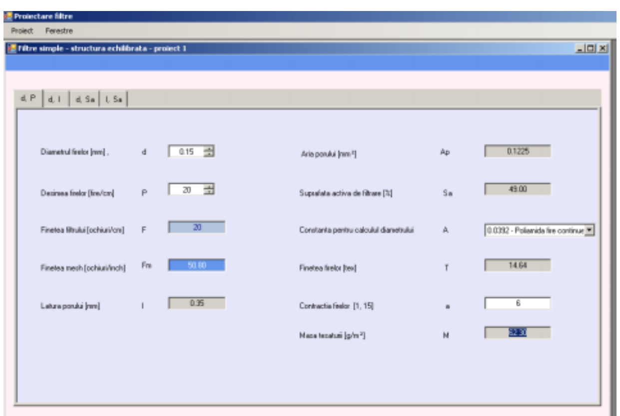


Figure 1: Screen on which the programme

For the option of designing/redesigning the filtering woven fabrics that are balanced in count and density, there can be opened a window with a menu from which one can choose the needed algorithm according to the input data. Then, according to the calculation algorithm, on the screen, the input data and the calculated parameters of the filters are displayed successively.
Figure 1 presents a screen on which the programme of designing the balanced simple structures is opened, with initial data of yarn diameter and density, that is d = 0.15 mm and P = 20 yarns/cm

(algorithm I -variant I). The calculated elements are: the filter fineness F = 20 stitches/cm or Fm = 50 mesh, the pore side 1 = 0.35 mm, the pore area A_p = 0.1316 mm^2 and the active filtering surface S_a = 50%. For calculating the yarn count, a value for constant A is adopted , and, for calculating the woven fabric mass, a value for the yarn shrinkage in the woven fabric is adopted (3,4). If the redesigning of this filter is required, so that the pore side would be 0.5 mm, all the filter characteristics are recalculated with algorithm II-variant II. The filter fineness becomes 40 mesh and the active filtering surface becomes 59%. The increasing of the active surface and the decreasing of the filter fineness, under the circumstance of the yarn count staying constant, entrains a significant diminishing of the mechanical properties. Research can go further and there is the challenge of accomplishing the filter of 50 active surface and 0.5 mm pore side, of larger diameter yarns algorithm V -variant III.
The technical data sheets of the three woven fabric projects (table 3) allow the carrying out of a comparative analysis and the taking of certain adequate decisions.

Table 3: Technical data for woven fabric projects

Name	Symbol	Measure	Woven fabrics variant		
			I	II	III
Yarn diameter	d	mm	0,15	0,15	0,2
Yarn density	P	Yarns/cm	20	15	14
Filter finess	F	Stitches/cm	20	15	14
Mesh finess	F_m	Stitches/inch	50	40	36
Pore side	l	mm	0,35	0, 5	0,5
Pore area	A_p	mm^2	0,1316	0.25	0,25
Active surface	S_a	%	50	59	50
Diameter calculating constant	A	mm	0,0392	0,0392	0,0392
Yarn count	T_{tex}	tex	14,67	14,67	20
Yarn shrinkage	a	%	3	3	3
Woven fabric mass	M	g/m^2	58,9	46,49	66,8

Simulation of the fabric filters designed is in figure 2. The simulation is realized with Arachweave software.

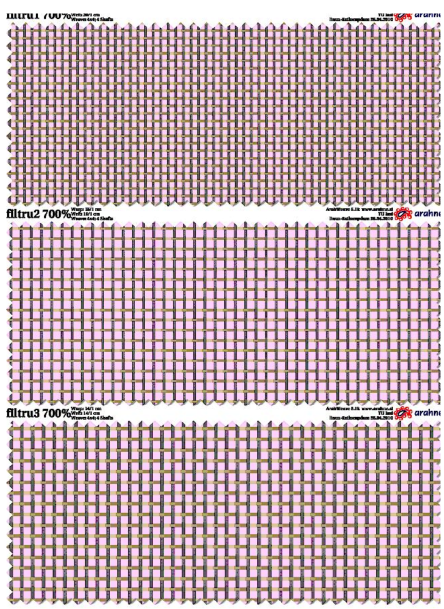


Figure 2: Simulation of the fabric filters designed

5. CONCLUSIONS

The paper defines the structural and functional elements that are specific to the filtering woven fabrics, which have a structure that is simple, balanced and unbalanced in count and density.
Five algorithms of designing the filtering woven fabrics having a simple structure were elaborated, which can be differentially applied depending on the initially introduced elements.
A computer - assisted calculation programme was elaborated, which can be used for designing,

redesigning or identifying the parameters that are specific to the filtering woven fabrics made as simple structures.
The calculation programme allows the rapid appraising of the functional characteristics of the filt ers having simple structures, the constituting of a portfolio of versions and the decision taking based on the comparative analysis of these.

6. REFERENCES

1. Cioară, I., Cioară, L. (2003). Aspects regarding the architecture of the filtering woven fabrics. *UNITEX (Belgium)*, No.1, pg. 28-30
2. Cioară, I., Cioară, L. (2009).Criteria of estimating the functionality of the filtering media obtained by weaving, *Industria Textilă (Textile Industry),* No. 1, pg. 21-25, ISSN 1222-5347
3. Cioară, L. (2002). *Woven Fabric Structure*, Ed.Performantica (Performantica Publishing House), ISBN 973-8075-16-15, Iassy
4. Marchiş, A., Macovei, M. & Mureşan, T. & Ionescu, St. (1964). *The woven fabric structure and designing*, Ed.Tehnică (The Technical Publishing House), Bucharest
5. Marchiş, O., Cioară L. & Cioară, I. (1991). Considerations on certain factors that influence the filtering plane porosity, *Industria Uşoară (Light Industry),* No.4, pg.237-238, ISSN 1222-5347
6. Medar, S., Ionescu, F. (1986). *Filters meant for hydraulic and pneumatic drives*, Ed. Tehnică (The Technical Publishing House), Bucharest

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

FUNCTIONAL PROPERTIES OF THE ANTISTATIC WOVEN FABRICS FOR PROTECTIVE CLOTHING

L. Cioară[1], I. Cioară[1], A.Mustaţă[1]

[1] *Technical University Gheorghe Asachi, Iassy, Roumania*

Corresponding author: Cioară Lucica, lcioara@tex.tuiasi.ro

Abstract: In this paper are presented the results of researches concerning the structure and properties of some antistatic woven fabrics with metallic fibers content for use in protective equipment manufacturing. The structural characteristics of woven fabrics for protective equipment application must be designed so that, on one hand, they offer physiological comfort, and on the other hand, the protection against risk factors that can threaten the security or even the life of the wearer. The design of such woven fabric must take into account the demands and the properties required in the exploitation process. The antistatic properties have the highest level of importance for the woven fabric category subjected to analysis. From this point of view one can state that all the woven fabric variants are appropriate. The woven fabrics with a surface resistivity beyond the limit specified in standards are recommended as components of the protective equipment.
Key words: woven fabric, protective equipment, functionality, surface resistivity, mechanical characteristic.

1. INTRODUCTION

The structural characteristics of woven fabrics for protective equipment application must be designed so that, on one hand, they offer physiological comfort, and on the other hand, the protection against risk factors that can threaten the security or even the life of the wearer. The design of such woven fabric must take into account the demands and the properties required in the exploitation process.
The protective equipments against the risks created by the static electricity are necessary for safety of specific activities in the mining, petroleum, electronics (clean rooms), pyrotechnic, military field, and so on [2, 3].Electrostatic charge prevention of protective equipments made from woven fabrics may be obtained as follows [2, 3]:by use of fabrics woven entirely from conductive yarns, by spraying of metal or silver vapors on the fabric surface, by use of woven fabrics with grids of conductive yarns that are distributed along warp or/and weft direction with the aim to discharge the electrical charges accumulated during exploitation process, by antistatic finishing of fabrics.
The most advantageous solution for manufacturing of antistatic woven fabrics is that of use of conductive yarns even distributed into fabric structure because in comparison with the other methods the antistatic effect is stable and also do not depend on the air humidity. The reason of this statement is that the stainless steel fibers have not only good conductive properties, but also good washing resistance. The antistatic properties, defined by the EN 1149 standard, must be maintained during 200 washing cycles of protective equipment [3, 4].

2. EXPERIMENTAL PART

In this paper the results of researches concerning the structure and properties of some antistatic woven fabrics with metallic fibers content for use in protective equipment manufacturing are presented. The antistatic properties of woven fabrics can be assessed by measuring the surface resistivity. The surface resistivity from woven fabrics antistatic, is between $10^5 – 10^{12}$ Ω [1, 2, EN 1149].

When the antistatic properties of the woven fabrics are conferred by the use of metallic fibers, a relatively low percent of 2 – 4 % metallic fibers can assure the recommended surface resistivity.
Designing the experimental woven fabric took into account the following criteria: the realization of the antistatic properties by homogenous distribution of metallic fibers, and also the realization of all other properties of woven fabric that confer functionality to the protective equipment. W oven fabrics having weft yarns with content of metallic fibers were chosen, respectively Nm -25/1 Rhovyl 95 % + Bekinox 5 %. All the fabric variants were woven with warp yarns of Nm -50/2 Polyester 67 % + Cotton 33 %. The mechanical characteristics of yarns used in woven fabric production are presented in table 1, and in figure 1 the stress-strain curves of the two yarns are presented.

Table 1: The mechanical characteristics of yarns

Parameter	Measurement unit	Warp yarn PET 67 % + Cotton 33 %	Weft yarn Rhovyl 95 % + Bekinox 5 %
Yarn fineness - Nm	m/g	50/2	25/1
Yarn diameter	mm	0.255	0.266
Breaking force	N	10.5	3.168
Breaking elongation	%	9.6	21.2
Energy-to-break	J	0.1570	0.1249
Factor of energy-to-break		> 0.5	> 0.5
Proportional limit	N	3.75	1.16
	mm	6.8	2.55

The breaking force and elongation do not provide enough information in order to assess the behavior in processing and utilizations of yarns and thus the stress-strain curves (figure 1) and some indexes calculated with them (table 1) will be analyzed. The mechanical characteristics presented in Table 1 show different behavior of the two yarns when subjected to axial loading. The yarn Nm -50/2 PET 67 % + Cotton 33 % has a higher breaking force and a lower breaking elongation than the yarn Nm -25/1 Rhovyl 95 % + Bekinox 5 %. Factor of energy-to-break has values higher than 0.5 for both yarns, and indicates a good deformation capacity, the yarns being able to take over the loadings during processing and utilization. The load-extension proportional limit is registered for the yarn Nm-50/2 (PET 67 % + Cotton 33 %) at significant higher values than those registered for the yarn Nm -25/1 (Rhovyl 95 % + Bekinox 5 %). The rate of stress-strain curves is significant different. On the curve of Nm -25/1 yarn a large flow zone can be noticed [6]. The yarn will present high deformations at relatively low modifications of load. It can be anticipated that the two yarns will confer different tensional characteristics to the woven fabric.

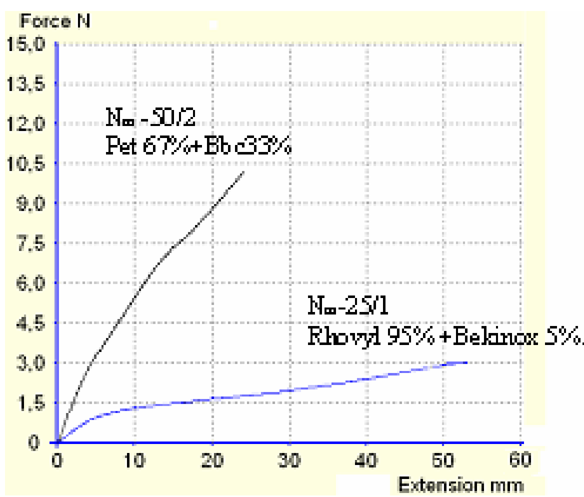


Figure 1: Stress-strain curves of yarns

The experimental program conceived for research includes two variants of simple woven fabrics and one variant of compound woven fabric. For all the variants of woven fabrics, the yarns containing stainless steel fibers were inserted in the structure as weft yarns. All woven fabrics were obtained on a projectile weaving machine.All variants of simple woven fabrics were designed according to the common practice from the woven fabric design, using a geometrical model of fabric structure [5]. The first variant from the experimental program (V-I) is a plain weave fabric.

The second woven fabric variant from the experimental program has the same characteristics as the variant V-I excepting the fabric weave which is a twill 2/2 weave.
The weaves adopted for simple fabric variants, V-I and V-II, respectively plain and twill 2/2 weave, have the same equilibration degree and the weft containing stainless steel fibers is balanced oriented on the front and back side of the fabric.
The difference between the two weaves concerns the length of the float and consequently the firmness of interlacing. For the third variant, V-III, a compound structure has been chosen. On a reference structure, equivalent to V-I, a woven fabric with weft backed weave was designed.
The weft backed weave woven fabric has two wefts, B1: Cotton 33 % + PET 67 % and B2: Rhovyl 95 % + Bekinox 5 %. Thus, the disadvantageous mechanical characteristics of B2 weft are balanced by those of B1 weft. Also, the weft backed weave allows the weft containing metallic fibers to appear only on one of the woven fabric sides. In order to analyze the distribution of the weft yarns with metallic fibers in the woven fabric structure, next to the weave pattern, sections along the warp and weft direction are represented (table 2).
The simple woven fabrics, V-I and V-II, have the weft equally distributed on the front and back side. The variant V-III has a weft oriented to the front side of the woven fabric, and the other weft oriented only to the back side.

Table 2: The structure characteristics of woven fabrics

Parameters		Woven fabric V-I	Woven fabric V-II	Woven fabric V-III
Raw material	Warp	Cotton 33% + PET 67%		
	Weft	Rhovyl 95%+ Bekinox 5%		Weft 1: Cotton33% + PET 67% Weft 2 : Rhovyl 95%+ Bekinox 5%
Yarn fineness T_{tex} (N_m)	Warp	20x2 (50/2)		
	Weft	40 (25/1)		Weft1 : 20x2 (50/2) Weft2 : 40 (25/1)
Yarn density [yarns/10cm]	Warp	230	224	220
	Weft	225	225	230 230
Yarn contraction [%]	Warp	4.15	1.77	4.85
	Weft	8.34	7.1	5.2
Fabric weight [g/m^2]		192	192	284
The weight percent of metallic fibres [%]		2.5	2.4	1.65
Weave		Plain	Twill 2/2	Weft backed weave

In table 2 the structure characteristics for all variants of woven fabrics are presented. For each variant the weight percent of metallic fibres in the woven fabric was calculated.

Table 3: The physico-mechanical properties of woven fabrics

Parameters		V-I	V-II	V-III
Surface resistivity (Ω)	Front side	1.27×10^3	1.74×10^3	1.04×10^4
	Back side	1.90×10^3	2.22×10^3	2.50×10^2
Abrasion resistance Martindale [No. of cycles until destruction]		> 230	> 175	> 422
Breaking strength [N]	Warp	1190	1070	1073
	Weft	466	416	1311
Breaking elongation [%]	Warp	18.00	12.19	15.56
	Weft	36.67	34.31	18.30
Air permeability [mm/s]		617.2	684.7	396.8

The structure optimization from the functionality point of view imposes the correct establishment of characteristics so that each component contributes to reach the performance (quality) indicators of woven fabrics. This optimization requires the knowledge of the relationship between the structure and the woven fabric properties. In order to carry out this analysis, the priority properties that give the service value of the woven fabrics have been tested.

3. RESULTS AND DISCUSSIONS

Along the warp direction all variants of woven fabrics have aproximately the same breaking strength because the warp used in their weaving is the same.

The fabric variant V-I characterized by the greatest firmness of interlacing has the highest breaking strength.The breaking elongation along the warp direction differs from a variant to another due to the weave type and weft yarn density. These characteristics determine crimp frequency of warp yarns.

The variant V-I with plain weave and the variant V-III with weft backed weave have comparable elongation because de warp yarn contraction is almost the same (4.15 % for the variant V -I, and respectively 4.85 % for the variant V-III).

Along the weft direction the structure characteristics of the tested woven fabrics differ significantly and therefore the values of breaking strength and elongation are different.

The low values of breaking strength along the weft direction for woven fabric variant V -I and V-II may be explained by using as weft the Rhovyl+Bekinox single yarns. The weft yarn density is comparable with the warp yarn density, while the breaking strength along weft direction is lower by 35 – 40 % than the breaking strength along warp direction. Due to the low values of breaking strength these woven fabric variants do not pass the requirements of durability and security imposed to preventive equipments.

The variant V-III with a weft backed weave has two systems of weft. One of the wefts is a folded yarn Nm-50/2 67 % PET+33 % Cotton, and the other is a single yarn Nm-25/1, 95 % Rhovyl +5 % Bekinox.

The breaking strength along the weft direction of this woven fabric is 3 times higher than the breaking strength of the first two variants and it is comparable with that along warp direction. The breaking elongation along the weft direction is significantly influenced by the raw material characteristics, the crimp degree of yarns being less important.

The weft yarns Nm-25/1, 95 % Rhovyl +5 % Bekinox confer to the variants V-I and V-II a high elongation (34.31 %, and respectively 36.67 %) that can be considered a disadvantage if the deformation that appears during woven fabric utilization is remanent. Inserting the second weft with different tensional characteristics (higher breaking strength and lower elongation) aims to correct the disadvantages conferred by the Rhovyl yarns.

On the curves presented in figure 2 one can be seen the different stress-strain behavior of the three woven fabric variants. The modifying of stress-strain behavior along the weft direction makes obvious that the use of weft backed weave represents a modality of optimization of structure-properties relationship.

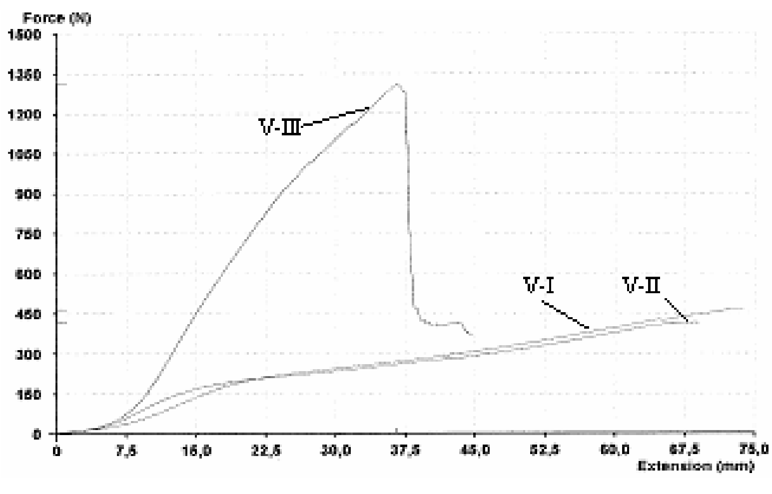


Figure 2: Stress-strain curves along weft direction

The analysis of the experimental values allows some observations that are discussed below.

3.1.The analysis of the electrostatic properties

The woven fabrics with superior antistatic properties are considered those with surface resistivity between 10^5 and 10^9 Ω. For all experimental variants of woven fabrics, the surface resisitivity of the

order of magnitude of 10^2, 10^3, and 10^4 Ω lies between the limits recommended for woven fabrics that dissipate the electrical charge by conductivity.
The simple woven fabrics, V-I and V-II, with a content of metallic fibers of 2.5 % have close values of resistivity because all the characteristics are almost the same and the weaves are similarly equilibrated.
The variant V-III with a content of metallic fibers of 1.65 % has a good surface resistivity although the weight percent of metallic fibers is lower. The difference between the values of resistivity on the front side and back side of the fabric shows the fact that the weft containing stainless steel fibres is oriented only to one of the woven fabric sides.
The woven fabric has antistatic properties and has the advantage of arrangement of yarns containing metallic fibers on the front side or back side of the fabric. Therefore, the discomfort factor due to the metallic fibers can be eliminated when protective equipments are manufactured.

3.2.The analysis of air permeability

The values of air permeability of tested woven fabrics assure the physiological function and the wear comfort imposed to protective equipment. The fabrics woven with simple structure, V -I and V-II, have higher air permeability because they are less compact.
These woven fabrics are more permeable also due to the fact that the single weft yarns are bulkier and allow the air passage. The variant V-III with weft backed weave has the air permeability lower by 60 - 65 % than the first two woven fabric variants.
The value of air permeability of 400 mm/s lies between the range limits recommended for a woven fabric for use in clothing.

3.3.The analysis of abrasion behaviour

The abrasion behavior of woven fabrics interests firstly under the aspect of defining the fabric durability, but also the efficiency in assurance of antistatic properties. The abrasion behavior of woven fabrics was assessed using the number of cycles until sample destruction.
For all three variants of woven fabrics, the blend of four components with different properties represents a factor that accelerates the cyclic phenomenon of destruction by woven fabric abrasion. The simple variant V-II with twill 2/2 weave has the lowest abrasion resistance. This may be explained by the low compactity of the woven fabric structure, the fibers being easily removed from yarn and fabric. The variant V-I with plain weave has structure characteristics similar to variant V -II, but due to the weave type it has high compactity, and consequently a higher abrasion resistance too (the number of cycles until destruction of variant V-II – twill 2/2 weave is 24 % lower than the number of cycles until destruction of variant VI-plain weave).
The woven fabric with weft backed weave V-III also has high abrasion resistance, the fabric being constituted of three yarn systems. The woven fabric was subjected to abrasion in the worst conditions, respectively on the side with conductive fibers that it is supposed to be abrased at the most during utilization. In the case of variant V-III, the Rhovyl yarns break first after 250 cycles and the structure is considered destroyed by abrasion. This finding is important for service value establishing and for assessing the woven fabric performance during utilization.

4. CONCLUSIONS

For the woven fabrics for multifunctional protective clothing application it is necessary to establish on the basis of some scientifical and objective criteria the functions of the woven fabric and their level of importance. The testing of physical and mechanical properties that have priority aims to assess the level attained by the woven fabric functions.
The antistatic properties have the highest level of importance for the woven fabric category subjected to analysis. From this point of view one can state that all the woven fabric variants are appropriate. The woven fabrics with a surface resistivity beyond the limit specified in standards are recommended as components of the protective equipment. Variant V-I has appropriate functionality properties and one recommends its utilization for light protective equipment.
The use of two weft systems in the woven fabric structure of variant V -III aims to compensate the unfavourable mechanical characteristics of weft B2, Nm -25/1 95 % Rhovyl + 5 % Bekinox, with those of weft B1, Nm-50/2, 67 % PET + 33 % Cotton. The modifying of the stress -strain behavior of the woven fabric on the weft direction one considers an optimization of structure -properties relationship.

5. REFERENCES

1.Bonnot, G. (1996). L'electicite statique elimin ee, *TUT*, No..4, p.55-57, ISSN 1161-9317
2.Fuchs, H.& Haase, J. (1998). Overview of new protective clothing types against termal and electrical risk, *Technical textiles*, nov., p.211-213, ISSN 0964-5993
3.Pinar, A.& Michalak, L.(2007). Influence of structura l Parameters of wale - knitted fabrics on their electrostatic properties, *Fibres& textiles in Esteam Europe*, No.5, dec., p.69-74, eISSN 1230 – 3666
4.Tack, L. (2007). Des solutions de securite pour les vetements de protection, *TUT*, nr.65, nov., p. 32-37, ISSN 1161-9317
5. *** (2002). *Manualul inginerului textilist*, vol.1, Editura AGIR, ISBN 973-8466-10-5, Bucureşti

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

PATTERN MAKING FOR KNITWEAR WITH UNCONVENTIONAL 3D SHAPES

M. Creţu[1], L. Ciobanu[2]

[1] *"Gheorghe Asachi" Technical University, Iaşi, ROMANIA*
[2] *"Gheorghe Asachi" Technical University, Iaşi, ROMANIA*

Corresponding author: Mioara Creţu, mcretu@tex.tuiasi.ro

Abstract: Fashion trends or the development of functionalised garments may require the modification of the classic shape of fully fashioned knitted clothing. The design of knitted garment based on the 3D surface offers different possibilities of controlling the aspect of the final product on the wearer's body. The paper presents the main design principles for fashioned knitted garments with unconventional forms, the reference being the classic pullover with sleeves. In order to exemplify the discussed principles, the paper presents the design stages and particularities for three models considered unconventional with regard to the 3D shape of the final product, as well as to the 3D fashioning possibilities.
Key words: knitwear, 3D fashioning, basic pattern, model pattern, 3D shapes.

1. INTRODUCTION

The production of knitted clothing can be in some circumstances considered an artistic endeavour instead of classic constructive-technological design. For a fashion designer, the knitted fabrics are a magical world where he can work with design elements, as well as principles – from the selection of yarns, colours, fabric structure, etc to the development of the 3D shape of the new mode l, leaving room for a total expression of creativity and originality [3].
Currently, there is a special interest regarding the fashioned knitted garments, world -renowned designers creating collections based only on knitted fabrics. The main goal of each d esigner is show-stopping items that are obtained through different techniques, like the transfer of constructive elements used especially for woven clothing or the use of unconventional structures. The pleats, faulds, complex drapes, deknittable elements, etc can effectively restructure the 3D shape of knitted clothing, offering originality together with enhanced functionality. Starting from the idea that the knitted garment must be considered initially as a 3D shape with specific projections in different p lans and the garment aspect from all sides, it must be concluded that the structure of such a garment can be more complex than in the case of a classic garment wit face, back and sleeves sewn together.

2. PATEERN MAKING PRINCIPLES FOR KNITTED CLOTHING WI TH UNCONVENTIONAL 3D SHAPES

Considering the flexible character of the knitted clothing, the 3D shapes are obtained only in relation to the wearer's body shape. The component patterns of such garments represent more or less accurate 2D plans of the body surface. In the case of a classic garment with shoulder support (pullover with classic sleeve), the patterns give a 3D shape that is the closest to the human body.
The use of design algorithms for the patterns that are different from the classic ones will generate a different aspect of the final garment on the wearer's body, ensuring the product originality, according to fashion trends, a particular designer style, etc.

The modification of design algorithms for garments like pullover or female jacket can b e done by using one or more of the following techniques:

- Over dimensioning of main constructive elements;
- Partial or total modification of some contour lines of the main and/or secondary patterns;
- Atypical partition of the over all garment surface;
- Garment assembly from flat pieces with specified geometry (pieces with regular geometry);
- The use of *origami* techniques [4];
- Introduction of right-left asymmetries in the garment structure, in contrast to the symmetrical shape of the human body;
- The use of pleats with different depth and directions in the same garment element;
- Introduction of atypical constructive elements in fashioned knitted garments (cuts, cowl or twist drapes, creases, nopes, etc)

The creative potential of the above mentioned techniques is practically unlimited, as illustrated in Figure 1 with different types of unconventional clothing. The production of these models requires the stages of pattern design, knitting programming and prototyping.

Figure 1. Examples of knitwear with unconve ntional shapes [5]

3. DESIGN PARTICULARITIES FOR GARMENTS WITH ATIPICAL SHAPE

The process of constructive design for garments with atypical shapes is based on the algorithm used for typical shapes. The spatial geometry of the new shapes can be evaluate d by comparing the allowances values, while the garment unconventionality is obtained through the use of additional constructive lines in the basic lines. The paper exemplifies this idea with design solutions for three models, considered unconventional fr om different points of view.

2.1. Model 1

The model presented in Figure 3 is a jacket that has the aspect of a garment with dolman sleeves with a supplementary volume in the underarms areas. The model patters is based on the basic network of the classic pattern, given in Table 1. The initial data considered in the Table is the chest perimeter and the allowance specific to a classic jacket size 46 (Pb = 92 cm, Ab = 4 cm).

Table 1: Basic lines for the classic product [1,2]

No.	Constructive segment	Calculus relation	Value (cm)
1.	11. – 31.	(Pb/8 + 10 cm) + Ab/2	23.5
2.	11. – 41.	-	40 - 42
3.	41. – 51.	-	18 - 20
4.	11. – 91.	Lpr	66
5.	31. – 34.	Pb/4 + Ab/2	24
6.	47. – 17.	Lt + 2 cm	44
7.	17. – 171.	(Pb/20 +1,5 cm) + Ab/20	6.2
8.	17. – 172.	(17. – 171.) + 1 cm	7.2

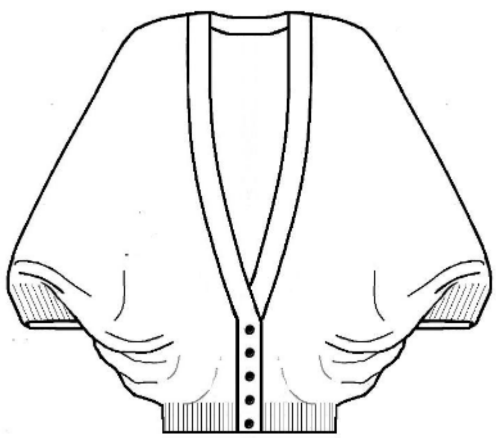


Figure 2. Model 1

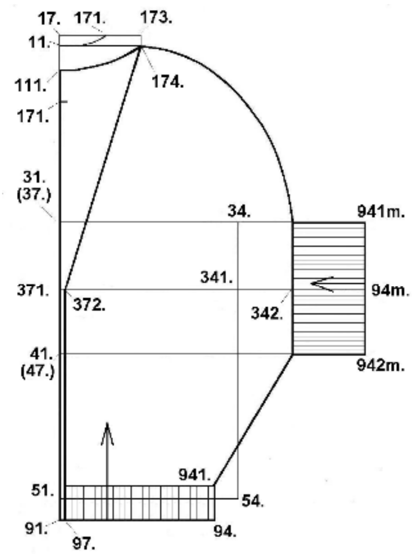


Figure 3. Pattern making for the elements of model 2

The model pattern (see Figure 3) has a additional volume in the armhole zone while the position of the sleeve end line is atypical.
34. – 341. = 9.5 cm
341. – 342. = 7.5 cm
342. – 94m. = 10 cm (the rib cuff width)
94m. – 942m. = 94m. – 941m.
11. – 91. = 66cm (garment length)
91. – 94. = εx . Ps/2 = 21 cm (for the hip perimeter P ş =100 cm and εx = 0.85).
The dimension of segment (91. – 94.) determined based on the extensibility coefficient will determine a tight fit on the hips line that is necessary in order to emphasise the model and to ensure its stability.

2.2. Model 2

The jacket presented in Figure 4 has an original sleeve shape and is inspired from the origami technique. Origami is one of the most exotic form of art that uses the plying of paper to create aesthetic 3D shapes. The origami techniques are used in the fashion design for the diversification of the classical shapes and for the development of innovative ones.

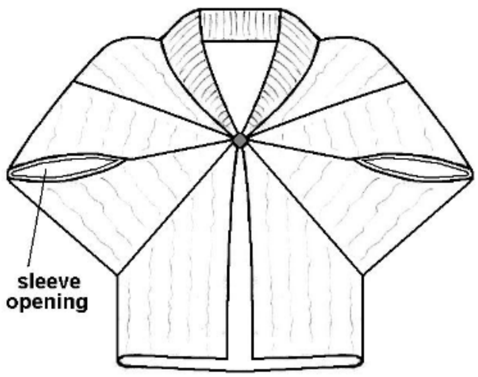


Figure 4. Model 2

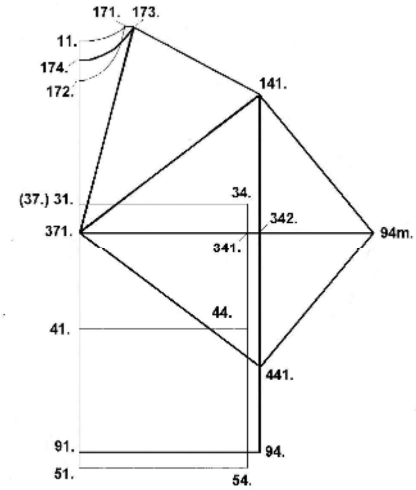
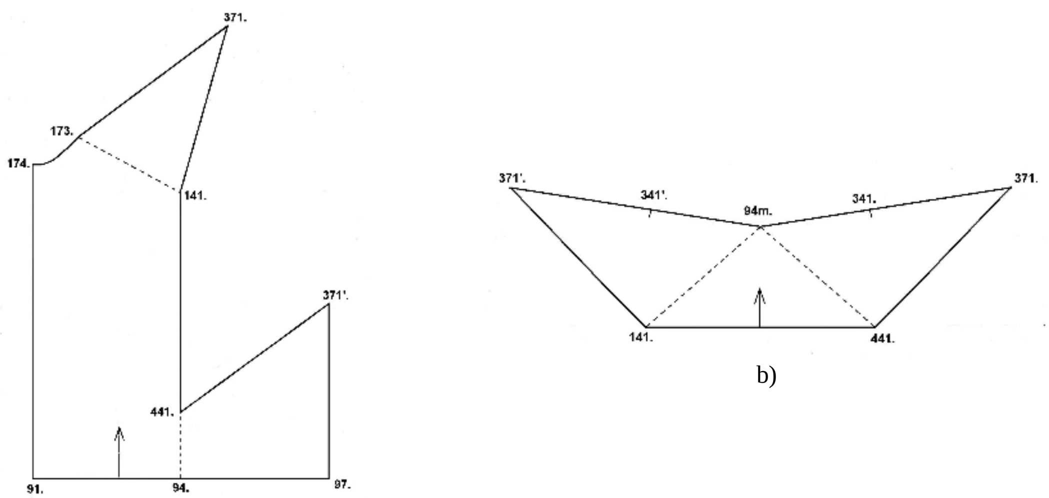


Figure 5. Transformation of the basic pattern



b)

a)

Figure 6. Model 2 - patterns
a) body; b) sleeve

The pattern design is also based on the classic basic lines. Figure 5 illustrates the preliminary stage of defining the 2D flat plan of the model surface through the cut lines and the plying of the component parts.

34. – 341. = 4 cm
341. – 342. = 2 cm
342. – 94m. = 17 cm
342. – 141. = 342. – 441 = 20 cm

The sleeve opening is placed along the (94m. – 342.) segment, determining a particular garment shape where the sleeve position is in front of the model. Figure 6 presents the final form of the model patterns, the arrows indicating the knitting direction. The dot lines mark the plying lines before sewing.

2.3. Model 3

The pullover model presented in Figure 7 is characterised by the asymmetry of the secondary elements (sleeves and collar) and the over dimensioning of the main element (product body).

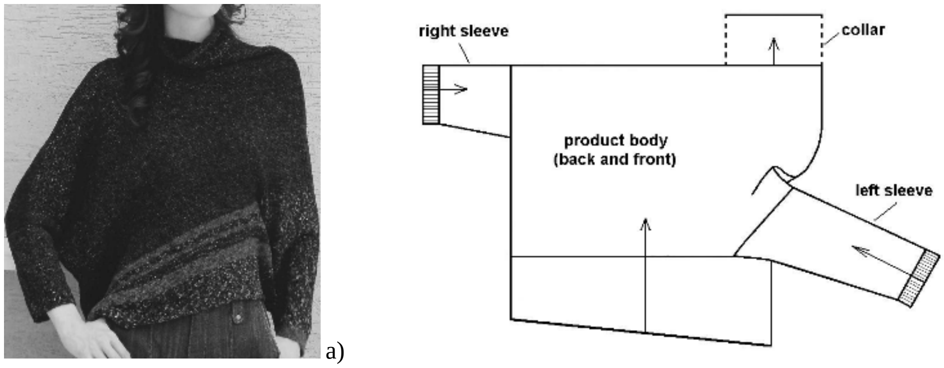


Figure 7. Model 3
a) garment aspect; b) scheme of garment shape.

In this case the pattern is created without the need of the basic lines of the classic product. Due to the asymmetry of the model, the main pattern is obtained from the flat plan of the respective elements (front and back). This required the use of specific symbols of these points (that emphasise the right to left positioning of the garment).
Figure 8 presents the pattern for the back, front and sleeves. The dimensions of the main pattern are determined using an allowance along the waist line (Ab) that is much bigger than for the classic products. This way the garment can be dressed on and the aspect will be original. The sleeves lengths are so calculated that the end line of the right sleeve is 10 cm above the hand joint (Figure 7.a). The model aspect can be diversified by the use of knitted fabrics with colour patterns, the resulting stripes having an inclined position in relation to the human body.
The main constructive segments of the pattern are marked in Figure 8 and are calculated with the following relations (considering Ab = 18 cm):
14d. – 121s. = Pb/2 + Ab = 64 cm
14d. – 44d. = 14d. – 44’d. = 40 cm
44d. – 94s. = 44’d. – 94’s. = (14d. – 121s.) – 10 cm = 54 cm
44s. – a. = 44’s. – a1. = 18 cm
121s. – 121d. = Pb/10 + 10 cm = 19.2 cm
121d. – 94md. = lu + (Lmc – 10cm) = 62 cm, where
lu = shoulder length = 12 cm
Lmc = classic sleeve length = 60 cm
441s. – 94s. = 442s. – 94’s. = 18 cm
14s. – 34s. = 14s. – 34s. = (44’ – a1.) + (a1. – 442s.); 14s. – 94ms. = (14d. – 94md.) + 15 cm = 33 cm

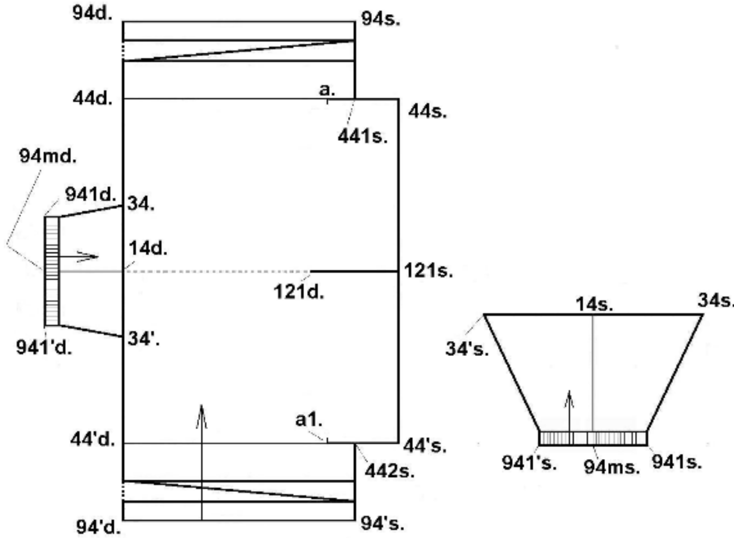


Figure 8. Pattern and knitting scheme for model 3

3. CONCLUSIONS

The constructive principles for knitted garments with unconventional 3D shapes, exemplified in the paper do not cover all constructive, aesthetic and functional diversification possibilities. The particular forms of the patterns are suited for different destinations, from fashion to functional products (medical items, clothing for persons with disabilities etc). The regular geometry of the patterns give the possibility of complex structures, that in the case of classical products raise problems with regard to fashioning.
The domain approached in the paper presents a special potential, with a high level of technical creativity that can be extended to other types of garments and that can lead to original products.

4. REFERENCES

1. Aldrich W.: *Metric Pattern Cutting,* ISBN 1-4051-0278-0, Blackwell Publishing, Oxford, 2004
2. Creţu M.: *Proiectarea constructiv – tehnologică a confecţiilor din tricoturi*, ISBN 973-8050-35-7, Editura Gh. Asachi , Iaşi, 2000.
3. Donofrio - Ferrezza L., Hefferen M.: *Designing a knitwear Collection,* ISBN 978-1-56367-492-1, Fairchild Books, New York, 2008.
4. Katamura E.: *Designer Knit*, Japan.
5. * * * : *Fashion Box – Women's Knitwear – fall-winter 2009/2010,* PM Studio, Italy

Acknowledgements
This paper is published within the frame of the research project PN II ID no. 376/2007, under the authority of the Romanian Government, through CNCSIS.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

FABRICS AND CIRCULAR KNITTING MACHINES FOR NEW FIELDS OF APPLICATIONS

V. Creţu[1], E. Moisescu[1], L. Macovei[1]

[1] *Technical University "Gh. Asachi", Iaşi, ROMANIA*

Corresponding author: Viorica Cretu, vcretu@tex.tuiasi.ro

Abstract: Circular knitting technology is capable to create a variety of products with different properties combining with short set-up times, an extreme efficiency and an adequate standard of quality. Circular knitting machines builders offer new innovative developments, some of them to open up new markets for circular knitting producers. The paper presents a ra nge of solutions of Mayer & Cie, to extend its market to the mattress cover production, and to the technical knits by the new machine Technit D3, and, some functional knit fabrics, included in the innovative 3 – layer system "ecs", from Eschler.
Key words: circular machine, mattress cover, technical knit, functional sport knit.

1. INTRODUCTION

The globalization of the market imposed on circular knitting technology to develop the field of machine engineering design, and of the knitted fabrics, with innovat ive products in odder to access new application areas.
Beside the traditional production of knitted fabrics and fashion clothing, for different kind of target groups, in recent times, circular knitters have been able to penetrate new markets, as those for home textiles, technical textiles (mainly in the medical area) and sport activities. On this context, the paper presents some recently developed solutions of leading circular knitting machine builder Mayer & Cie, and of the Swiss fabric manufacturer of fun ctional and technical sportswear fabrics, Eschler.

2. MAYER & CIE - INNOVATIVE DEVELOPMENTS FOR NEW MARKETS

Leading German circular knitting machine builder Mayer & Cie has developed a range of solutions to extend his market to the mattress covers, and to the technical textiles produced by its performing and new designed machines.

2.1 Circular knitted fabrics for mattress covers

While ago, specialists used to recommend hard mattresses, nowadays elasticity is the watchword when it comes to ensuring good night's sleep. If the surface is too soft, no support is offered to the spinal column, too hard a mattress forces the spine to assume an unnatural "S" shape. Depending on the position we adopt for sleeping (on the side, front or back), different degrees of matt ress zoning are recommended. This transformation has sparked a change in the materials used to make mattresses. While interior sprung mattresses were used predominantly in beds over several decades, today it is know that this degree of firmness permits onl y minimal adaptation to the needs of the body. Consequently, firm mattresses are no longer to be recommended for people with back problems.
So, to ensure to the new demands placed on the mattresses, the materials used now are: cold foam, hydro foam made of high-grade foam qualities, latex and Talalay latex, for its point stability. The

production process creates different degrees of hardness, providing end users with a mattress which is adapted to their individual needs.
The adaptability of the mattress to the pressure of the body, to ensure the optimum posture, calls for covers witch are just as flexible as the mattresses themselves.
In recent times, on the market for mattress covers, completely dominated by woven fabrics, the circular knitted fabrics start to penetrate due to the properties and the impressive benefits offered:

- compared to the woven fabrics, knitted fabrics eliminate the need to use cost -intensive special yarns to achieve sufficient elasticity, because them natural two -way elasticity and extremely good elastic recovery;
- pleasantly soft, voluminosity, air permeability;
- they are washable and capable of production in wide -ranging different weights;
- less susceptible to warping and bulging;
- permit better further processing due to their volume;
- can be produced in tubular form and eliminate the need for quilting as an additional work step;
- allows the cover to be easily removed and replaced, very necessary to modern mattress covers that are predominantly removable and washable.

For the mattress cover market segment, the manufacturer of circular knitting machines, Mayer & Cie, has precisely configured its OVJA machine range to suit the needs of this market.
Currently, the mattress market is subdivided into three main segments [1]:

a) *top segment*
    - share approximate 20% from the market
    - the sale price for mattresses currently ranges between 1400 – 1700 Euro
    - the yarns used are natural fibers
b) *medium segment*
    - share approximate 25% from the market
    - the retail prices for mattresses range between 300 – 1400 Euro
    - the yarns used are predominantly natural fibers
c) *cheap segment*
    - share approximate 55% from the market
    - the retail prices for mattresses range between 50 – 300 Euro
    - the yarns used are largely synthetics.

Primarily, mattress covers are knitted using electronic circular knitting machines because them patterning reliability and high speed of pattern changeover witch turns costly hours per setting into economically productive time. Mayer & Cie electronic machines enjoy a prominent market position with them individual needle selection using just one magnet per feeder.
In vision of Mayer & Cie, its machines witch ideally address to the three main segments of the mattress market, are:

- OVJA 1.6EE and OVJA 1.1 TTRB – for top segment;
- OVJA 1.6E and OVJA 1.6 EM – for medium segment;
- OVJA 1.6 E/EM and OVJA 2.4E – for cheap segment.

The characteristics of these knitting machines, that recommended them for the named segments, are:

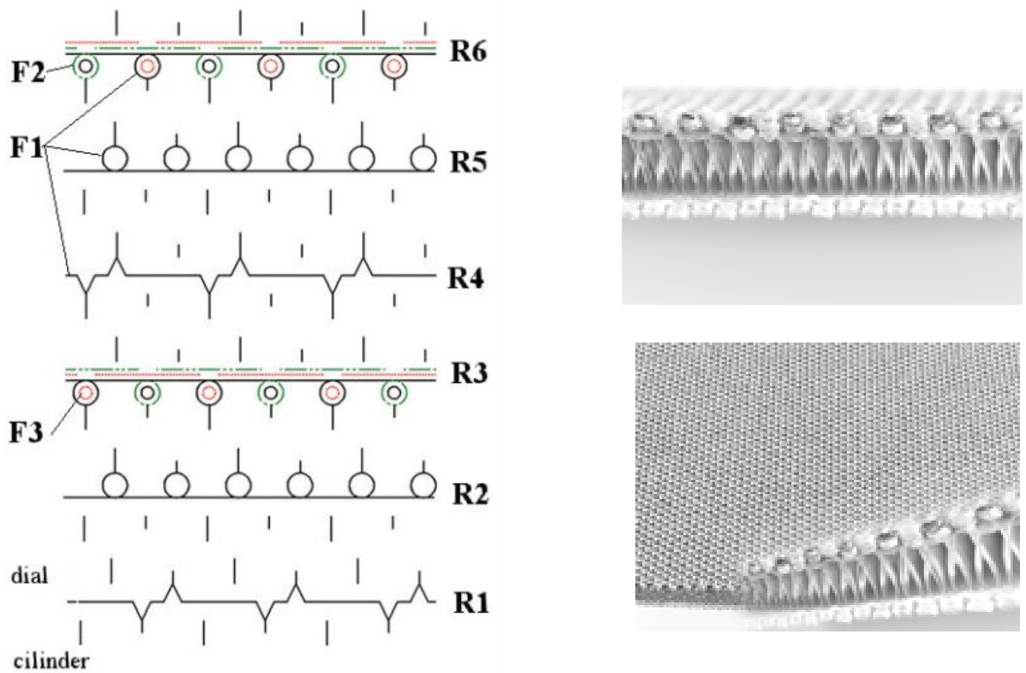
- OVJA 1.6E offers operating simplicity and reliability, extensive patterning versatility and simple resetting, also on the reverse side;
- OVJA 1.6 EM has been specifically modified by Mayer & Cie, for mattress cover high production. So, in comparison to the OVJA 1.6 E, by increasing the speed from 18 to 24 rpm, with 38”, the productivity increases of 30%. To guarantee this output in continuous operation, it was changed the electronic individual needle selection, the knitting head was equipped with special yarn carriers and needles, and it was design a new control sinker;
- OVJA 2.4 E, with 92 feeders and a diameter of 38” is ideal for mattress covers fabrics in the low-price segment. This machine is highly productive with 2.4 feeders per inch in conjunction with an industrial machine frame for fabric bales of up to 920 mm and its fast pattern resetting provided by full electronic capability;
- OVJA 1.6 EE knits full jacquard in design and structure on both fabric faces, with electronic individual needle selection in cylinder and dial cam. Compared to OVJA 1.6 E, as the dial needles also knit the pattern using electronic control, it is indicated for the manufacture of more demanding mattress cover designs. This machine also provides minimal resetting times for high levels of productivity, even for small batch sizes;
- OVJA 1.1 TTRB offers everything a circular knitting machine could conceivably provide to stay at the forefront of changing fashions:

- individual needle selection, by electronic 3-way, of the cylinder and dial needles, for patterns on both fabric faces;
- automatic stitch forming depth adjustment, for the body and the welt of the mattress cover;
- the option of elastomer plating in definable areas, to provide greater elasticity in specially zoned areas of the mattress.

2.2. New circular knitting machine - Technit D3

The new Mayer's Technit D3 [2], is a double jersey machine for 3D spacer fabrics for technical applications. This machine applies the technology pioneered by Mayer & Cie on its single jersey MLPX 3-PL witch is aimed to produce high quality plush fabrics, for car upholstery and furnishing, with a very high cover factor and a good stability.
The essence of this new technology results on producing a complete plush course per one feeder, with a ground yarn and up to two color yarns. Applies to double jersey knitting machine Technit D3, this new technology permits the production of a more stable fabric than on MLPX 3-PL, witch is important for new applications such as shoe fabrics, Mayer claiming that the Technit D3 makes the most stable weft knitted fabrics available today. Warp knits can be engineered to be more stable, but circular knitted fabrics are cheaper to produce and can be produced in smaller lots more economically due to the relatively high cost of yarn preparation and machine set up in warp knitting. These economics lend themselves to shoe manufacturing where relatively small quantities of fabric are used in each shoe.
The Technit D3 can produce rib fabrics or spacer fabrics (Figure 1), with three yarns per feeder (a ground yarn - F1, and two plating yarns – F2 and F3), on the cylinder side.
The two yarns F2 and F3 are in a plating relation to the yarn F1:

- F2 – plating yarn and F1 – ground yarn;
- F3 – ground yarn and F1 – plating yarn.



Thread courses | Section viw of the fabric

Figure 1: The spacer fabric

The cycle of knitting, for this spacer fabric (Fig. 1), includes six courses (R1 ÷ R6); the evolution of the three yarns being characterized by:

- the yarn F1 connects the two sides of the fabric, and realized all the stitches on the cylinder side of the fabric and the stitches 1:1, alternative, on the dial side of the fabric;
- the yarns F2 and F3 are inserted in 1:1 (2:1 or 3:1 possible too): F2 is 50% visible on the fabric face, while F3 is located inside the fabric, depending on the yarn application and therefore concealed.

In consequence, both yarns F2 and F3 can be used as functional yarns witch give additional functionality to the fabrics, witch become capable of addressing to a varied application spectrum:

- fine rib with functional yarns, can be produced, to provide a shield against electromagnetic waves, in articles of clothing;
- using a functional thread for electrical transmission of heat, the fabrics can be used for outdoor clothing or seat covers;
- due to their substantially higher abrasion resistance values (2 yarns per stitch and 3 per feeder), the fabrics produced on Technit D3 are particularly suitable wherever durability is called for: home textile sector, for seats and upholstered furniture, in the automotive sector, for linings and seat covers, or for inner linings and inlay soles in shoe production;
- in medical applications, the functional threads can be used for a whole range of different treatment methods, such as knitting a silver thread to give anti -bacterial properties.

3. SOME INNOVATIVE KNIT FABRICS FROM ESCHLER

Swiss functional knit fabric manufacturer Eschler, has introduced an innovative 3 -layer system for all its products for cycling, outdoor activities, or winter sports. Eschler Comfort System (ecs) is using highly functional fabrics, for the first, second and third layers of clothing, each layer having a specific function.

These layers work perfectly together to deliver maximum comfort for sports and work use, the fabrics in the Eschler Comfort System being segmented in the following categories [6]: e1 – Absorption, e2 – Insulation, e3 – Protection and e3+ - Protection Plus.

- **e1 – Absorption** (Fig. 2)

Eschler *e1* fabrics actively absorb perspiration without drying out the skin. Thanks to their hygienic, skin-friendly qualities and freedom of movement, they ensure outstanding we arer comfort.

- **e2 – Insulation** (Fig. 3)

Eschler *e2* fabrics keep the body warm in cold weather. They held regulate climate against the skin, and thus ensure optimal thermal balance of the body.

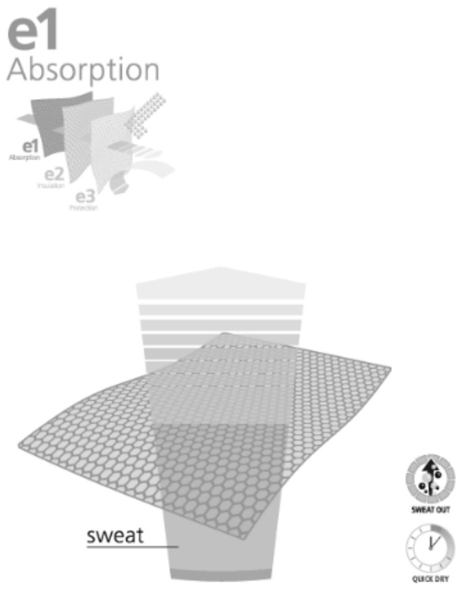


Figure 2: *e1* fabric, for absorption of perspiration

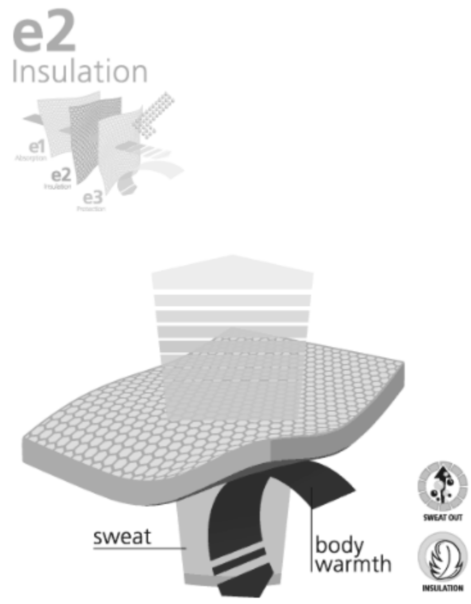


Figure 3: *e2* fabric, for keeping the body warm in cold weather

- **e3 – Protection** (Fig.4)

Eschler *e3* fabrics are wind and water resistant. Besides providing good protection against these elements, they allow air circulation, witch promotes optimal breathability.

- **e3+ - Protection Plus** (Fig. 5)

Eschler *e3+* fabrics incorporate modern membrane technology and are wind and waterproof. They provide optimal protection even under harsh weather.

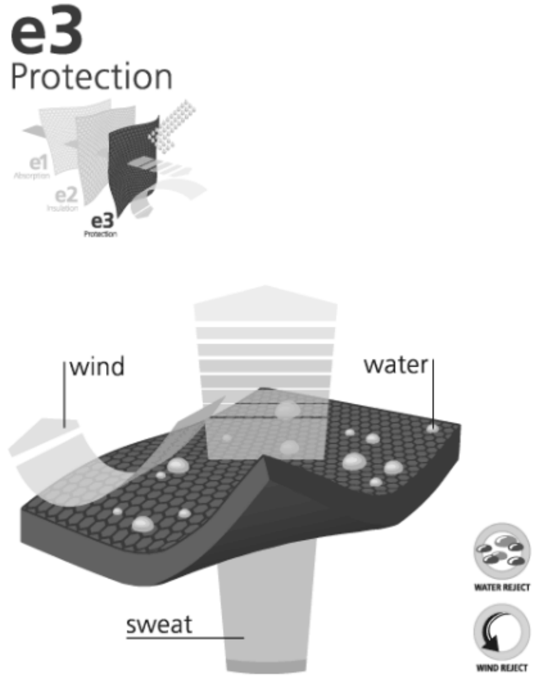


Figure 4: *e3* fabric, for wind and water resistant

Figure 5: *e3+* fabric, for optimal protection even under harsh weather

Among the last functional ecs fabrics integrating innovative technologies, developed by Eschler, are included:

- ***e1 - PCR Bioactive*** [4]**,** is a fabric by yarns made of 100% PCR (Post-Consumer Recycled) Polyester, in this case, PET bottles. These yarns have a very soft touch, great elasticity and good moisture management. PCR Bioactive also features silver ions incorporated in the polymer of the fibers, witch inhibit the growth of odor-causing bacteria. This makes it the perfect fabric for functional underwear, technical shirts, as well as performance garments for high aerobic activities.
- ***e1 - SWAN coldblack,*** is a technical knit with a unique dimple structure or "golf ball" surface creating good aerodynamic properties. This material is indicated for competition sports clothing, from the suits of pro short track runners to bike and triathlon apparel. SWAN coldblack is utilizing Schoeller's revolutionary coldblack technology, witch reduces heat absorbency in dark colored textiles and guarantees a high level of UV-protection.
- ***e1 – Carbon*** [3]**,** is a lightweight stretch knit fabric made of 76% Polyamide, 21% Elastane and 3% Carbon. This allows the fabric to achieve improved temperature management, prevents formation of odor and features antistatic properties. The presence of carbon core yarn ensures a bacteria-repellent effect, thus preventing the occurrence of odors. The notably better humidity transport of fabrics with carbon also provides improved thermal balance of the body, in sport activities this resulting in better performance as the body consumes less energy for cooling.
- ***e1 –Flash*** [5], is a bi-component knitwear, that "dry in a flash", by utilizing Polyester inside and Polyamide outside. This bi-component construction guaranties an outstanding moisture management and excellent cooling properties. The Polyamide yarns are a lot finer than the Polyester yarns and this create a bigger outer surface area, resulting in a mechanical moisture transport through capillary action. The Polyamide outer material further guarantees high abrasion resistance. By adding Lycra Power, Eschler giver to this fabric elasticity, so more freedom of movement even for garments with close-fitting, being ideal for bikewear, triathlon or running apparel.

4. CONCLUSIONS

In odder to access new application areas, the circular knitting machines builders and the fabrics manufactures have develop innovative products as:

- mattress covers, adapted to the new mattresses that ensure different degrees of hard ness, created by Mayer & Cie on its OVJA machine range. These circular knitted fabrics ensure properties and impressive benefits that permit the penetration on the mattress covers, what was completely dominated by woven fabrics. To satisfy the three main segments of the mattress market (top, medium and cheep), individualized by them retail prices, the yarns used for the knitted mattress covers and the share of the market) Mayer & Cie developed individual groups of machines, respectively OVJA 1.6EE and 1.1 TTRB, OVJA 1.6E and 1.6EM, OVJA 1.6E/EM and 2.4E, that offer the best specific characteristics for each market segment.

- a new double jersey knitting machine, Technit D3, an innovative solution of Mayer & Cie, for the production of technical textiles. On this machine, by a new technology, results a 3d spacer fabric (very stable, important for new applies as shoe fabrics) including three yarns per feeder on cylinder, (a ground and two plating yarns) by a different visibility. The special evolution of these yarns result, by using functional yarns, in technical fabrics addressing to a varied spectrum of utilizations.
- highly functional fabrics for different sports, developed by Eschler, included in the Eschler Comfort System (ecs) based on three layers of clothing, each with a specific function. Among the last functional ecs fabrics integrating innovative technologies, developed by Eschler, are: e1 -PCR Bioactive, e1-SWAN coldblack, e1-Carbon and e1-Flash.

5. REFERENCES

1. www.knittingindustry.com – Mayer & Cie covers mattress market
2. www.knittingindustry.com – New dimension in technical knits from Mayer & Cie
3. www.knittingindustry.com - Eschler's e1 Carbon fabric comfort cyclists
4. www.knittingindustry.com – Highly Functional Knitwear for Summer 2009
5. www.knittingindustry.com –Eschler collection utilizes innovative technologies
6. www.eschler.com – The Eschler Comfort System

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

MORPHOLOGIC CHARACTERIZATION OF HUMAN BODY THROUGH 3D SCANNING FOR CREATING THE GENERALIZED ALGORITHM OF THE SKIRT PRODUCT

M. DIACONU[1], M. DIACONU[1], C. NICULESCU[2]

[1] *SC Diaman Art SRL, Iaşi, România*
[2] *National Institute of Research and Development for Textiles and Leather, Bucharest, Romania*

Coresponding author Manuela Diconu, office@diamanart.ro

Abstract: The 3D scanning method allows the study of the external human body shape, with all its morphologic aspects, with the purpose of perfecting the measurements systems and design algorithms for ready -to-wear and customized production of garments.
The paper identifies the basic morphologic aspects which play a role in the customized design of products with waist support. Depending on these elements a new body classification criterion arises and a new way of approaching the design for eliminating the trying -on stage on the real body, or 3D draping on the scanned body. The new criterion includes all categories of bodies and constitutes th e basis for creating generalized design algorithms for the skirt and trousers products.
The research was conducted within the project EUREKA "A ne w clothing – CAD for 2D/3D geometrical modeling of clothing products". The data base was *provided by using the 3D scanner (Human Solutions)* owned by INCDTP Bucharest.
Keywords: customized design, 3D scanning, generalized algorithm, 3D draping, made-to-measure.

1. INTRODUCTION

Made-to-measure clothes or customized clothing products are difficult to make because of the complex external shape of the human body. The anthropo-morphologic evaluations and analyses conducted up to now through direct or indirect measuring methods, such as 3D scanning, have created an impressive data base, which is mainly used in the ready-to-wear production. Even in designing customized products the specialist uses, most of the times, ready-to-wear algorithms or digitized patterns which are altered so they correspond to the dimensional configuration of the subject. This is the reason why software developers have developed made-to-measure applications mainly for this work system.
Another variant, which is used very seldom, implies designing the customized patterns, starting from an optimal set of dimensional characteristics, and eliminating, if possible, the trying-on stage before the final version of the product. Modern calculus applications and mathematic optimization allow at present the automatic development [1] of complex design systems which can guarantee the exact correspondence between the body and the pattern, so that the final evaluation and measuring of the pattern, as well as product trying-on, are completely eliminated.
Another goal of this work method is finding an easy system of looseness allowances, which can guarantee that the used value is enough for the target figure, without the risk of pressing or strangulation of the product on the body.

2. ANTHROPO-MORPHOLOGICAL CHARACTERISATION OF THE BODY FOR THE SKIRT PRODUCT

The classic work system uses ready-to-wear patterns for making customized garments. Thus, a complete set of parameters is measured on the body, the ready -to-wear pattern is altered depending on them, and the product is tried on for the final alterations.
The classic design method classifies the body using several criteria, taking into consideration the deviations of certain parameters from their normal values (normal body configuration) . Table 1 presents a classification variant of this kind. [2]

Table 1: Body classification variant

NR. CRT	BODY CHARACTERISTIC	DEVIANT PARAMETERS
1	Long or short legs	Inner leg length
2	Long or short lower torso	Side seam line at waist Central front line at waist Central back line at waist
3	Prominent or flat hip curve	Side seam line at waist
4	Narrow or wide hips	Maximum belly circumference Hip girth Side seam line at waist Central front line at waist Central back line at waist
5	Prominent or flat belly	Waist girth Maximum belly circumference Hip girth Central front line at waist
6	Prominent or flat buttocks	Buttock girth Central back line at waist
7	Sway front, sway back	Central back line at waist
8	Large thighs	Hip girth over the thighs

Having into consideration the new design method based on generalized algorithms, any traditional system for body classification is pointless. On the other hand, the routines contain mathematic relations in which all ready-to-wear parameters are involved, to which we add the most appropriate parameters responsible for the real body deviation from the normal configuration. This approach eliminates any approximation or convention found in ready -to-wear design (table2).

Table 1: Anthropometrical parameters specific to the generalized algorithm for the skirt product

NR.CRT	SYMBOL	PARAMETER NAME	OBSERVATIONS
1	ign	Knee height	
2	ips	Hip height	
3	if	Buttock height	
4	iab	Maximum belly circumference height	
5	dba	Distance between the front darts	
6	dbf	Distance between the back darts	
7	Aab	Maximum belly depth	max(0,Aab)
8	Al	Hip depth	max(0,Al)
9	Af	Buttock depth	
10	Lats	Central front line at waist	
11	Llts, st./dr.	Sideseam line at waist	min(Lltsst., Lltsdr.)
12	Lpts	Back line at waist	
13	Pt	Waist girth	
14	Pab	Maximum belly circumference	
15	Pf	Buttock girth	
16	Ps	Hip girth	
17	Psc	Hip girth over the thighs	
18	As	Hip allowance	(0÷4) cm

All measurements are standardized and/or made between well defined anthropometric points by STAS 5279-87 (Garments – Human body measurement.

3. DIMENSIONAL CHARACTERISTICS WHICH REQUIRE NEW DESIGN RULES

3.1. Girths

In ready-to-wear design, irrespective of the body shape, the parameter that determines the width o f the product on the hip line is the buttock girth, including belly depth [3]. For making customized patterns, measuring this girth through the direct method is difficult, and the resulting pattern is sometimes oversized. On the other hand, the 3D scanners do not provide this parameter.

The evaluation of the lower torso indicates difference between bodies, meaning maximum circumferences on for levels: buttocks, hips, thighs and belly areas. In figures 1÷4 we analyze four bodies for which the maximum gir th is found on different lines. Pmax(Pab,Pf,Ps,Psc) is the girth which determines the maximum width of the product. As a consequence, the generalized algorithm of the skirt pattern will start with a decision block with four customized branches, each manifest ing specific relations.

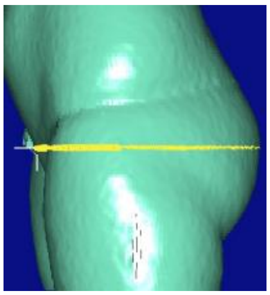


Figure 1

ID 1258
Pf=117,1
Psc=102,2
Ps=104,4
Pab=87,2

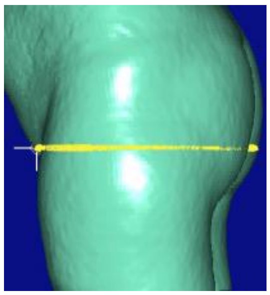


Figure 2

ID 0237
Psc=103,2
Pf=102,5
Pc=99
Pab=91,,3

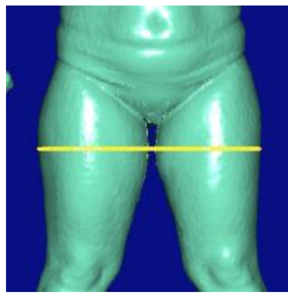


Figure 3

Psc=109,5
Ps=108,3
Pf=103,5
Pab=91,5

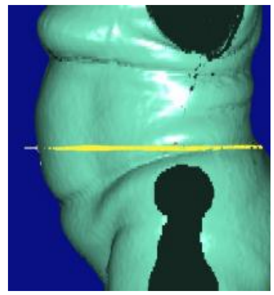


Figure 4

Pab=106,5
Pf=105
Ps=102
Psc=101

The frequency of these body categories is presented in table 3.

Table 2 Frequency of various body categories

BODY CATEGORY	FREQUENCY
Corp Ps=Pmax(Pab,Pf,Ps, Psc)	very often
Corp Pf=Pmax(Pab,Pf,Ps, Psc)	average
Corp Psc=Pmax(Pab,Pf,Ps, Psc)	very rarely
Corp Pab=Pmax(Pab,Pf,Ps, Psc)	ver rarely

Another morphologic aspect with direct implications for designing customized products with small looseness allowance is represented by the ration between the fo ur girths mentioned before. There are bodies characterized by the following ele ments: close values of Pab şi Ps (Pf/Psc), belly depth close to 0 and small lateral depth, compared to the buttocks depth, figure 5. In this situation, on the line defining the maximum product width, the pattern must be supplemented with a value X, which depends on the body parameters and varies inversely to As, in order to prevent the pressing and strangulation of the body in the belly area, equation 1.

$Xi = f(Pab, Pi, Pt, Af, Aab, Al, Af, Llts, Lpts, iab, if, As)$, in which Pi=Pf,Ps,Psc **(1)**

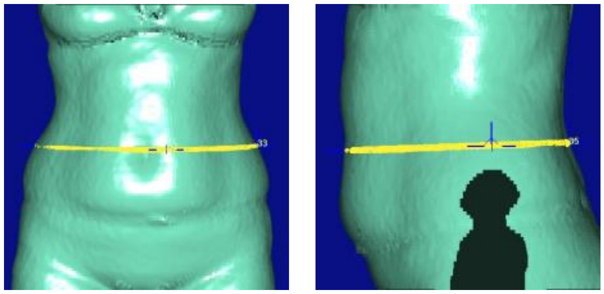


Figure 5

Scanned body ID 1149 : Pab=94, Ps=98,8, Aab=0,2, Al=2,3, Af=5,8, X=1,83

According to Chart 1, for the body with ID 1149, for the products with very small looseness allowance (As=0,5÷0,7), a significant X supplement is necessary (X= 1,71÷3,48), which becomes 0, for As=1, 4. In other words, for As≥1,4 the pattern width is not supplemented. Although these situations are rare, in the generalized algorithm, the relation responsible for the calculation of the product width contains right from the beginning the X factor, in order to generate correct patterns, irrespective of the body and the wanted looseness degree. For X< 0 (most frequent) the value of the factor is automatically assigned as 0.

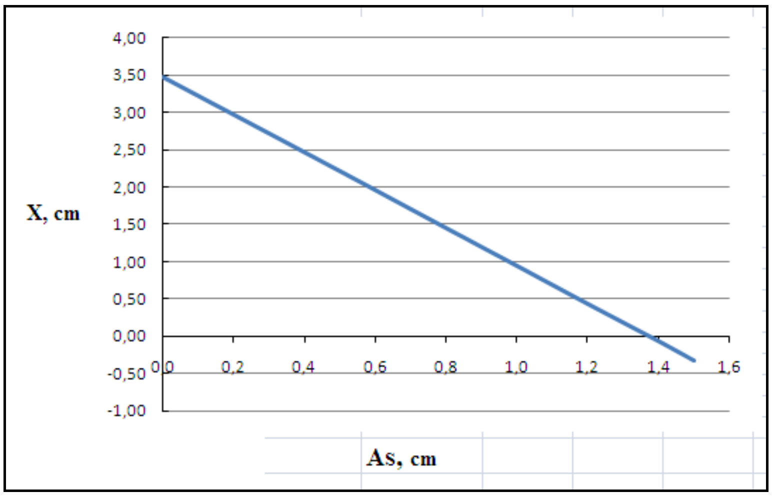


Chart 1

3.2. Depths

This type of parameter can be used for designing darts widths within customized patterns. Most of the times the darts width is approximated through ready-to-wear design rules. Later on, by trying on the product, we get the real value. For calculating this width, the depths are by far the most useful parameters. For the skirt product, the depths involved are: maximum belly depth, hip depth and buttock depth, which are calculated as follows [4]:

½ Total front darts width = $\frac{Aab}{(Aab+Al+Af)} * 0{,}5 * (Pi + X + As - Pt)$ **(2)**

½ Total lateral darts width = $\frac{Al}{(Aab+Al+Af)} * 0{,}5 * (Pi + X + As - Pt)$ **(3)**

½ Total back darts width = $\frac{Af}{(Aab+Al+Af)} * 0{,}5 * (Pi + X + As - Pt)$, în care, Pi=Pf,Ps,Psc,Pab **(4)**

When it comes to depth measuring there are certain particularities which vary from one body category to another:

- The belly depth is measured from the waist line to the tangent to the belly prominence, figure 6.

- The lateral depth is measured from the waist line to the tangent to the hip prominence. Depending on the level at which the maximum girth is found, the tangent point will be upper or lower, figure 7.

- The buttock depth is measured from the waist line to the tangent to the buttock prominence for all body categories, excepting those for which Pab=max (Pf, Ps,Psc,Aab). In this case the tangent to the body is placed on the belly line, in the back part of the body, figure 8.

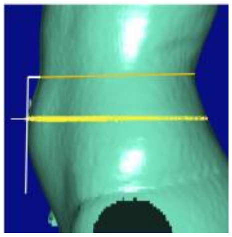


Figure 6: Ab
The tangent to the body is on the belly line

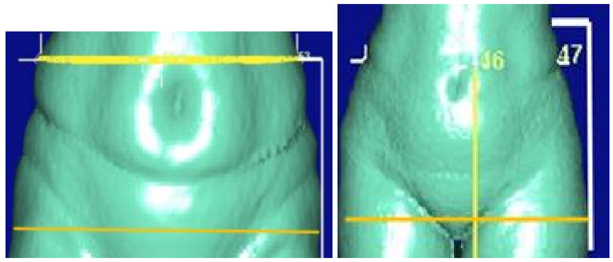


Figure 7: Al
The tangent to the body is on the buttocks line, respectively on the hip line, laterally

.

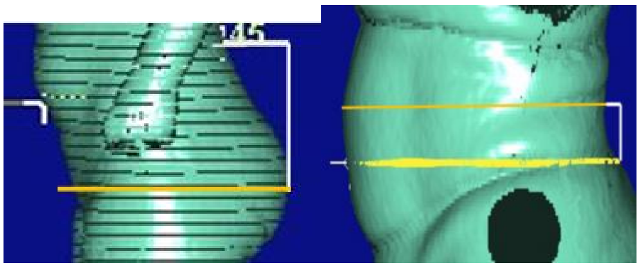


Figure 8: Af
The tangent to the body is on the buttocks line, respectively on the belly line, posteriorly

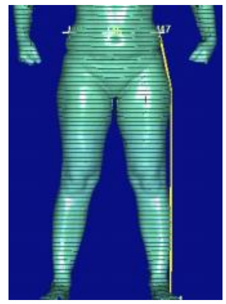


Figure 9: Llts

3.3. Lengths

For the skirt product the three waist – ground lengths measured over the three prominences: belly, hip (figure 9) and buttocks: Llts, Lats, Lpts [3], [4] are essential. These parameters can be found in any ratio, as opposed to ready-to-wear design, where the common convention Llts<Lpts=Lats is applied. Generating the waist line correctly, according to the real body morphology, constitutes the most difficult design task of this clothing product, because the following rules should be abided:

- the waist lines curves close under common tangents in the darts' ends
- the added waist lines = waist girth
- the lateral curve of the pattern = the corresponding dimension drawn from the body, between waist and hip.

The complete resolution of the design rules implies mathematic optimization calculations, because even with these restrictions, parities, the problem remains a complicated one [5], [6]

4. CONCLUSIONS

The paper illustrates the numerous problems that need solved when getting from the ready-to-wear design to customized design, having into consideration that the main goal is obtaining a correct pattern, irrespective of the subject's anthropo-morphologic configuration, and eliminating entirely certain steps, such as measuring and checking the pattern, and trying on the product. It is a working variant which can be run only by an automatic system, because of the complexity of the mathematical calculations necessary for meeting all design rules.
Regardless of the difficulties implied by the elaboration of generalized algorithms, once the correct variant is found, the working system becomes much easier to use than the current applications for garments design. The user sets the anthropometric parameters in a working space and the system automatically analyses the input and generated the unique pattern in a few seconds. [7]

5. REFERENCES

1. Diaconu, M., Pintilie E., Avădanei M.& Diaconu, M. (2007). DMM Patter n Design CAD/CAM, software de proiectare automată a îmbrăcămintei, *A XIII[a] Conferinţă Română de Textile şi Pielărie*, CORTEP 2007, Buletinul Institutului Politehnic, tomul LIII, fas.5, vol II, pag. 18 - 20,ISBN 978-973-730-401-8, Iaşi, septembrie 2007, Editura Performantica
2. JUDITH A., Rasband Elizabeth L.G. Liechty (2006) Fabulos Fit, Fairchild Publications, Inc., ISBN: 1-56367-321-5, New York
3. Filipescu E. (2003) Structura şi proiectarea confecţiilor, Editura Performantica, ISBN 973 -7994-33-7, Iasi
4. ОЭЕРОВА И.А. ШЪЕМ, БЕЗ ПРИМЕРКИ НА НЕСТАНДАРТНУЮ, ФИГУРУ, ГЕНЕТКА ИНДИВИДYАЛЬНОГО КРОЯ – М.: ЗАО ЦОЛИГРАФ, 2007
5. Diaconu M., Mitu S., Pintilie E., Filipescu E. (2008). Modelarea matematică a construcţiei de bază pentru produsele cu sprijin pe umeri personalizate în vederea proiectării automate, *Simpozionul anual al specialiştilor din industria de tricotaje-confecţii*, Textilele Viitorului, Editura Performantica, pag. 343, Iaşi, noiembrie 2008, Iaşi
6. Diaconu, M., Mitu, S., Diaconu, M., (2008). Model de descriere geometrică a tiparelor pentru elaborarea aplicaţiilor de proiectare automată. *Revista industria textilă*, INCDTP Bucureşti, vol.59, nr.5, (2008), pag.205+212, , ISSN 1222-5347 (193-248)
7. Diaconu M., Pintilie E., Avădanei M., Diaconu M.,(2008). Sistem integrat de producţie a îmbrăcămintei personalizate pentru IMM-uri cu profil confecţii textile. *Revista industria textilă*, INCDTP Bucureşti, vol.59, nr.2, (2008), pag.63+68, ISSN 1222-5347 (49-96)

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE MATHEMATICAL ANALYZE (2D AND 3D) OF COMFORT INDICATORS FOR SPECIAL GARMENT STRUCTURE (Part one)

Dulgheriu Ionuţ, Matenciuc Cristian –Constantin, Mitu Stan

"Gh. Asachi" Technical University, Faculty of Textile and Leather, Iaşi, România

Abstract: In many cases it is necessary to establish some statistical correlations between two or three measures that are experimentally determined. These correlations are identified by means of the statistical processing of a great number of measurements, the traditional methods of calculus involving a considerable workload. When determining the comfort and the function of the clothing items, a special importance is placed upon the establishment of relationships among the defining parameters and the characteristics of structure of the plane surfaces from the ensemble, their correlation as well as the manner in which some of the textile and physical features condition some of the interdependences. The numerical values of the physical measures that are to be processed are generally obtained following their measurement or their calculation and the comparison, if the case may be, with another measure of the same type taken as a reference unit. In the present paper the authors calculated two sets of data obtained from a great number of determinations specific for the textile and physical characteristics in the establishment of the main indicators of influence of the comfort for clothing items intended for men for the cold season, being comprised of a coat and a raincoat. Regardless if it is about the 2D or the 3D representation, each figure also contains the interdependence equation as well as the correlation coefficient. It must also be specified that through the application of the above-mentioned software in the paper, numerous interdependence functions are displayed, but it was chosen the variant that most clearly expresses the interdependence between the parameters under study. The displayed mathematical models express the truthfulness of the interdependence, as they are related with the presented interpretations which, in turn, correspond to the technological variants under study on the one hand and to the calculus conditions on the other hand. It must also be noticed the connection among the data listed in the centralized tables, the graphical representations, the mathematical models and the correlation coefficients. In the present times, when the modern calculus technique is used, the traditional, laborious calculi should be dismissed in order to test the correlation hypotheses, the estimation of the mathematical model, the determination of the constants and of correlation coefficients and all these elements could be directly calculated using this software program.
Keywords: clothing item, comfort, thermal insulation, vapour permeability, resistance to air permeability, air permeability, 2D system, 3D system.

1. INTRODUCTION

When determining the comfort and function of the clothes, there is a special role played by the connections between its defining parameters and the structural features of the plain surfaces, their correlation, as well as the way in which a series of the textile – physical characteristics limit some of the interdependencies.
The numerical values of the physical sizes which will be processed are generally obtained as a result of their measurements or calculus, and the comparison, if possible, to other size of the same type, taken as sample unit.
After choosing the unit system, the results of the measurements are expressed with the help of certain numbers. It is known that in the case of the measurements made with enough accuracy regarding a size, the results differ from one another and therefore they are affected by errors. In our case, from the multitude of selected layers, sorts and clothes, the experimental database is shown, with the

parameters which influence the comfort, without insisting upon the initial features or upon the type of identification.

One of the main problems of the mathematical processing of the experimental results is the assessment of the true values of the sizes measured according to the obtained results. In other words, after repeatedly measuring a size and obtaining a series of values - each of them with a certain unknown error – it is important to calculate the approximate value as accu rately as possible.

In this study we calculated two sets of data obtained following a large number of identifications of the textile-physical features, used to establish the main indicators which influence the comfort for clothes which are typical for the semi-season, meant for men, made of jacket and raincoat.

According to the known methodology [1], the comfort parameters for the clothes items were established in two technological variants: classical technologies and technologies for thermal gluing, in both cases having chosen the right basic material. We specify this because many of the variants which contain new materials based on microfibers or similar combinations.

As we may see from tables, the calculations were made both in environmental and lab oratory conditions, which created a large investigation field and which allowed the introduction of the corresponding elements. We mention that the large number of 100 variants included in tables correspond to complex researches performed along several pha ses. Therefore, the research is complex meaning that the values which are characteristic to the elementary layers are reflected in the characteristics which influence the comfort of the type, and their values in different combinations are reflected in special destination complexes. In this case it is about structures of clothes which include products and materials with new structural particularities.

Besides the measuring units, the graphics also show the meaning of the notes:

- Rvmed means the resistance at the passage of the vapour under environmental conditions;
- Rsumlab- the thermal resistance summed under laboratory conditions;
- Rsummed – the thermal resistance summed under environmental conditions;
- Rp – resistance to air passage;
- Pa – air permeability.

Generally speaking, the functional dependence of a variable y compared to another variable x can be studied empirically, as an experiment, making a set of measurements regarding the variable y for different values of the variable x. In this case the re sults correspond also to the group of dots in the representations.

The question in this case is to find the analytical representation of the functional dependence sought, i.e. to choose a formula that describes the experiment results.

For the processing in the 2D system, the variable y corresponds to resistances, and variable x to air permeability, on the one hand and thickness, on the other hand, and in the case of the processing in the 3D system there have been made couplings between resistance, air perm eability and thickness , or only between resistors. In fact the further representations confirm it.

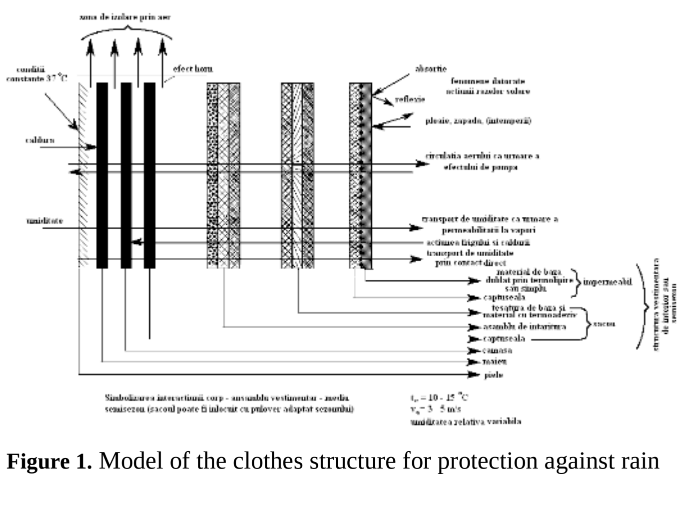


Figure 1. Model of the clothes structure for protection against rain

2. WAY OF WORK, RESULTS AND INTERPRETATIONS

In many case it is necessary to establish some artistic correlations between two or three sizes identified experimentally. These correlations are identified with the help of the statistic processing of a large volume of measurements, the classical calculation methods requesting – as we have already specified – a great work volume.

Generally speaking, any correlation of two physical sizes may be transcribed analytically with the help of a function as $y = f(x)$. If each variable is submitted to a random spreading, we have to use the methods of analysis of the correlation, which allow the determination of an average law regarding the behaviour of the variable y according to the other.

If any variable x is associate to the average of the values corresponding to the variable y, we obtain the regression function of y over x , graphically represented by the regression curve.

Excel spreadsheets program is able to determine the trend line (extrapolation) from the data plotted on a chars shaped as area, bar, column, line or XY diagram. You can select five types of regression: *Linear, Logarithmic, Polynomial, Power, Exponential.*

The program allows the display of the selected regression equation type as well as the value of the correlation coefficient, R^2.

1. Graphical representation of the point cloud (x_i, y_i)
   First we test the graphical representation of the point cloud coordinates (x_i, y_i). We subsequently declare the independent variable (x) and dependent variable (y). The chart (Fig.2) is obtained through the following steps:

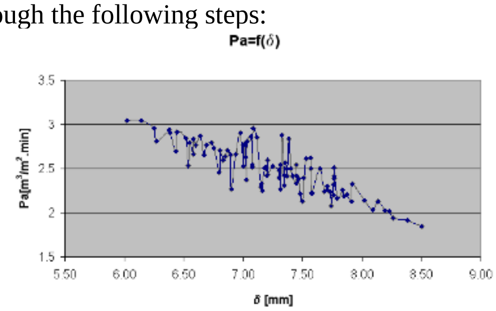


Figure 2. Air permeability variation depending on the thickness

3.AUTOMATED IDENTIFICATION OF THE EQUATION OF THE REGRESSION LINE

The equation of the regression line may be established directly, by using the previously elaborated point cloud chart. We right click the mouse on the point cloud, which will display the list in figure 3. From the list, we select the option ***Add Trendline***.

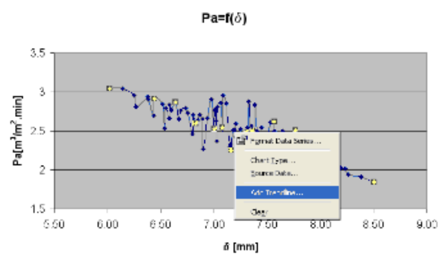


Figure 3 Air permeability variation depending on the thickness

The program allows the display of the mathematical model of the regression equation and of the correlation coefficient.

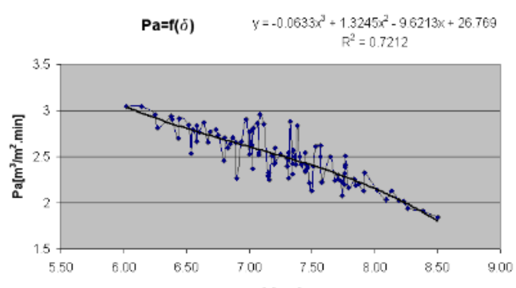


Figure 4 Air permeability variation depending on the thickness , Trendline, regression equation

The representation of the 3D diagrams was made with the app lication of ***TableCurve 3D v2***, designed by ***Jandel Scientific Softwaew.***
The data may be introduced directly into the window *TableCurve 3D editor* or they may be imported from the spreadsheet programs such as *Excel*, *Quattro Pro Windows* or *Lotus Windows* .

The user assigns to the values from the columns, the Ox, Oy and Oz representation axes.

The automated testing process for the strings of values is done in the following order:

- Polynomial XY equations (225 type)
- Polynomial Taylor series (18 types)
- Rational XY equations (256 types)
- Rational Taylor series (4 types)
- Non-linear equations : (168 types)

The program allows the display of the 3D diagram and of the list of equation in descending order of the correlation coefficient R^2 .
In addition to all the mentioned, the program displays the statistical information regarding the three series of analysed values.

4. RESEARCH VARIANTS AND INTERPRETATIONS

The results of the experimental research gathered in tables stood at the base of the estimation of the mathematical models of interdependence and of application of a certain procedure which should express accurately their authenticity.
Regarding the interconnection between air and thickness, as we may see in figure 5, between these parameters there is a linear interdependence, and the correlation coefficients in both cases are close to 0.85. The orientation of the regression lines in the system of orthogonal coordinates underlines a decrease of the air permeability compared to the thickness, and by testing the eq uivalency with the average values, the two terms of the regression equation are identical.
From the figures 6 and 7 we have the variations of the thermal resistance according to the thickness, for both testing conditions (laboratory and environmental), as well as for both types of technology.
In all the situations, the thermal resistance varies between the reasonable limits according to the season, that is 0.35 – 0.55 $m^2.h.^0C$/ kcal, and the thickness varies between 6 – 11.5 mm.
The vapour resistance also increases according to the thickness in both technological variants, underlining the fact that the limits are included between 0.7 -0.85 $mm.h.m^2/g$. It can be seen in figure 8.
According to figure 9 we elaborated the chart for the variation of the air re sistance according to the thickness. If the air resistance varies between 0.035 – 0.08 $mm.h.m^2/kg$, the limits for the thickness stay the same, i.e. 6 – 11.5 mm.
Several representations have been made in the 3D system, both in the classical technological va riant as well as in the variant where the basic material is doubled through thermal gluing. Thus in figure 10, we observe the way in which the vapour resistance, calculated under imposed environmental conditions, increases when the thickness increases and decreases when the air permeability increases. This is explained both physically and from the point of view of the definition of the vapour resistance, as well as from the point of view of the relation between body – clothes – environment; when the air streams increases, the air permeability increases, influencing both the thermal resistance and the vapour resistance, within very narrow limits.

5. BIBLIOGRAPHY

1.Mitu, S.(2000).Confortul şi funcţiile îmbrăcămintei (*Clothes Comfort and Functions*) . " Gh. Asachi" Publisher Iaşi 2000
2.Person R. (1997). Utilizare Excel (Manual de utilizare complet) (*The Use of Excel/ Complete User's Book*), Teora Publisher, Bucharest.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE MATHEMATICAL ANALYZE (2D AND 3D) OF COMFORT INDICATORS FOR SPECIAL GARMENT STRUCTURE (Part two)

Dulgheriu Ionuţ, Matenciuc Cristian –Constantin, Mitu Stan
Faculty of Textiles-Leather Engineering and Industrial Managementl, Doctoral School, Iasi

Abstract: In many cases it is necessary to establish some statistical correlations between two or three measures that are experimentally determined. These correlations are identified by means of the statistical processing of a great number of measurements, the traditional methods of calculus involving a considerable workload. When determining the comfort and the function of the clothing items, a special importance is placed upon the establishment of relationships among the defining parameters and the characteristics of structure of the plane surfaces from the ensemble, their correlation as well as the manner in which some of the textile and physical features condition some of the interdependences. The numerical values of the physical measures that are to be processed are generally obtained following their measurement or their calculation and the comparison, if the case may be, with another measure of the same type taken as a reference unit. In the present paper the authors calculated two sets of data obtained from a great number of determinations specific for the textile and physical characteristics in the establishment of the main indicators of influence of the comfort for clothing items intended for men for the cold season, being comprised of a coat and a raincoat. Regardless if it is about the 2D or the 3D representation, each figure also contains the interdependence equation as well as the correlation coefficient. It must also be specified that through the application of the above-mentioned software in the paper, numerous interdependence functions are displayed, but it was chosen the variant that most clearly expresses the interdependence between the parameters under study. The displayed mathematical models express the truthfulness of the interdependence, as they are related with the presented interpretations which, in turn, correspond to the technological variants under study on the one hand and to the calculus conditions on the other hand. It must also be noticed the connection among the data listed in the centralized tables, the graphical representations, the mathematical models and the correlation coefficients. In the present times, when the modern calculus technique is used, the traditional, laborious calculi should be dismissed in order to test the correlation hypotheses, the estimation of the mathematical model, the determination of the constants and of correlation coefficients and all these elements could be directly calculated using this software program.
Keywords: clothing item, comfort, thermal insulation, vapour permeability, resistance to air permeability, air permeability, 2D system, 3D system.

3. RESEARCH VARIANTS AND INTERPRETATIONS (continuation)

In figures 11 and 12, we analyse the relation between the **thermal resistance** and the thickness and air permeability, with very narrow values in both variants.
As for the air resistance, the representation in figure 13 is very explanatory, as we may notice a visible increase compared to the thickness and a decrease of it when the air permeability increases, which also varies between very narrow limits.
We also notice a visible interdependence between the thermal resistance, the vapour resistance and the air resistance (figure 14). Thus, if a high thermal resistance is requested, the values of the vapour and air resistance are also growing.
In figure 15 we notice how the vapour resistance increases along with the thickness, being maintained within constant limits compared to the air permeability, which for the analysed clothes structures is maintained within very narrow limits.
The summed thermal resistance calculated under laboratory conditions also increases along with the thickness and decreases with the air permeability. The 3D representation system underlines it (figure

16) .The same evolution is visible for the thermal resistance established under environmental conditions, being visible and important growth along with the thickness and a decrease along with the air permeability (figure 17). In figure 18 we have the representation of the complex function which expresses the interdependence between the air resis tance, thickness and air permeability. Physically and analytically speaking, it increases with the thickness and it decreases with the air permeability. The thermal resistance calculated under environmental conditions (figure 19), increases with the vapour resistance calculated in the same conditions, with the same evolution and compared to the air resistance.

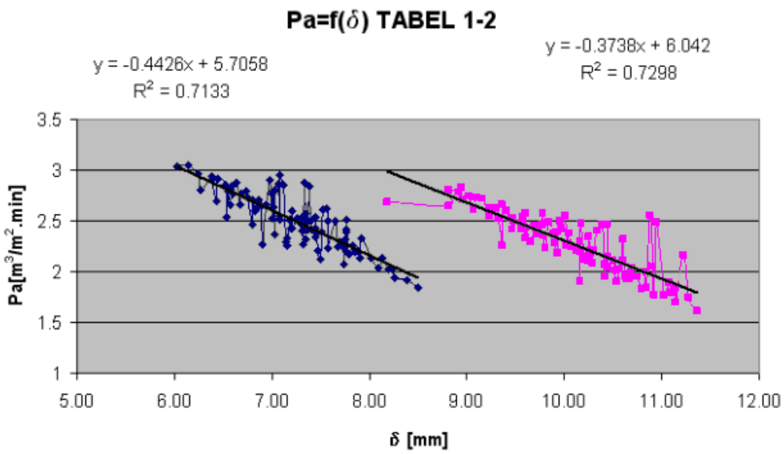


Figure 5. Air permeability according to the thickness

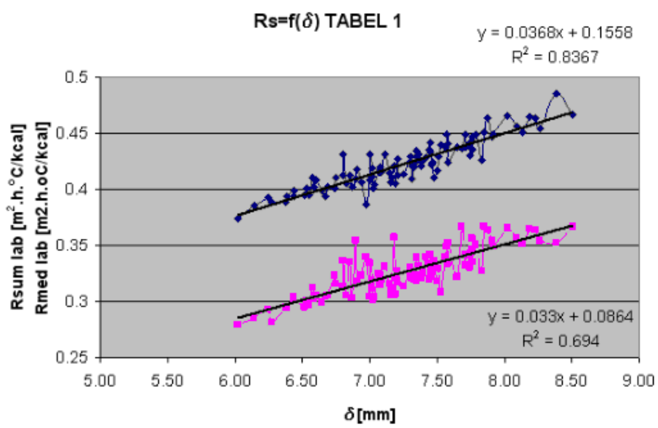


Figure 6. Thermal resistance according to the thickness, first version

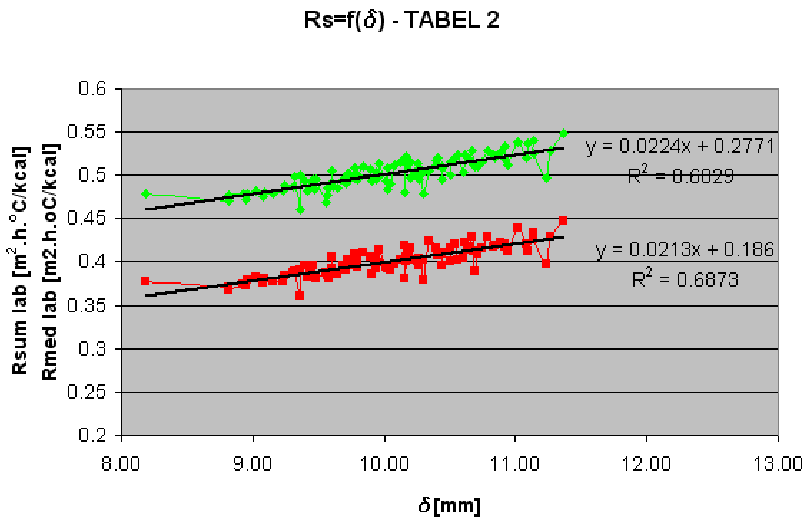


Figure 7. Thermal resistance according to the thickness, second version

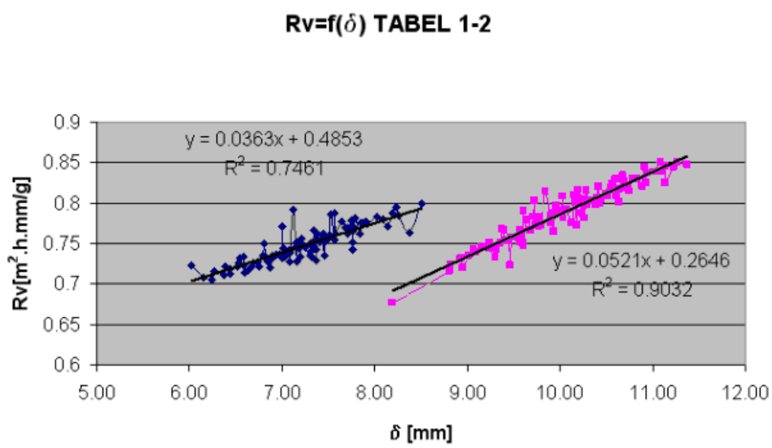


Figure 8. Vapour resistance according to thickness, both versions

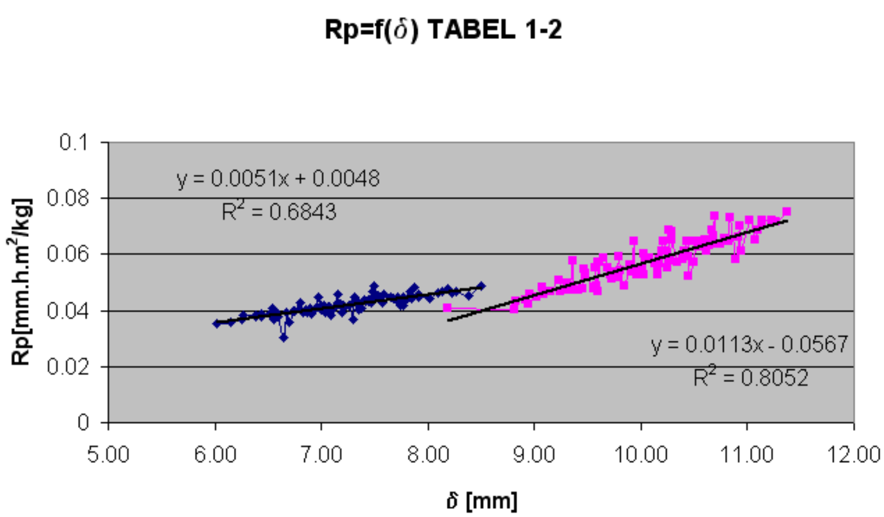


Figure 9. Air resistance variation according to thickness

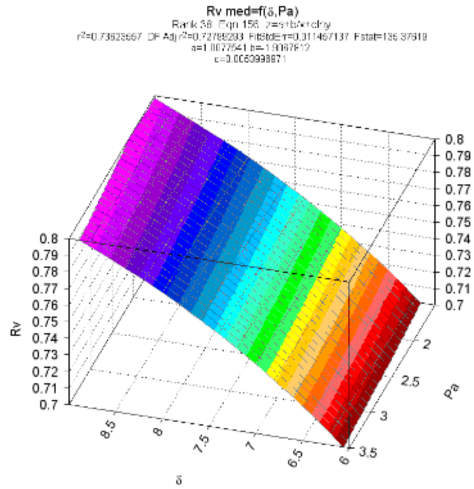


Figure 10 Relation between vapour resistance, thickness and ai r permeability

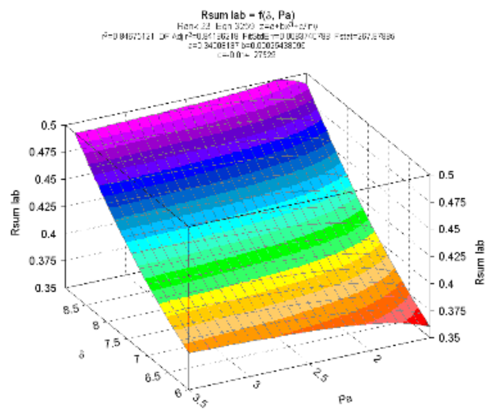


Figure 11 Relation between thermal resistance and the parameters of thickness and air permeability

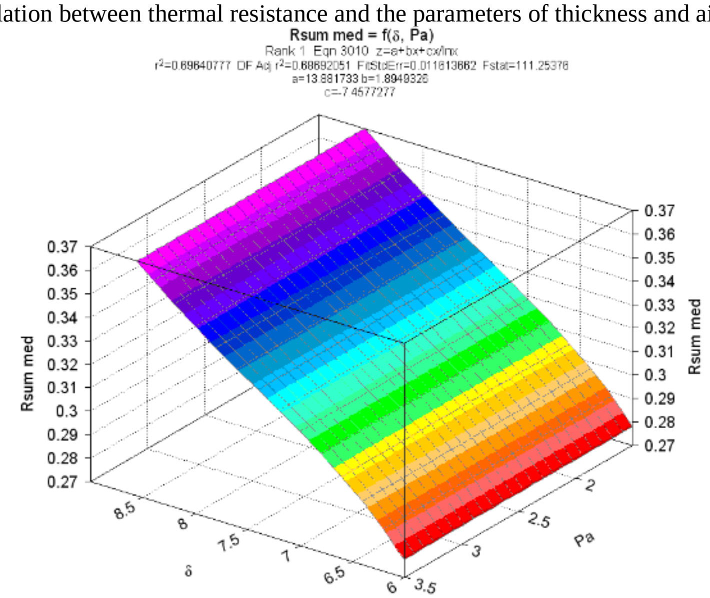


Figure 12 Relation between thermal resistance and the parameters of thickness and air permeability

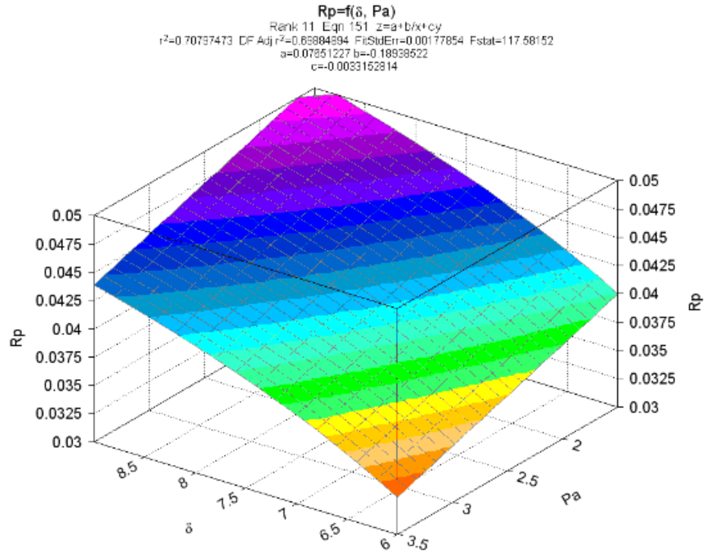


Figure 13 Tabel **1**

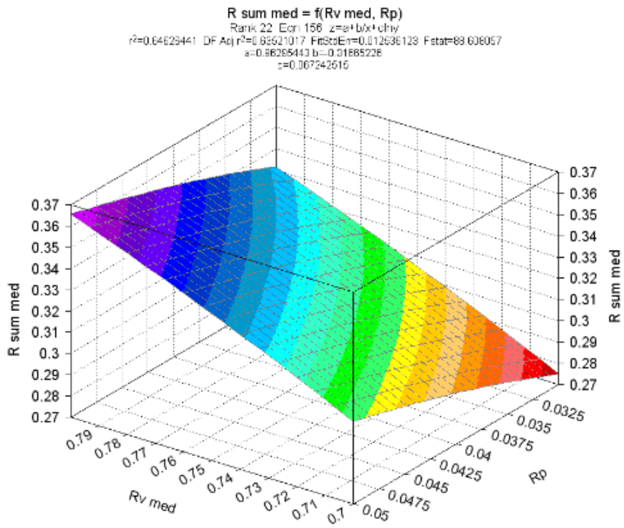


Figure 14. Relation between thermal resistance, vapour resistance and air resistance

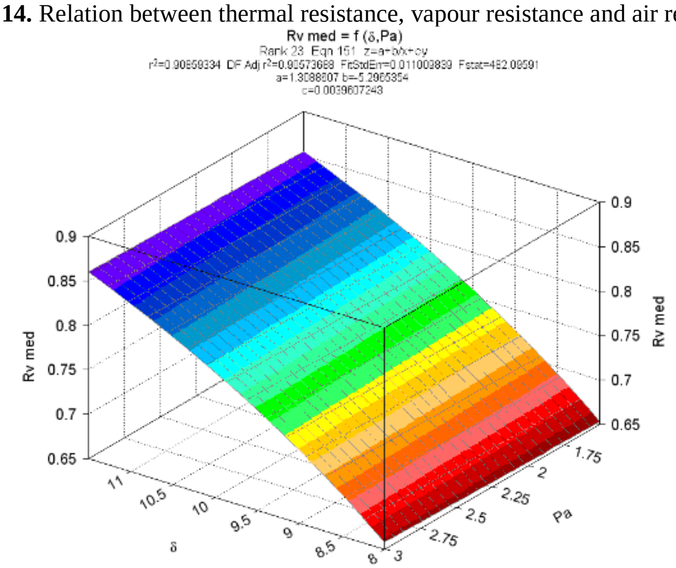


Figure 15 Relation between vapour resistance, thickness and air permeability

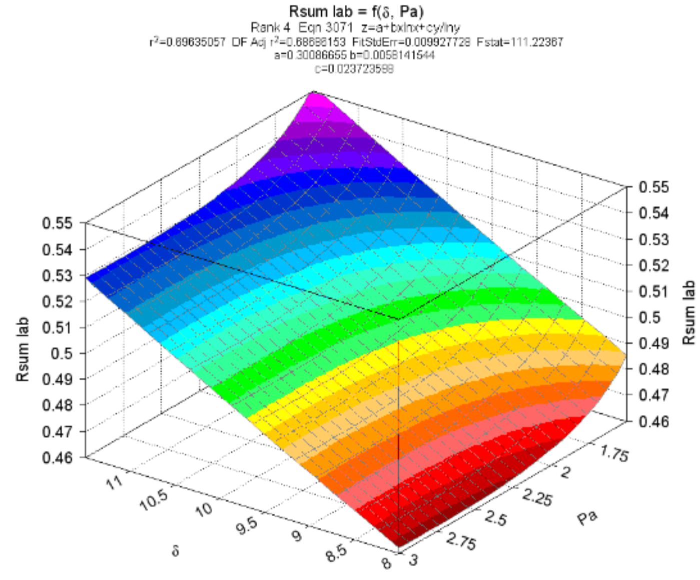


Figure 16 Relation between summed thermal resistance, thickness and air permeability

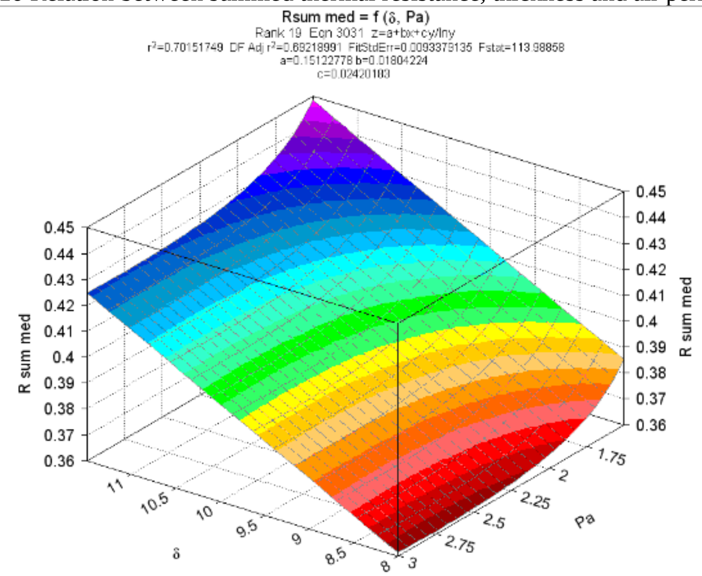


Figure 17. Relation between summed thermal resistance, thickness and air permeability

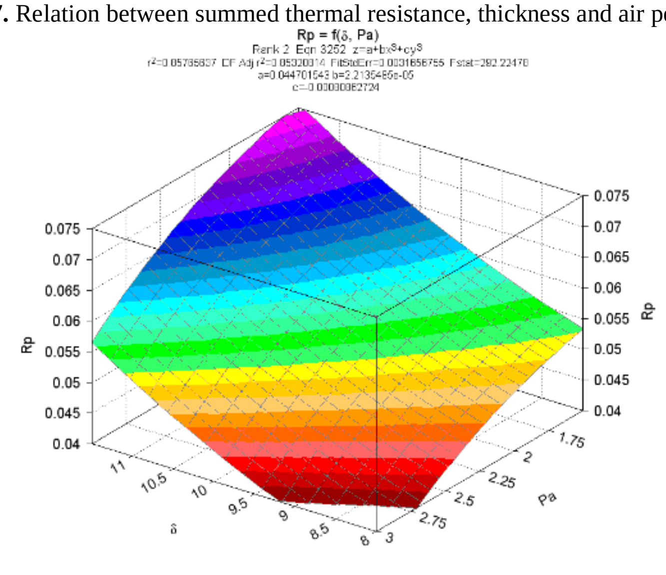


Figure 18 Relation between the air resistance, thickness and air permeability

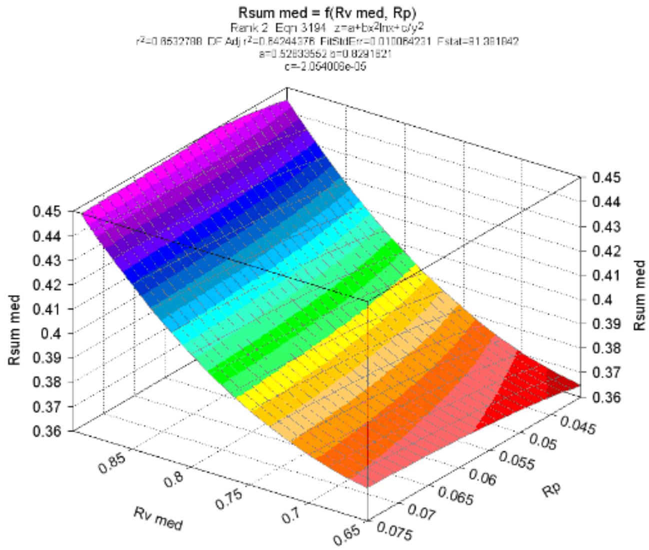


Figure 19. Relation between summed thermal resistance, vapour resistance and air resistance a

4. CONCLUSIONS

As a general conclusion, whether it be the 2D or 3D representation, the interdependence equation id written on each figure, along with the correlation coefficient. We also specify that, by applying this program, many interdependence functions ar e displayed, but we chose the version which bests expresses the interdependency between the studied parameters. The displayed mathematical models express the authenticity of the interdependence, because they are in relation with the presented interpretations which, on their turn, correspond to the technological variants studied and also to the calculation conditions. Notice also the connexion between the data on the tables, the graphical representations, the mathematical models and the correlation coefficie nt.

Notice also the fact that in the present times, when we have a modern calculation technique, we may give up the classic calculation methods for testing the correlation hypothesis, for estimating the mathematical model, for establishing the correlation constant values and the coefficients, and to establish all these elements based on the program.

5. BIBLIOGRAPHY

1.Mitu, S.(2000). Confortul şi funcţiile îmbrăcămintei (*Clothes Comfort and Functions*) . “ Gh. Asachi” Publisher Iaşi.

2.Person R. (1997). Utilizare Excel (Manual de utilizare complet) (*The Use of Excel/ Complete User’s Book*), Teora Publisher, Bucharest.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

ANALYSIS OF THE WOMEN CHEST SHPAPE AND IMPLICATIONS OVER THE PATTERN SIZING ON THE BUST LINE

Elena Filipescu[1], Emilia Filipescu[2]

[1.]Technical University "Gheorghe Asachi" Iassy, ROMANIA
[2.]Technical University "Gheorghe Asachi" Iassy, ROMANIA

Elena Filipescu: elena.filipescu@yahoo.com
Emilia Filipescu: emfi@tex.tuiasi.ro

Abstract: Designing the clothing using geometric method requires knowledge of a significant volume of initial information. Information about the shape of the body segments - areas for clothes support- plays a primary factor. For the products with support on the shoulders the bearing surface is defined on the upper side (in frontal plane) by the pectoral arch, anterior by the chest protuberance and on the posterior side by the shoulders protuberance. Sizing the patterns on the bust line and sizing the three related segments: back width (ls), width sleeve cut (LRM) and front width (LF) should be realized in close conjunction with the position on which the two body diameters are found on the body. The two d iameters which are characterizing the shape and chest size, are the front or transversal diameter (Dttor.) and anterior -posterior diameter (Y-p ing.).

This paper presents the results of researches that aimed the characterization of the women chest shape. T hese researches were done in order to obtain a proper sizing of the structural segments of the patterns on the bust line with positive repercussions on ensuring the dimensional correspondence between the body and product at the chest line.

Key words: pattern design, chest shape, selection, primary data, statistical processing, construction segments, clothing shape.

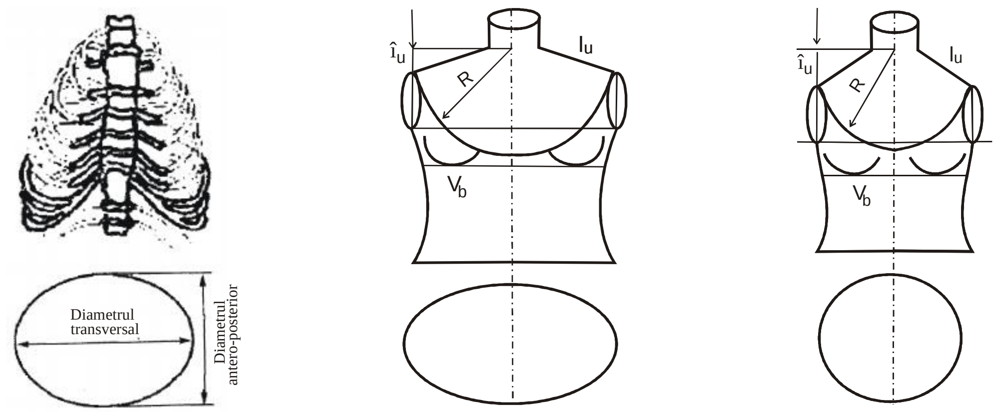
1. THEORETICAL CONSIDERATIONS OVER THE WOMEN CHEST SHAPE

The specialists gives a great importance to the chest shape as a support surface f or the cloth garments . In figure 1. is presented the rib skeleton (which determines decisively the chest shape) and the chest contour in section view with a transversal plan, drawn over the shoulders and bust projection. This section is characterized by the transversal chest diameter (Dttor.) and anterior -posterior chest diameter (Y-p ing.). The ratio of two diameters has a large variability thanks to the skeletal chest shape and to the musculature, adipose tissue deposition and development of the mammary gland in females as well. It is necessary to know the main report between the two diameters of chest shape characterization because it allows the bodies classification by this criterion with repercussions on the sizing of the three segments from the construction bust line.

In the literature, considering the ratio between the two diameters there are three basic forms:

- ✓ ***Normal chest*** with balanced development in the anterior-posterior and transverse plane, with Dttor> Let p tor.;
- ✓ ***Elliptical-shaped chest*** (chest flattened), characterized by higher values of Dttor. compared with those of normal chest;
- ✓ ***Circle chest,*** characterized by an almost identical development in the two planes, transverse and anterior-posterior.

In figure 1b is presented the elliptical chest shape and in the figure 1c is presented circular chest shape.



a) b) c)

Figure 1..The basic shapes of the chest

a) normal chest ; b) elliptical chest (flattened); c) circular chest

The front plane view of the chest and the view of the torso fro m the upper side provides information on the dimensional indicators that are influenced by the chest shape :

- ✓ Shoulder tilt;
- ✓ Bust peak position;
- ✓ Bust width;
- ✓ Shoulder length;
- ✓ Level of the anterior axillary's points;
- ✓ Distance between nipples points;

Thus, for the flattened chest:

- ✓ Shoulder angle has low values (raised shoulder position)
- ✓ axillary's anterior points, nipple points and shoulder protuberance points have a raised position, compared to the ones from the normal chest form
- ✓ flattened back;
- ✓ Increased bust width.

It should be noted that in the literature are not presented averages values and limits of variation for the three basic shapes of the chest.

In order to use the obtained information from the analyze of the chest shape to the pattern sizing on the chest line, a new indicator must be introduced, called the "chest shape" (FT), computed with:

Ft = Dttor. – Da-p tor.(1)

In this context, the chest shaped was analyzed in the following sequence:

- analysis of statistical parameters for characterization the variability of anthropometric sizes which define the chest shape, transversal diameter (front) of the chest (Dttor.) and anterior - posterior chest diameter (Y-p ing);
- Analysis of statistical parameters for characterization of the chest shape indicator (Ft) .

2. PRESENTATION OF EXPERIMENTAL RESULTS

To conduct the research were used the primary data obtained from an anthropometric investigation by 3D scanning method, for the grownup population of Romania, in a scientific research contract coordinated by INCDTP-Bucharest [2]

The research was conducted on a homogeneous and representative selection of volume n = 675 women aged between 20 and 65 years.

The two diameters (Dttor and Yes Tor-p) are the main factors for the calculation of the indicator for the chest shape evaluation Ft.

The primary data were subjected to the one-dimensional statistical processing, on the entire selection and classes formed based on age. Statistical parameters, which characterize the variability of anthropometric sizes, were calcula ted using the specialized software EXCEL to variables indicated above.

In Figure 2 are compared the average values calculated on the total selection and on classes formed by groups of age for the anthropometric sizes Dttor and Da-ap. Tor. , Within the relationship of calculation proposed for assessing bodies as chest shape (Ft) .

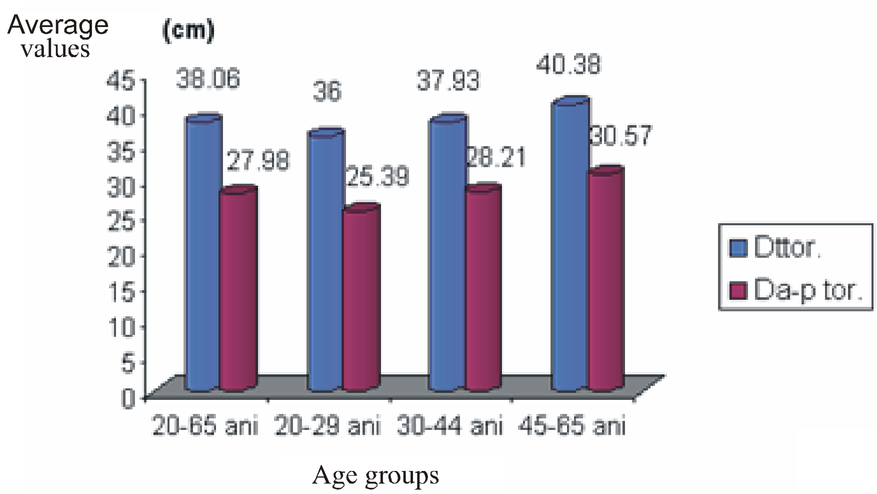


Figure. 2 Average values for Dttor. and Da-p tor., for the total selection and for the age groups

The results shown in Figure 2 allows the following conclusions

- for the total selection and for the age groups the Dttor. > Da-p tor with an average value of 10 cm
- for the younger age group (20-29 years) was recorded the lowest value for both diameters because both muscle and fat deposits values are low for young women;
- elder women have the highest values of these diameters due to uneven development and submission (but frequently on the thorax) of adipose tissue.

The coefficient of variation (CV) was calculated for the two diameters, for the total selection and for the age groups. The result can be viewed in figure 3.

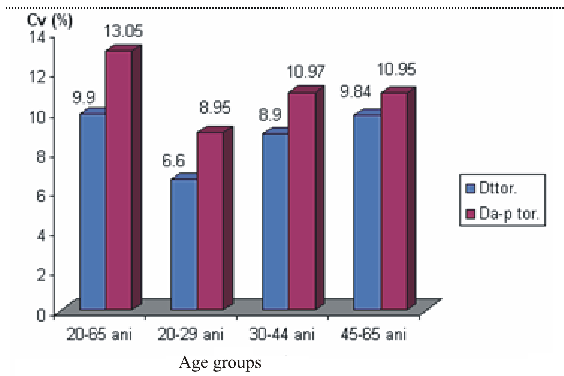


Figure 3. Cv (%) values, on total selection and on groups for the two diameters Dttor., Da -p tor.

Figure 3 shows that:

- the lowest variability is submitted for Dttor (for all age groups this anthropometric s ize presents a very high homogeneity);

- for Da-p tor the homogeneity is average, except the group which includes young women (20 -29 years),where the homogeneity is very high (CV <10%).

The fact that the two diameters do not have a high variability, recomm ends them to be used in assessing the general shape of the chest, using the proposed indicator (Ft).

The results of mathematical processing for the primary data, for Ft indicator are presented in Table 1.

Statistical parameters presented in Table 1 demonst rate the following:

- The average values, for the total selection and for the age groups are very close to the minimum and maximum values recorded for the age groups. This fact lead to a high amplitude for the group of elderly women, equal to the one regis tered on the total selection. This means that for this age group the variability for the indicator Ft is the largest, which is reinforced by the the value of CV (32.4%) and which is expressing a high variability of this indicator;

Table 1. Statistical parameters calculated for Ft indicators

Statistical parameters	(20-65 years)	20 – 29 years	30 – 44 years	45 – 65 years
X med. (cm)	10.08	10.61	9.72	9.81
Standard error	0.11	0.15	0.20	0.21
Median (cm)	10.30	10.70	9.80	10.00
Modulus (cm)	9.50	9.10	10.30	10.70
Deviation S_x (cm)	2.78	2.31	2.73	3.18
Dispersion S^2_x (cm^2)	7.72	5.33	7.45	10.08
Vaulting coefficient	1.37	0.36	0.09	1.69
Asymmetry coefficient	-0.45	-0.05	-0.29	-0.53
Amplitude (cm)	25.00	13.70	15.20	25.00
X min (cm)	-4.20	3.60	1.80	-4.20
X max. (cm)	20.80	17.30	17.00	20.80
Selection Vol.	675.00	252.00	189.00	234.00
Variation coefficient Cv (%)	27.55	21.77	28.08	32.38
Average test selection $t\bar{x}$	3.63	4.59	3.56	3.09

- For all age groups resulted that subjects have the chest with a balanced development in transversal and anterior-posterior plane. For the persons of average age and for elderly persons the average value for Ft is lower then the average value for the total selection. It can be noticed in this case a higher occurrence in these age groups of the circular chest;
- CV for the total selection and for age groups shows great variability of Ft indicator;
- the entire selection and for the age groups $t\bar{x} > t_{Student}$, meaning that selection is significant in statistical report. The conclusions learned from its analysis can be extended to the community level from which the selection was taken.

Based on the average selection (X med.), Sx parameter and information from the literature [3] was established the range for the subjects with a normal shape of the chest (Ft_N), using the mathematical relation

$Ft_N = X_{Ft} \pm S'x_{Ft}$ where: (2)

X_{Ft} reprezts the average value for the total selection, for the Ft indicator;

$S'x_{Ft}$ - detection limit, is calculated with the mathematical relation :

$S'_{Flt} = 0,8\ Sx_{Ft}$: (3)

Sx_{Ft} - deviation for Ft

The following areas have been established for the chest types, based on indicator Ft:

- ✓ circular chest shape , Ft < 7,9 cm
- ✓ normal chest shape, Ft = 10±2 cm (8 ÷ 12 cm)
- ✓ elliptical chest shape (flattening) Ft> 12.1 cm

On the selected population was performed an analysis over the affiliation of the subjects to one of the three chest shapes: circular shape, normal shape and flattened shape. In the figure 4 is presented by graphic the relative frequency of the subjects to the three chest shapes. Figure.4. shows that on the total selection most of the subjects have a chest shape with balanced development in transversal and anterior-posterior plane (normal thorax) but also that the on the total selection there are subjects with a flat chest (21.6%) and subjects with a circular thorax (19.7). On the total selection was made also an analyses over the relative frequency (fi) of subjects affiliation, on total selection and on group selection made on age criteria.

In Figure 5 is graphically presented the relative frequency of the subjects with circular chest shape. It can be noted that middle-aged women and older represents the highest percentages of subjects with circular chest shape then younger women. This fact is explained by the rounded shape of the chest due to fat deposits, specific to these age groups

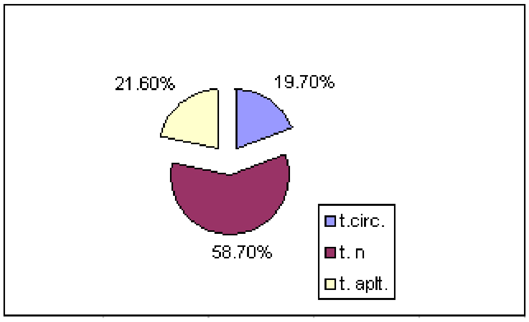


Figure .4. Relative frequency of the subjects for the base shapes of the chest

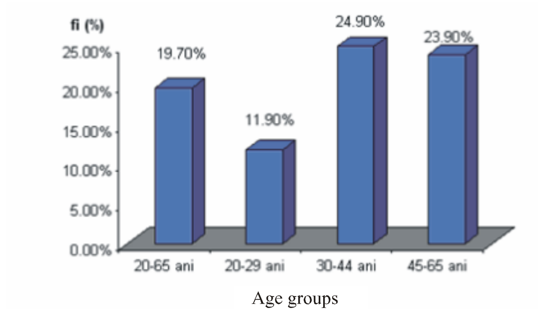


Figure 5 Relative frequency of the subjects with circular chest shape

In figure 6 is graphically presented the relative frequency of the subjects with normal chest shape. It can be noted that middle-aged women and older represents the lowest percentage of subjects with normal chest shape than young women. This is explained by the rounded form of the chest due to fat deposits, specific for theseage groups.

In figure 7 is graphically presented the relative frequency of the subjects with flat chest shape. It can be noted that for this type of chest shape, the relative freq uency has close values for both the total selection and group selection. , which is explained as: this chest shape is the most influenced by the shape of the rib cage, so by the skeleton. It was found that there are not significantly differences from one age group to another.

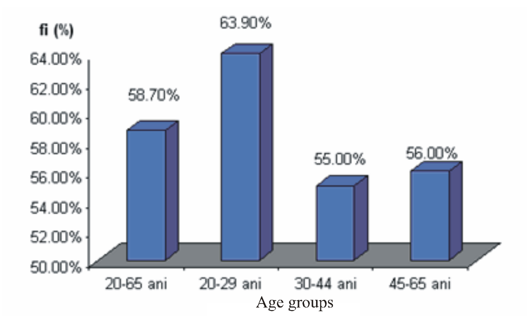


Figure 6 Relative frequency of the subjects with normal chest shape

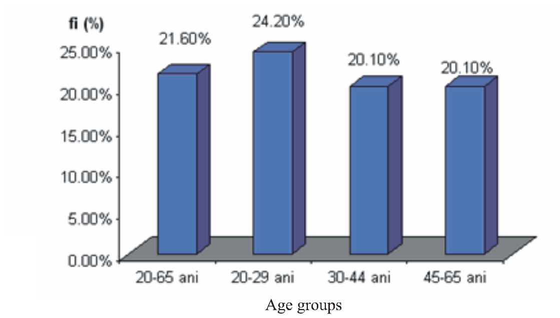


Figure 7. Frecvenţa relativă a subiecţilor care prezintă torace de formă aplatizată

In figure 8 can be viewed the outline of the chest and the appropriate areas of the body, back width (a), lateral zone width, corresponding to the outer sleeve of the patterns (2) and face width (3).
In figure 9 can be noticed the constructive segments of the basic pattern, matching those on the body.

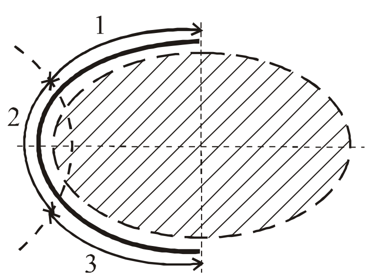


Figure 8. Chest outline with the appropriate areas of the body

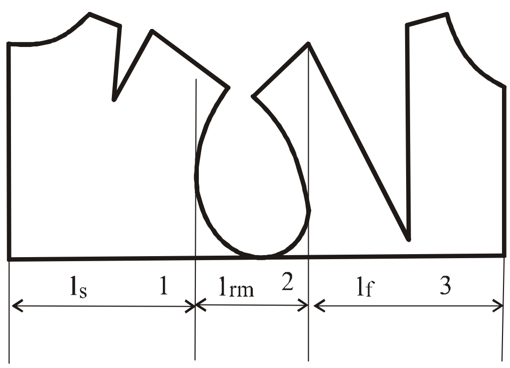


Figure 9. Constructive segments from the bust line

Characterization of the chest shape using the proposed indicator (Ft) allowed the adoption of proportionality relations used worldwide [4] for the sizing of the bust line segments as it is shown in table 2.

Table 2. Sizing relations of the constructive segments of the bust line for the three variants of chest shape

Normal chest	Flattered chest	Cylindrical chest
ls = 1/8Pb + 5,5 cm = 17 cm lrm = 1/8Pb –1,5 cm = 10 cm lf = 1/4 Pb – 4 cm = 19 cm	ls = 1/8Pb + 6 cm = 17 cm lrm = 1/8Pb –2,5 cm = 9cm lf = 1/4 Pb – 4 cm = 19,5 cm	ls = 1/8Pb + 5,5 cm = 17 cm lrm = 1/8Pb –0,5 cm = 11 cm lf = 1/4 Pb – 5 cm = 18 cm

The values of the constructive segments from the table 2 correspond to the chest perimeter (Pb) 92 cm (without using the structural additions). It appears that the proposed sizing for the three segments of the bust line reflects the fact that for the bodies with flattened chest it must be decreased the width of the outer sleeve segment and for the cylindrical shape bodies the same segment design should be increased, in both cases compared with the amount used for bodies with normal chest.

3. CONCLUSIONS

- Female chest shape was evaluated based on the diameters which are defining the specific region from the body, transversal diameter of the chest (Dttor) and anterior-posterior chest diameter (Da-p tor). After the research it was found that this anthropometric dimensions that influence a range of body sizes which are important for clothing designing have a small variability and medium variability for the investigated population (the highest variability was found for Da-p tor).

- The introduction of the indicator for the assessment of the chest shape (FT) allowed determination of the frequency of meeting of the investigated subjects for the three types of chest resulted from the present study: normal thorax, elliptical and cylindrical

The research of the distribution of the subjects from the studied age groups on the three chest shapes shows the following:

- 63,9% from female from the young age group have the normal chest shape, 24,2% flattened chest and 11,9% circular chest shape;

- for the grown up women and for elder women, the frequency for the normal chest shape is of 56% and the circular chest shape has a frequency of 24-25%.

Characterization of the chest shape using the proposed indicator (Ft) allowed the adaptation of the proportionality relations used worldwide [4] for the sizing the segments from the bust line, back width (ls) for outer sleeve width (LRM) and face width (LF).

4. REFERENCES

1. Şerşneva L., P. , Larikina L. V., Konstruirovanie odejdî (Teoria i praktika), Forum-Infra-M, Moskva, 2006.

2. x x x. Reaserch Contract : Domestic clothing market development using 3D scanning method to identify specific anthropometric characteristics of the population in Romania 2007-2009, coordinator INCDTP-Bucureşti.

3.Filipescu, E., PhD tesis " Contributions to optimize clothing construction to provide corresponding dimensional body-clothing system elements in static and dynamic", Iasi, 1998

4. x x x. Revista „Atelier, 2004

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

RESEARCH REGARDING THE PHYSICAL PROPERTIES OF THE WEFT KNITS WITH THE BASIC STRUCTURES

Daniela-Smaranda IONESCU[1], Marina ROMAN[2], Costea BUDULAN[2]

[1] *University of Oradea, Oradea, ROMANIA*
[2] *"Gheorghe Asachi" Technical University of Iasi, Iaşi ,ROMANIA*

Corresponding author: Daniela-Smaranda IONESCU, dionescu@uoradea.ro

Abstract: Dimensional stability represents the capacity of knits of maintaining their form and dimensions during their use. The study of dimensional variations has been carried out on 27 knit samples, whose diversification is obtained by modifying the technological parameters, more exactly the stitch forming depth and knit pulling. For the jersey structured samples, the pull value is 10% smaller than the normal one and brings changes to the porosity values of 4%, from the standard value (WM = 3,4). The variation interval of the porosity for the jersey fabric is 82,23 – 87,99%. For the rib fabric samples there haven't been noticed major changes, no matter the values of the stitch forming depth and pull used, the variation interval being between 87.82 and 88.82%.

Key words: technological parameters, apparent fabric density, fabric compactness

1. INTRODUCTION

Dimensional stability represents the capacity of knits of maintaining their form and dimensions during their use. The study of dimensional variations has been carried out on 27 knit samples, whose diversification is obtained by modifying the technological parameters, more ex actly the stitch forming depth and knit pulling.

2. RESEARCH REGARDING DRY STATE LAY KNITS DIMENSIONAL STABILITY

The study of dimensional variations has been carried out on 27 knit samples, whose diversification is obtained by modifying the technological parameters, more exactly the stitch forming depth (NP) and knit pulling (WM).
The values of the technological parameters used in the making of the 27 samples are represented in Table 1.
For the evaluation of the dimensional changes have been calculated [1]:

- The coefficient of length $\mathbf{C_L}$**,** width $\mathbf{C_l}$ and the surface C_S changes, using the following relationships:

$$C_L = \frac{B_f - B_i}{B_i} \cdot 100, \quad [\%] \tag{1}$$

Table 1: NP and WM values according to the samples

Knitted structure	NP-Stitching levels	WM Knit pulling
Single Jersey	11.5	3.4-10%, 3.4, 3.4+10%
	12.0	3.4-10%, 3.4, 3.4+10%
	12.5	3.4-10%, 3.4, 3.4+10%
Rib 1x1	11.5	3.4-10%, 3.4, 3.4+10%
	12.0	3.4-10%, 3.4, 3.4+10%
	12.5	3.4-10%, 3.4, 3.4+10%
Purl	11.5	3.4-10%, 3.4, 3.4+10%
	12.0	3.4-10%, 3.4, 3.4+10%
	12.5	3.4-10%, 3.4, 3.4+10%

$$C_l = \frac{A_f - A_i}{A_i} \cdot 100, \quad [\%] \qquad (2)$$

$$C_S = \frac{A_f \cdot B_f - A_i \cdot B_i}{A_i \cdot B_i} \cdot 100, \quad [\%] \qquad (3)$$

Where:

- Af, Bf represent the final, after the relaxation values of the step and the height of the stitch
- Ai,Bi are the initial values of the step and height of the stit ch

» The apparent fabric density, ρa, [g/cm3], which represent the mass of the volume unit, Va which includes, besides the yarn volume and capillary pores air,

$$\rho_a = \frac{M}{g_t} \cdot 10^{-3} \qquad (4)$$

Where:

- M – the mass of the surface unit [g/m2]
- gt – the fabric thickness [mm]

» The fabric porosity, P[%], represents the air percent included both in the yarn and the free spaces in the fabric

$$P = \frac{\rho_r - \rho_a}{\rho_r} \cdot 100, \quad [\%] \qquad (5)$$

Where:

- ρa – the apparent fabric density
- ρr – the real density

» The fabric compactness, Ct, repres ents the fraction between the apparent and the real density

$$C_t = \frac{\rho_a}{\rho_r} \cdot 100, \quad [\%] \qquad (6)$$

The structure parameters established experimentally for the 27 samples are:

- · Horizontal density Do(s/5cm), vertical density Dv(r/5cm)
- · The stitch yarn length lo (mm)
- · The mass of the surface unit M/m2
- · Fabric thickness (mm)

Calculated structure parameters: Step A and height B of the stitch

A = 50/Do, [mm] **(7)**

B = 50/Dv, [mm] **(8)**

The length changes jersey structure samples are contained in the interval 1,88 – 5,61%, the biggest values being recorded at the density level of 12.5 and the pull with 10% smaller than the normal values. The surface change coefficient for the jersey fabrics increases at the same time with the change

of the stitch levels. Therefore, for large density levels we record large values of the surface change coefficient (fig 1).
The biggest width dimensional changes have been obtained by modifying the pull with a value of 10% bigger than the normal one in the case of jersey fabric.
It has been noticed that for the rib fabrics the dimensional variation is the most pronounced on the stitch course direction, the biggest value recorded being of 5.2% for a stitching level of 12.5 and a pull's value bigger by 10% than the normal one. The biggest value of the stitching level used in the study brings the biggest surface changes in the case of the rib fabrics, the values of this coefficient varying directly proportional with the pull values (fig 2).
For the purl fabrics, the dimensional variations between the three levels of the stitch forming depth correlated with the three values of the pulling mechanism are very small, the variation interval being between 1,92 and 3,9% (fig 3).
Of the three base links used, the biggest dimensional variations both in leng th and in width have been pointed out at the jersey fabrics. The big dimensional changes of the jersey fabric are explained by the migration of the yarn in the structural element, comparatively with the other base links that are more stable.

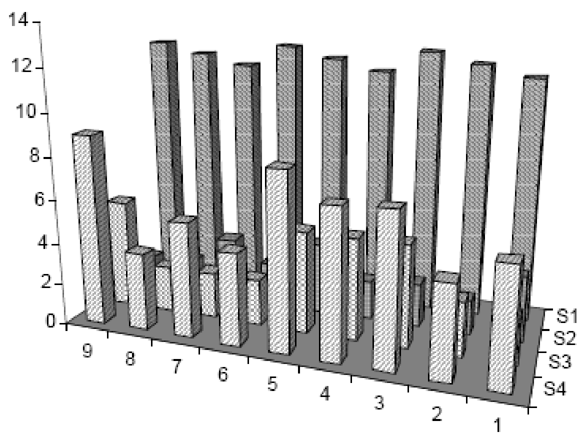


Figure 1: The values of the coefficient for the length, width and surface changes of the jersey fabrics:
S1 – The coefficient for the length change; S2 – The coefficient for the width change; S3 – The coefficient for the surface change, S4 – stitch depth

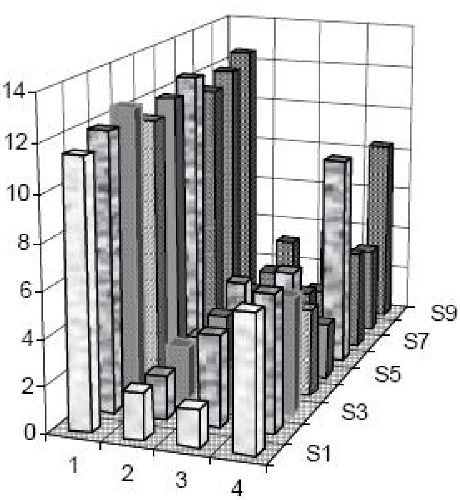


Figure 2: The values of the coefficient for the length, width and surface changes of the rib fabrics;
S1 – The coefficient for the length change; S2 – The coefficient for the width change;
S3 – The coefficient for the surface change; S4 – stitch depth

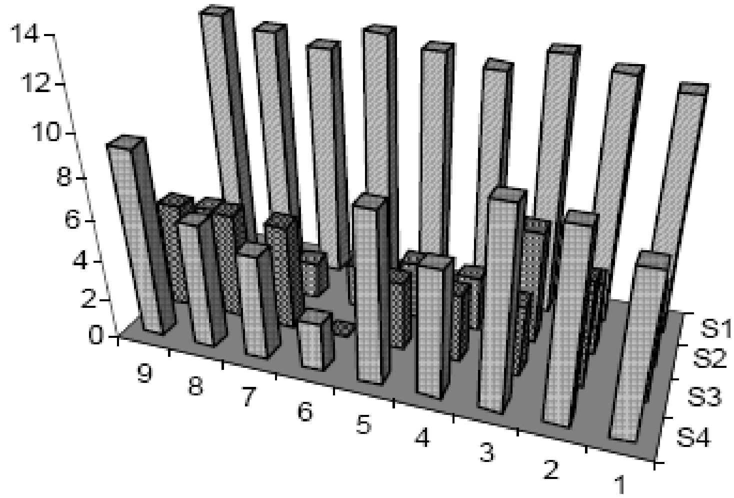


Figure 3: The values of the coefficient for the length, width and surface changes of the purl fabrics

From the three base links, the purl fabrics have the biggest porosity value, having as a determining technical parameter the value of the fabric pull. Therefore, the variation of the porosity values function of fabric pull for the studied samples is in the 0.12 – 4.4% interval.
For the jersey structured samples, the pull value is 10% smaller than the normal one and brings changes to the porosity values of 4%, from the standard value (WM = 3.4). The variation interval of the porosity for the jersey fabric is 82.23 – 87.99%.
For the rib fabric samples there haven't been noticed major changes, no matter the values of the stitch forming depth and pull used, the variation interval being between 87.82 and 88.82%.
Considering the fact that the fabric compactness varies inversely proportional with the fabric porosity, the biggest values of this property being are obtained for the rib fabrics with NP = 11.5 and WM = 3.4 +10%.

3. CONCLUSIONS

The most pronounced dimensional changes have been pointed out at the jersey fabrics, the determinant factor being the stitch forming depth.
The jersey and purl structures with NP = 12,5 and WM = 3,4 – 10% can be used with good results for hot season clothing, assuring the ventilation and the humidity transport at the skin level.

4. REFERENCES

1. P. Elsner, K. Hatch, W. Wigger – Alberti, *Textiles and the skin*, vol.31, Karger 2003
2. Rebenciuc C., Anand S.C., "Effect of knitted structure and fabric density of dimensional properties of weft knitted fabric "Inovation –Technics –Educations in the textile and garment industry Budapest/Hungary 2001
3. Rebenciuc C., Preda C, Wang Rong Rong, Feng Xun Wei "Research regarding stability of the interlock fabrics "The Bulletin of the Polytechnic Institute in Iasi Tome XLVI, Fasc. 3 -4, 2000

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

RESEARCH AND EVALUATION OF THE IMPROVEMENT SOLUTIONS FOR THE TAKE – DOWN DEVICE

Lecturer PhD. Eng. Liliana Lutic

"Gh. Asachi" Technical University, Faculty of Textile and Leather, Iaşi, România

Abstract: This paper presents the current and future state of the take – down device of the knitting machines. The improvements brought to the take – down device of knitting machines are punctually presented emphasizing their advantages in practice.
Key words: take – down device, knitting machines, improvements, advantages.

1. INTRODUCTION

Ensuring the optimal knitting conditions as well as knitted fabric quality is possible when the take - down and wrapping of the fabric takes places correctly. For this, the take down mechanism has to ensure:

- constant take-down tension on all wales of the fabric, and thus obtain uniform stitches throughout the fabric;
- constant adaptation of the take-down tension to the fabric structure and yarn;
- minimal sliding of the knitted fabric on the take-down rollers;
- fabric stretch in order to eliminate creases on the margins;
- optimal wrapping of the fabric.

Considering these basic principles of the take-down mechanism used on knitting circular machines, there were numerous improvements, with regard to the construction of these mechanisms, as well as in the posibilities of adjusting the speed and take-sown tension.

2. DEVELOPMENT SOLUTIONS FOR THE TAKE-DOWN DEVICE OF KNITTING MACHINES GENERAL INFORMATION

❖ One of the improved solutions is the **Cadratex system** (Figure 1).

This systems is made of 2 T shapped arms which guide the tubular knitted fabric from both sides following a surface that allows the passage from a tubular form to a flattened one without straining the knitted fabric (length, nor widthwise).

The Cadratex System offers the following advantages [1, 2, 3, 5]:

- Avoides deformation (bowing) of the rows in the knitted fabric (the stitch row line is maintained horizontal);
- Equalizes the take-down tension in all stitch wales, resulting an uniform knitted fabric throughout its whole width;
- Because the take-down is uniform, the value of the take-down tension can be reduced with the following benefits:
  - ✓ reducing the stitch strain;
  - ✓ diminishing the loop forming mechanism wear results in prolonging its functioning period;

- ✓ reducing the yarn strain implies a cut-out in defects of the knitted fabric;
- ♦ Posibility of reducing the pressure between take-down cylinders this way decreasing the risk of deforming the knitted fabric;
- ♦ Adjustements of the machine are simpler.

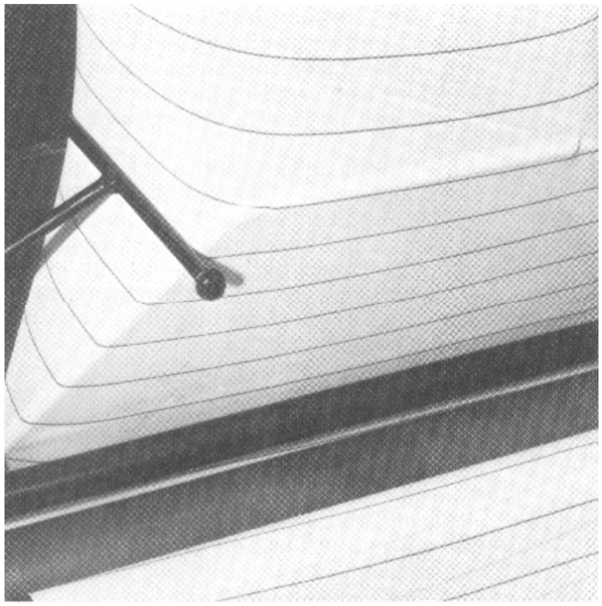


Figure 1. CADRATEX System

- ❖ Another solution regarding the optimization of the take-down process is presented in Figures 2 a and b and is reffering to **the shape and placement of the take-down and compresion cylinders**.

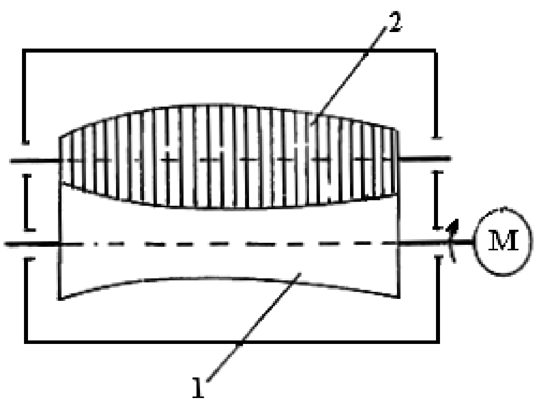


Figure 2. The take-down device with discs

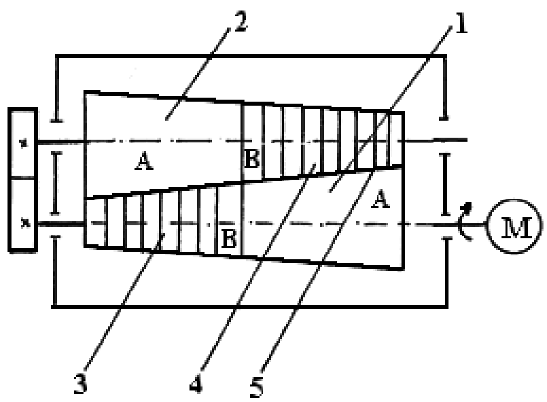


Figure 2. The take-down device with diagonal rolls

In Figure 2 a, **the driving monobloc take-down cylinder** (1) **represents all rotation surfaces with the variable diameter**, while **the compression cylinder** (2) **consists of discs placed on a common axis**, eliminating the sliding of the knitted fabric and the modifications of the take-down speed throughout the knitted fabric.

The problem in the uniformity of the take-down forces throughout the fabric circumference can be solved using **diagonal take-down rolls** (see Figure 2 b). Rolls A, B have 2 component parts. The compact parts (1), (2) of the cylinders ensure the take-down (determining the take-down speed and tension), while the discs (3), (4) have a compression role avoiding the fabric sliding [4].

- ❖ The **TERROT** company uses a **double wrapping take –down system** for its machines (Figure 3).

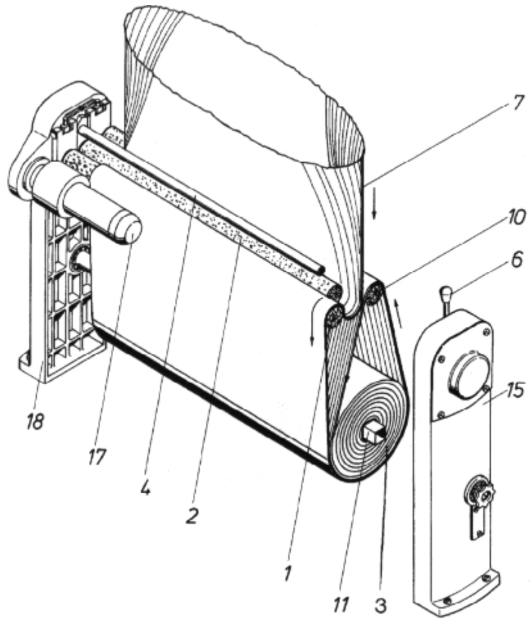


Figure 3. The take-down device with double wrapping -TERROT

The ensemble of take-down cylinders (1, 2, and 10) ensures the movement of the knitted fabric (7) during take-down and wrapping on cylinder (11). The take-down cylinder (2) is fixed on the bearing blocks (15, 18), being driven by a DC motor (17). The adjustment and control of the take-down is carried out through controlled variation of the current intensity (generated by an electromagnetic field). The knitted fabric (7) goes between cylinders (2) and (10), above cylinder (1) and wraps around cylinder (11), this way driving the fabric roll (3).
Because all 3 take-down cylinders have the same the peripheral speed, the length of the wrapped fabric is equal to the length of discharged fabric.

The advantages offered by this system are:

- elimination of the actual take-down mechanism;
- uniformity of fabric tension during its wrapping;
- wrapping the knitted fabric in a relaxed state;
- maintaining constant take-down speed.

- Performance improvement of the take-down mechanism can also be by adapting some **electronical devices for control and adjustment of the take-down tension**.
- One must also consider the **tendency of encreasing the height of frame**, in order to increase the fabric roll diametre up to 1m diameter.
- **The protection system for the take-down zone and fabric wrapping has reinforced plastic gates, with large porthole,** which ensures visibility of the fabric roll, protects the knitted fabric against soiling, and allow a quicker cleaning of the machine.

Among the special constructive modifications, affecting the knitted fabric quality and equipment efficiency, the following can be mentioned:

- **Fabric splitting and flat sheet wrapping device**, presented in Figure 4.

The device contributes to eliminating the center creases, appearing on the finished tubular fabrics and flat sheet fabric wrap.
Currently, this device is used for knitting machines made by VIGNIONI, LIEN YUAN – Taiwan and KEUM YONG – Korea [6].

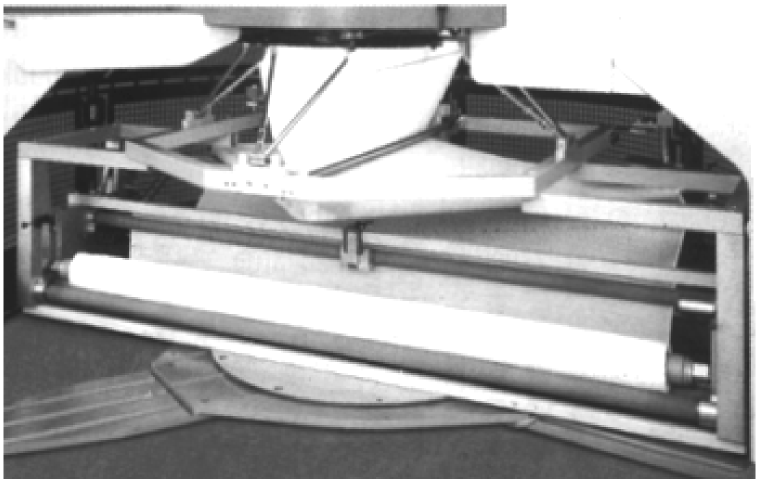


Figure 4. Knitting machine equipped with fabric splitting device and flat sheet wrapping

- **Automation of knitted fabric cutting – roll removal – fabric edge rewind.**

The solution is an „automation" attempt associated with high productivity circular machines. This solution has been first presented at ITMA'91 by MONARCH, under the name of AUTODOFFER. Currently, this solution is also used by KEUM YONG [6].

The development of different components interchangeability that is specific to the circular machines, obtained through the application of CAD technologies leads toward the third millennium "MECANO" machines where the assembly of different components can be made by the user, depending on its requirements [6].

10. CONCLUSIONS

The improvements of the fabric take-down and wrapping mechanism on circular knitting machines ensure:

- quality of the knitted fabrics by avoiding stitch deformation and maintaining the fabric tension at a low and constant value;
- Reducing the yarn stress, therefore reducing the number of fabric defects;
- The fabric relaxation process right on the machine;
- Adjustment of the compression force between take-down cylinders depending on the fabric structure;
- Increase in knitting machines productivity by large-sized fabric rolls.

11. REFERENCES

1. Lutic, L., "Contributions to the Design and Quality Evaluation of Weft Knitted Fabrics", Doctoral thesis, Iaşi, România, 2005
2. Iyer, Mammel, Schach, "Circular Knitting", Meisenbach, Bamberg, Germany, 1995
3. Lutic, L., " Research and evaluation of technical solutions for knitted quality protection ", Doctoral paper, Iaşi, România, 2000
4. Svoboda, P., "Fehlererkennung in Groβrundgestriken", Meliand Textilberichte 2 /1981
5.* * *, Prospects of IRO – MEMMINGER
6. * * *, Prospects of ITMA participants

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

ELASTIC KNITTED FABRICS FOR MEDICAL OR NONMEDICAL PURPOSES

Laura Macovei.[1], Viorica Cretu [2], Elena Moisescu[3]

[1] Technical University"Gheorghe Asachi", Iaşi, ROMANIA
[2] Technical University"Gheorghe Asachi" , Iaşi, ROMANIA
[3] Technical University"Gheorghe Asachi" , Iaşi, ROMANIA

Corresponding author: Laura Macovei, E-mail address: lmacovei@tex.tuiasi.ro

Abstract: There is a permanent preoccupation of the textile specialists for the textile in general and peculiar for knitted (weft or warp knitted structures) product diversifications. They are interested for technical textile productions and also for textile with other special destinations. The domain of technical textiles on one side and that of textiles for special destinations on the other size, a component part of the textile sector, is characterized by complexity and diversity structure. The paper deals with the elastic (weft or warp) knitted fabrics for different compressive applications in medical field, sport domain and special destinations quotidian life niches.
Key words: elastic knitted fabric, compression role, medical destinations, bodice articles

1. INTRODUCTION

The technical textile sector is a divers and dynamic one, comprising a wide range of materials, products, processes and applications. Nowadays, the technical textiles sector is regarded as the most fast changing sector of the global textile industry, due to the innovation in new materials, processes and their applications. Although "technical" textiles have drawn the attention in the last 20-30 years, the utilization of fibres, yarns, knitted fabrics, woven fabrics for other applications than clothing, furniture, is not a new phenomenon; it is not even exclusively related to the apparition of modern man - made fibres and textiles. The evolution of industrial and technical applications for textiles has a long history and generally, the production of the textiles is focused on new materials, processes and applications. A definition[1] of technical textiles shows that these are "technical materials and products manufactured especially for their technical and performance properties rather than for their aesthetic or decorative characteristics" or "textile materials and products manufactured especially for being used in products, processes or services which belong mainly to certain non-textile industries".
Complexities and diversity of the technical textile make some problems in their classifications, so that there is different point of view for this. Techtextil, as the leading international exhibition and seminar forum for technical textile, defines 12 main end-use markets for technical textiles [2]

- Agrotech - Agriculture, aquaculture, horticulture and forestry
- Buildtech - Building and construction
- Clothtech - Technical components of clothing and footwear
- Geotech - Geotextiles for landscaping and civil engineering
- Hometech - Technical components of furniture, in/outdoor textiles and floor-coverings
- Indutech - Filtration, conveying, cleaning and other industrial uses
- Medtech - Hygiene and medical
- Mobiltech - Automobiles, ships, railways and aerospace
- Packtech – Packaging
- Protech - Personal and property protection

- Sporttech - Sports and leisure time
- Oekotech - Environmental protection

Until the 20th century, natural fibres such as cotton, flax, jute and sisal are used for thousands of years in applications used for the accomplishing of cloth type products, ropes and cords and were characterized by a relatively high weight, limited resistance to water actions and microbian/fungicide attacks, as well as a reduced fireproof character. The developments that took place in the domain of chemical fibres offered new development opportunities for the domain of technical textiles. Thus, polyamide, polyester, polyolefines, aramids, high performance fibres, glass and ceramics led to an expansion of technical textiles, in a multitude of utilization domains.

The historical progress of technical textiles led to alternative technologies for their accomplishing, mainly as regards the wide range of nonwoven techn iques, but also warp and weft knitting and modern braiding methods. Also, fibres, yarns and textiles of all types offer a starting point for a wide and continuous expansion range of armouring and formation composite technologies. Technical textiles find their utilization in all the domains of the textile industry. Most of the domains will register faster increasings as regards value in comparison with volume, as technical textiles tend to become more sophisticated and incorporate raw materials which are mor e specialized and of a higher value.

The evolution of technical textiles shows the following aspects:

- The yearly increasing of the global consumption of technical textiles during 2000 -2005 ranged as follows: 7,3% -geotextiles, 6,6% -protection textiles, 4,7% -sport and leisure time textiles, household textiles, 3,6% -medical and hygiene textiles, 2,2% -textiles for transport;
- For the period 2005-2010 it is a prediction of an increasing of up to 343 thousand tones of agrotextile consumption;
- The polyolefine consumption reached in 2006 the value of 950,000 tones, the utilization domains being represented by: agrotextiles, geotextiles, packings, textiles for constructions;
- The utilization of polyolefins for medical and hygiene textilesincreased in 2006 by 6%, r eaching the level of 500 000 tons.

2. Elastic knitted fabrics for different applications

The domain of technical textiles on one side and that of textiles for special destinations on the other size, a component part of the textile sector, is characterized by complexity and diversity. Actually, all the textiles and their specific technologies "are mobilized" for satisfying, under the conditions of an advantageous price, the requirements imposed by the utilization domain, by the legislation in force as regards human being security and environment protection [3].

Nowadays, textile specialists have a continuously preoccupations for textile in general and particular for knitted fabrics (weft or warp knitted structures) diversifications parallel with the extendin g of their applications. They are interested for technical textile productions and also for their special destinations.

2.1 Classifications and applications

The *elastic knitted fabrics*, which are presented in the paper, are used for their *compressive purpose*. These knitted fabrics [4] have different role, like: preventive, prophylactic, protections, sustain, fashionable, for shape the body, post operation, compressive therapy, aesthetic, etc.

Depending of their usage, this kind of knits is group:

- Medical domain/non-implantable materials;
- Sport activity;
- Quotidian life niches/special destinations.

It must be underline that, there are moments when *the same type of knitted produce* may be used for that three different scopes presented above: medical field, sport activity, quotidian life niches. For example *sustainable belt* can be used for: lumbar spine post operation or like a support for pregnancy woman or for modeling the body or in sport for sustain lumbar zone).

In general, for these elastic knitted fabrics, is used weft or warp knitted structure depending on their purpose in practical application. In these groups are also included the knitted fabric products that represent a technical, real and complex system which states modeling and optimization methods. Th e raw materials, the structure and the structure parameters, the device, its characteristics and the technological parameters of the knitting process, the form obtained through knitting are elements that determine a certain behavior of the knitted products and certain compulsory properties in connection with the destination, which has become more and more diverse.

The functional design allows obtaining some fabrics with pre -established shapes, characteristics, in conformity with the destination taking into account the characteristics of the raw materials and of the

approached structure. The form of presentation of the fabrics for different applications in the field with special destinations, can be represented by a plan or solid surface, contoured or not, achieved completely or partially through knitting. We must mention the fact that the knitting technology is especially flexible under the aspect of the fabric form, allowing obtaining the details with plan or spatial contouring, up to high degree products of assemblage through knitting and complete products.
The differences existent in the traditional fabrics and those with special destinations are established by being related to: destination, the requirements imposed by it (performances imposed by the field of use), the raw materials, the products with special destinations, which sometimes imposes the adaptation of the existent devices or the creation of new devices, testing the materials that must guarantee the optimal functioning of a product before using it, and in the last period, the computer simulation of the behavior of products, which offers good results in predicting their performance, the life duration and the production costs.

2.2 Elastic knitted fabrics for medical destinations.
Compressive knitted fabrics in medical field are represented by non-implantable knitted fabrics (non-invasive product) with purposes like: preventive, prophylactic, protections, support, post-operation, compressive therapy, venous insufficiency, etc.
These elastic knitted fabrics are divided into:

- medical consumable: different kind of bandages, elastic connections, knitted structure for pressure products;
- medical knitted fabrics:
  - orthopedic knitted produce/orthesis for different body zone, depending on the trauma positions: shoulder, arm, hand, finger, cervical spine, dorsal spine, lumbar spine, pelvis, hips, back, spine, knee, foot, ankle (Figure 1,2,3,4) [5],[6],[7];
  - clothing with effects of healing diseases: special stocking against the thrombosis or for sensitive skin (Figure 5), antirheumatic underwear;
  - knitted fabrics for compressive medical burn treatment;
  - knitted products for post operation treatment (see Figure 1,2,3,4);

Figure 1. Orthesis for upper limb

Figure 2. Orthesis for legs

Figure 3. Orthesis for dorsal and lumbar spine

Figure 4. Orthesis for cervical spine

Figure 5. Compressive stocking

2.3. Elastic knitted fabrics for non medical purposes.

There are known few knitted produce used in non medical applications.

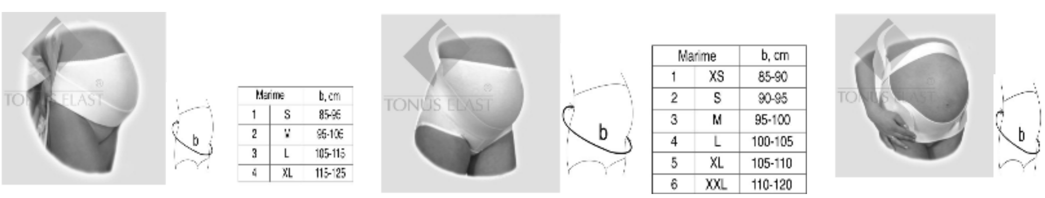
Elastic knitted fabric in sport field.

Elastic knitted fabrics in sport domain are used for different purposes: preventive, protections, support in order to avoid accident at muscle, tendons or joint or in muscle, tendons or joint trauma. For this kind of purposes are used knitted fabrics similar with that medical produce (for upper limb, for legs, for dorsal or lumbar spine, compressive stocking) or knitted fabrics with special destinations (support belt for different part of the body, sports cradles) presented in Figure 1,2,3,5,8.

Elastic knitted fabric for quotidian life niches/special destinations.

One of these special destination niches is represented by the group of bodice articles for pregnancy woman, for post natal period in woman life or for persons with oversized abdominal area [8], [9],[10]. These articles may have different role: aesthetical, maintenance figure, protective, sustainable, post operation. The classifications of knitted fabrics with these destinations consist in:

- belt:
    - prenatal belt (Figure 6.a),
    - postnatal belt(Figure 7),
    - post operation belt,
    - belt for person with health problem,
    - belt for person with oversized abdominal area,
    - belt for modeling of body shapes(Figure 7),
    - maintenance figure,
    - aesthetic clothes belt, Belly Bend belt (Figure 9);
- panties belt:
    - prenatal belt (Figure 6.b),,
    - postnatal belt,
    - post operation belt,
    - belt for person with health problem,
    - belt for person with oversized abdominal area,
    - belt for modeling of body shapes,
    - maintenance figure;
- harness belt:
    - prenatal harness belt, (Figure 6.c),
    - sport harness belt (Figure 8),
    - post natal harness belt (Figure 8),



Marime		b, cm
1	S	85-96
2	V	95-106
3	L	105-115
4	XL	115-125

a. Prenatal belt- IRENA

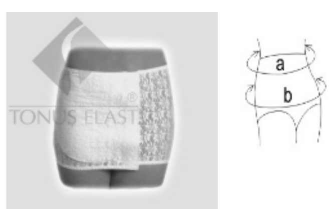
Marime		b, cm
1	XS	85-90
2	S	90-95
3	M	95-100
4	L	100-105
5	XL	105-110
6	XXL	110-120

b. Prenatal panties belt- NERA

Marime		b, cm
1	XS	68-80
2	S	80-100
3	M - XL	100-120

c. Prenatal harness belt- KIRA

Figure 6. Bodice article for prenatal period



Marime		a, cm	b, cm
1	XS	65-69	93-97
2	S	70-74	98-102
3	M	75-79	103-107
4	L	80-84	108-112
5	XL	85-89	113-117
6	XXL	90-94	118-122

Figure 7. Bodice article for post natal period –belt EVELINA /modelling of body shape

Figure 8. Bodice article for post natal period /sports - Harness belt

Figure 9. Bodice article– Belly Bend belt

3. CONCLUSIONS

The contents of the paper allow formulating the following ideas:

- the domain of technical textiles on one side and that of textiles for special destinations on the other size, a component part of the textile sector, is characterized by complexity and diversity;
- the elastic knitted fabrics, which are presented in the paper, are used for their compressive purpose;
- these have different role: preventive, prophylactic, protections, sustain, fashionable, for shape the body, post operation, compressive therapy, aesthetic, etc.;
- depending of their purpose, this knits are used for: medical domain/non-implantable materials, sport activity, quotidian life niches/special destinations;
- elastic knitted fabrics are realized like weft or warp knitted structure depending on their purpose in practical application.

4. REFERENCES

1. *** *Textile Terms and Definitions,* Textile Institute, Manchester
2. *** *Technical textiles* http://textile.2456.com
3. Macovei Laura, Serban Viorica, (2002).*Tehnologii si utilaje in tricotaje*, Editura Gh.Asachi, Iaşi.
4. Horooks, A.R., Anand, S.C. *Handbook of Technical Textiles*. Woodhead Publishing Ltd, UK, 2000, ISBN 1 85573 385 4. Ollenhauer-Ries C.,: *IHE 2000*, Knitting Technology, 4/2000
5.Tiron C.,Ciubotaru A.,Rusu L., Budulan C., *Research of knitting compression stockings for medical applications"* 16th International Conference 2009/Liberec,Cech Republic, 3-5 december,pg.87
6. http://www.ortoprofil.ro, Accessed: 19/09/2009.
7. http://medicina_sportiva.ro
8. http://www.amazon.com/Mom-EZ-Maternity-Back-Support/dp/B0000E5J6L,Accessed: 25/05/2009
9. http://www.tummywear.org/proddetail.php?prod=pc-original-prenatal-cradle, Accessed: 25/05/2009
10. http://www.lovemytummy.com/info/waistsupport.htm , Accessed: 25/05/2009.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE IMPORTANCE OF ECOLOGICAL FEATURE FOR THE QUALITILY OF CLOTHING PRODUCUTS

Elena Moisescu[1], Viorica,Creţu[2], Laura Macovei[3]

[1,2,3]*Technical University "Gh. Asachi" Iasi*

Emena Moisescu: moisescu@tex.tuiasi.ro
Viorica Cretu: vcretu@tex.tuiasi.ro
Laura Macovei: lmacovei@tex.tuiasi.ro

Abstract: Given the current context is the production and marketing of textile products, a series of national and international regulationse to be imposed, covering textile ecology (human, the use of products, waste management and production). At the design stage, the technological stages of product development and during its use, should be considered an ecological function. Such product and process documentation and content labels will be placed in ecological characteristics. In testing materials and products will follow first ecological characteristics.
Keywords: textile ecology, ecological function, environmental/ ecological regulations

1.INTRODUCTION

Clothing products have some features that constitute the interface between user requirements and quality characteristics. They may be common or special.
Common functions are: design - structural, ergonomic, comfort, aesthetic, ecological sustainability, the maintenance, protection, safety and economic use.Special functi ons correspond to products intended for unconventional areas (medical, technical, etc)
The share of these features (degree of importance on the quality) differ from one product type to another as determined by the user requirements.

2. The Ecological Function

In current conditions it is necessary that attention textile producers and traders to move towards environmental issues.The ecological function is the product's ability to create the user a state of comfort, not to affect the health of it and not pol lute the environment. This feature is in correspondence with the position of comfort (termofiziologic and sensory), ergonomic function with the safety in the use and availability.
Eco textiles function has four components shown in Table 1.

Table 1. Components of eco textiles function

Nr. crt.	Components	Observations
1.	The ecological function of production	Refers to manufacturing technologies effect on humans and the environment. This involves safety, consumption (water energy), waste water treatment, noise exposure and dust etc.
2.	Ecological function shown on the user	Expressed by fiber composition and content of materials and chemicals associated with the product, which could influence state and termofiziologic sensory comfort and user heal th
3.	Ecological function with manifests during maintenance products	Refers to the effects they have on user and environment, domestic maintenance operations (cleaning, chemical cleaning, etc.)
4.	Ecological function of waste management resulting from the manufacture and use of products	Products lie in the ability to degrade the biological environment and can be recycled or disposed of environment

Organic clothing products function manifested by a number of quality characteristics or nonquality presented in Table 2.

Table 2 Quality and poor quality features coresponding to the ecological funtion

Nr crt.	Ecological function of production	Quality features of the ecological function	Poor quality features of the ecological funtion
1.	The Ecological funtion of production	- Protective measures applied in production to harmful factors (toxic substances, temperature extremes); - Water consumption limits; - Energy consumption limits; - Low-noise; - Low air pollution with dust and lint	Lack of protective measures in production - Water losses; - Consun energy (heat, electricity) over the limits; - High noise - Air pollution with dust and lint than accepted limits.
2.	The ecological function shown on the user	- Free from harmful substances - Nice touch, low-coarseness of the surface; - Flattened appearance of seams; - Low flammability (low capacity flame ignition and propagation).	- High content of harmful substances; - Bad touch (cold, harsh); - Rigid seams without flattening - Increased flammability (flame ignites and spreads easily).
3.	Ecological function manifested during maintenance products	- Reduced capacity of pollution; - Capacity than washing or cleaning (for short, low-washing or cleaning substances. - Cleaning with biodegradable substances	- High capacity industrial pollution; - Reduced capacity cleaning (high consumption of washing or cleaning substances; - Cleaning chemicals that do not degrade.
4.	Organic waste management function	- Biodegradability; - Recycling capacity	- Sensitive partly or wholly in biological environment - Can not be recycled

Achieving Continuous Improvement and ecological function of clothing products is a requirement of a highly topical, addressing both research and production.

2.1 Guidelines for improving the ecological function of textile clothing products

For environmental compliance in both production and society were developed a number of agreed standards or global eropean.

Eco-textile research is focused on the following directions:

- Establishment of organic fibers and yarns;
- Creation of special purpose organic textiles;
- Identification of chemical substances used in textile production, which may endanger the comfort, human health or environmental integrity;
- Checking and processing products "second hand" against laws on consumer protection;
- Marking and labeling in correspondence with international standards;

Achieving organic fibers and yarns

Organic yarns and fibers and contain no harmful substances come into contact with humans and the environment. Both research and production of textiles are moving more and more towards getting a new generation of fibers, yarns and textiles from natural raw materials, or in environmentally friendly technologies.

Such fiber ecological characteristics are presented in Table 3.

Table 3. Caracteristics of fiber ecological

Nr. crt.	Denumirea fibrei	Characterization
1.	Ecological Cotton	- Is obtained by cultivation without or with a minimal amount of chemicals.; - The classic cotton crop use pesticides (65%), herbicides (20%), de foliation and growth regulators (14%), and fungicides and ot her toxic substabţe!%); - Organic cotton is grown without using synthetic fertilizers or insecticides and only after three years of cultivation can get organic brand.
2.	Naturally dyed cotton	- Is obtained in reddish brown color, brown to brown, green and olive green; - Is sold under the names Fox Top Man and Elbow; - Brown cotton fibers Fox is characterized by an increased resistance to fire fits in flammability standards; - Is recommended to achieve products of night clothes or furniture upholstery; Natural-colored as it eliminates the environmental pollution by chemicals used in dyeing.
3.	Eriotex	- Fiber obtained from the Finnish company Oy in plant Kulturturve "Bumbăcăritţa marsh; - Has a higher insulation capacity than wool, while having fireproof properties, antistatic allergic SSI.
4.	Pineapple Fibres	- Using the same domrnii as flax.
5.	Alginate fibres	- Are made from brown algae; - Prepared by the process of interwoven, are used as dressings, having a high absorption capacity (20 times higher than their mass) and healing, which corresponds to new medical approaches for treatment.
6.	Biowool	-Wool is a fiber produced by clean technology; - Sheep farm in Provence Alpes region, use natural pastures unpolluted by pesticides or fertilizers; - The cleaning and washing technologies using only soap solution, eliminating chemicals and high temperatu res; - By processing results from the money to obtain organic fertilizers; - Graftex painting is done by technology, by which the color is obsorbit fiber in Property, 100%, compared to conventional paint technologies that absorption is 75%.

Implementation of ecological textiles special purpose

Environmental and users of textiles, textiles were made with special features and ecological characteristics. Therefore the EU of textiles examples are presented in Table 4.

Table 4. Fabrics with special ecological characteristics

Nr. Crt.	Name	Characterization
1.	Environmental Agrotextiles	- From warp knitted or woven or as Grill, biodegradable materials (flax, hemp); - In the gaps occurring mineral impregnated knit structure, nutrients and active substances requ ired different crops.
2.	Medical Biotextiles	- Soak-made or biological agents in the spinning process or by chemical modification of textile material followed by incorporation of bioactive agent; - Are named according to the substance incorporated and fie ld use, for example, anesthetics, antimicrobial, hemostatic, anti -virus, enzyme, etc..
3.	Supraabsorbante fiber materials (SAPs)	- Linked polymers containing acid crosslinking through which absorb and retain aqueous fluids under a certain pressure; - Are used in the production of hygiene products as sports articles; - Provide comfort by high capacity to absorb and remove excess

Nr. Crt.	Name	Characterization
		moisture from the body surface; - Use and delivery of packages for transport and storage, ensuring better protection of goods.

Identify chemical substances used in textile production, which may endanger the comfort, human health or environmental integrity

Technologies for obtaining and processing of fabrics is done through chemical substances incorporated into products may have harmful effects on the body and may affect the debris removed from the environment (water, air, soil). To reduce these adverse effects to require the following actions:

- Identify chemicals used in- textile technology;
- Tests in accredited- laboratories, relating to human tolerance to a number of chemicals;
- Proper labeling of textile - products, so consumers can choose knowingly.

To eliminate the harmful effects of substances used in textile technologies, EU environmental legislation contains over 200 documents relating to: air and water pollution, waste management and chemicals, biotechnology, nature protection, industrial pollution and risk management, protection against noise and radiation.

An important European legislation is Directive 96/61/EC (amended by 2003/35/EC) on integrated pollution prevention and control (IPPC), which may be granted based businesses that meet certain conditionsi, integrated environmental permit (PIM)

PIM objectives are achieving both environmental and production efficient, reducing pollution and improving working conditions, while reducing consumption and production profits. These objectives can be achieved through implementation of a company environmental management system (ISO 14001) and quality (ISO 9000)

Among the European Directives on hazardous substances that must be met by industry and textiles are the following:

- 2002 / 61 - Prohibition of use of carcinogenic dyes that yield amine
- 94/27 - prescribes the amount of nickel products disposed in contact with skin;
- 2005/84 - banned phthalates for toys and childcare articles
- 1999/13/EC - volatile organic compounds
- 96/61 Integrated Pollution and Control - IPPC - reducing pollution by industrial enterprises

Producers should use less hazardous substances, or if not possible, to improve technology so that reduced risks to human and environmental health. In textile finishing operations have tested the degree of attachment to the fiber of substances and the degree of biodegradability. Painting raises most ecological and toxicological problems. Toxicity can be assessed by the degree of harm caused by a substance when it gets in or on the body and may have short -term effects (acute), subchronic (up to 90 days) and chronic (more than three months).

Checking and processing products "Used to" report on consumer protection laws

Textiles user may contact and the second hand. These may affect the safety and health of users, where disinfection treatment by fumigation for 48 hours if not properly conducted fumigation certificate is not obtained. Products must be accompanied by animal health and the opinion on the microbial and bacteriological

Marking and labeling in correspondence with international standards

To inform the user in connection with a series of product features for a choice of an objective and proper maintenance, the product must be accompanied by labels and logos.

2.2 The labeling of organic products

Organic products, carried out under low-pollution technologies may be accompanied by special labels. Eco-label application is made, in Romania, according to the European Council Regulation no. 1980/2000/CE on a revised Community eco-label. It has become mandatory for Romania with the EU For correct implementation was adopted Government Decision no. 236 of 7 March 2007 laying down measures to ensure implementation of the European Parliament and Council Regulation no. 1980/2000/CE. Environmental labels on groups of products and services is voluntary Each request for awarding a product is subject to payment of an amount representing the charge for processing an application.

Criteria for granting environmental labels are used to limit environmental impact throughout the product lifecycle. They promote including: reducing energy consumption, water, the amount of waste generated, promoting use of renewable and less environmentally harmful substances, promoting communication and environmental education Competent authority for awarding the Ministry of Environment and Sustainable Development (MESD). Besides MESD was established for awardin g the National Commission, a consultative body with decision -making role in awarding H.G. nr.236/2007 only provides measures to ensure the application of Community law. Provisions H.G. is "filled" with Community law on awarding and product groups, consisti ng mostly of decisions directly applied by Romania as EU member state After granting the right to use eco -label competent authority concluded a contract with the applicant on terms to use the organic label. Contents of the framework contract is stipulated in Annex 2 of the GD nr.236/2007. So far in Romania was given only eco -label for textiles and bed mattresses, although the organic labeling system included various products and services Constitute offenses, and punishable by a fine of 10.000 5.000 RON RON commit the following acts: placing on the market of products bearing the organic label without this law, the refusal of traders to this agreement to request supervisory body, false advertising or misleading or use of any label that can be confused with eco-label trader presentation by inaccurate data on performance evaluation results of the product, organic label placed on items other than those set out in regulation

ECOLABEL – The Ecologicical European Label

Figure 1.: The Ecologicical European Label “Ecolabel”

The european Ecolabel, was created by the European Comission in 1992. Wanted to be a single certification scheme designed to help consumers to distinguish products / services 'green', which affects the environment. Although the past decade has remained a voluntary scheme, the Euro pean Eco-label has become a symbol of European products / services (Figure 1.). European Ecolabel target 27 groups of goods and services in different sectors were presented in Table 5.

European ecolabel is not granted food, beverages, and medicines.

Evolution of the number of licenses in 1992 Since 1992 when we started Eco-label, number of companies that have requested and received labeling has grown every year. In early 2009, more than 750 companies had an eco - label for their products and services.

Table 5 . Groups of goods and services with eco - label

Nr. crt	Types of products	Classes of products
1	CLEANING PRODUCTS	Detergents for dishwashers
2		Hand dishwashing detergent
3		Cleaners and cleaners for sanitary
4		Soaps, shampoos and hair conditio ners
5	PAPER PRODUCTS	Absorbante paper
6		Paper copying and graphic paper
7	HOME PRODUCTS	Rigid flooring materials
8		Paints and varnishes
9		Mattresses
10	GARDEN PRODUCTS	Soil
11		Growing media
12	ELECTRICAL AND APPLIENCES	Washing machines, househ old
13		Dishwashers, household
14		Cooling appliances
15		T.V’s
16		Electric Lamps
17		Portable Computers
18		Personal Computers
19		Vacuums
20	FOOTWEAR	
21	TEXTILES	Clothing, bedclothes, interior textiles ,
21	PRODUCT HOME	Rigid flooring materia ls
22		Paints and varnishes
23		Matresses
24		Clothing, bedclothes, interior textiles ,
25	SERVICES	Touristic acommodation services

Nr. crt	Types of products	Classes of products
26		Camping services
27	HEAT POMPS	

The largest increase is observed from 2007-2008. Italy leads among countries (about 32% of the total licenses), France (18.5%), followed by Germany and Denmark . Romania had in 2009 a total of three eco-label (0.36%). Note that Italy and France in 2009 had 50.5% of licenses for the EU eco -label. In the areas where eco-labels were used for tourist accommodation services represent 34% of the total number of licenses, followed by cleaning products (12%), textiles (10%) and paint the exterior and interior (10%) .

3.CONNCLUSIONS

- Ecological problems and require manufacturers compliance with specific regulations;
- Textile technologies may have an adverse impact on those involved in production and environment;
- Testing performed in laboratories accredited environmental characteristics should become mandatory for textile companies;
- Objectives imposed by the use of organic labels have become a prime target

4.REFERENCES

1. Răducanu, I., *Calitatea marialelor terxtile în impact protecţia consumastorului şi a mediului,* 2010, http//mmq.ase.ro/sompozion/sec2/S2L1.htm
2. Răducanu, I.,Tănăsescu, D., *Marca "Eco-tex",* Tribuna Economică, nr. 14/2000, p, 66
3. ****Ecologia textilă,* http://okotex.com/OekoTex100_PUBLIC , 2010

-

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

3D BODY SCANNER ANTHROPOMETRIC INVESTIGATION OF THE ROMANIAN POPULATION AND ANTHROPOMETRIC DATA ASSESSMENT

C. NICULESCU[1], A. SALISTEAN[1], S. OLARU[1], E. FILIPESCU[2], M. AVADANEI[2], E. DANILA[3]

[1] *The R&D National Institute for Textiles and Leather , Bucharest, Romania*
2 *"Gh. Asachi" Technical University, Iasi, Romania*
3 *S.C. ADINA S.R.L., Galati, Romania*

Corresponding author: Claudia Niculescu, certex@ns.certex.ro

Abstract: The paper presents the newest technology in human body sizes measurement by scanning – the 3D body scanner – and the opportunities enabled for the anthropometric data exploitation by inter and multi-disciplinary collaborations. The focus is laid on the applications it facilitates for the clothing industry, namely aimed to: achieve a 3D anthropometric database for the Romanian female and male population, elaborate the normatives related to the population anthropometric data, and use these data for the manufacture of a mass-customized production and an individualized perfectly fit production of clothing items. The results of the anthropometric investigation conducted for the Romanian adult population are presented he rewith.

Key-words: 3D scanning, anthropometric investigation, anthropometric standard, anthropometric sizes, body types

1. INTRODUCTION

Anthropometrics or somatometrics is a branch of physical anthropology, whose object of study is the size-measuring technique of human body and its parts, the drawing, computing and interpretation of measurements conducted over the human physical dimensions. By means of anthropometrics, national or international anthropometric standards can be elaborated, based on which 'standard/normal size' is defined, as well as deviations from this. The anthropometric data, as national anthropometric standards, describe the anthropologic structure present at a certain time, which is very much dependent on age, gender, geographical origin, urban/rural environment, social-economical status, and the educational level.

The clothing items are high added-value products, and the body-size standards are crucial for the clothing design. These standards allow the producers design their clothing sizes and models, taking into account the variability of the anthropometric parameters, forecast their sales per different clothing sizes, and settle, as a result, their production volume, schedule and control .

The most important researches over the grown-ups and children dimensions, for the achievement of some standards useful in the clothing items industry, have been carried on in the former CAER countries during 1967-1970.

This way, each country built its own, national anthropometric databank needed for setting the sizes both for the garment standards, and for adapting the furnishing objects in their private or professional space.

The national anthropometric databanks built up to the 1999's were based on measurements in contact with the subject and the use of anthropometric specific measuring tools. Advanced and integrated technologies, such as the optical measurement, the electronic signal and data digital processing, the computer software and hardware, propelled the traditional 2D measurement of the anthropometric data towards a new trend – the use of a 3D body scanning technique for the anthropometric data achievement.
The 3D Body Scanner used in the clothing sector research promises to revolutionize the way the clothing item will be manufactured and sold. The anthropometric data achieved by scanning have the potential to offer new insights for issues related to clothing dimensioning and fitting, the more the clothing industry from Romania has not been successful in the last 20 years in up-dating the anthropometric data.
Additionally, the information taken over from the survey type of inquiry performed on young subjects (6-19 years old), considering age, sports practiced, food habits and the computer use, will not allow the exploitation of some final data, either for the domestic market, or for the assessment on the unhealthy behaviors of young people.

2. EXPERIMENTATION

2.1. The 3D Body Scanner Description

The 3D body scanning system used in Romania to get anthropometric data is a mobile system efficient in serial measurements, which consists in a very precise body scanner, VITUS Smart XXL, and a powerful software, Anthroscan [2], [3].

The VITUS Smart XXL scanner (fig. 1.) is based on the most precise optical triangular method with *laser*, for the 3D image capture, in conformity with EN ISO 20685:2005 - 3-D scanning methodologies for internationally compatible anthropometric databases.
The system combines the efficiency and flexibility of an automate capture of the body sizes, providing the user the possibility to define individual measuring rules perfectly fit to his/her own requests. Anthroscan is equipped with an automate measuring protocol, in conformity with ISO 7250 – "Basic human body measurements for technological design" and ISO 8559 – "Garment construction and anthropometric surveys - Body dimensions".

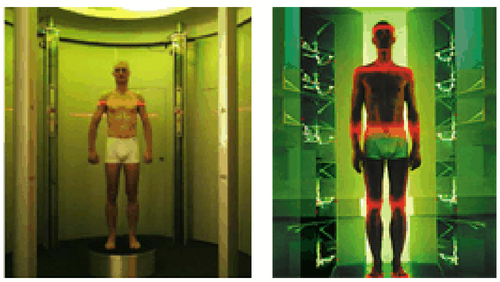


Figure 1- 3D Body Scanner VITUS Smart XXL

The Anthroscan Software allows us draw/capture from the virtual body some different dimensions, such as: height, lengths, widths, depths, perimeters, diameters, bending angles and distances to a vertical imaginary plan. The system allows us to create plans, conceive sections, measure distances within sections, as well as open curve lines, fig. 2.

2.2. Anthropometric survey in Romania

In the case of the anthropometric researches, the essential issue is to assure the test groups representativeness, respectively to assure the important features extracted from the test group are representative, in a narrow scale, for the whole population the groups come from. At the same time, the respective test group should be homogeneous in the sense such researches are generally targeted to very precise categories of population. Therefore, to achieve a representative selection, the following criteria were taken into account:

- The periodical stages of the calendar age, depending on the morphologic development stages: to settle the dimensional typology of the adult population, subjects were included from all the age groups (20 to 64 years old), per age groups, as follows: 20÷29 years old, 30÷39 years old, 40÷49 years old, and 50÷64 years old.

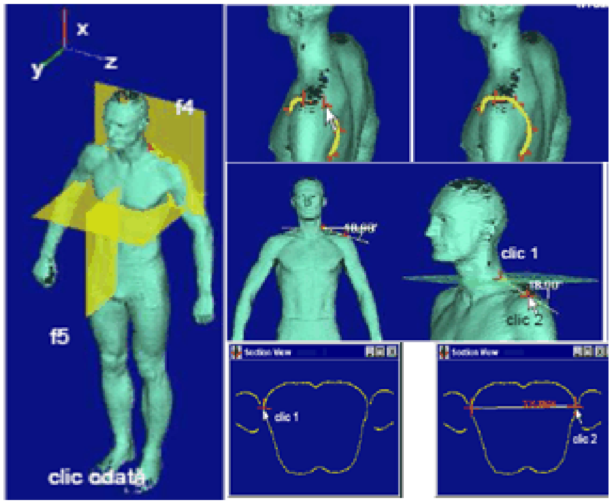


Figure 2: Example of dimensions that can be extracted from the scanned virtual body

- According to data collected in the most recent census giving the total adult population (female and male) aged 20÷64, in the selection, each age group of the ones specified above is found in a percent similar to the one in the general collectivity.
- In the selection, subjects were included belonging to different social -professional groups.
- When conceiving the selection, peculiarities and morphologic variability of the population per geographical areas were also considered, as the investigation was carried out in some representative regions – Moldova, Transilvania, Dobrogea, and Muntenia-Oltenia.
- For each age group, measures were taken to assure the selection was strictly random, meaning that any person in the respective category should have equal chances to be included in the selection.
- Although the information achieved about the general population are as mu ch correct as the volume/number of the test group is higher, yet, out of economical reasons, this was limited to a certain extent.

Settling the size and structure of the testing group was done based on agreeing a rational compromise between a great volume/number to be assuring a high representativeness and a limited volume/number to be sufficiently high to correctly estimate the characteristics of the general collectivity .
The anthropometric investigation was conducted in different regions of the country : Bacau, Mamaia, Bucharest, Cluj, Arad, Craiova and Targoviste.
After the 3D body scanning of the subjects within the anthropometric survey, the result was a database with primary information, which takes over 150 body sizes for each of the subjects . A protocol can be generated for each person subjected to measuring, into which all the body dimensions are given and visualized.
The primary data achieved within the anthropometric investigation have been subjected in turn to one - dimensional statistical processing, in which any of the anthropometric sizes is considered stochastic variable, and the individual values registered for this are replaced by the synthetic values characteristic to the entire selection.
These values acquire what is typical, representative fo r the variable under study, providing information on the level of distribution these individual values have against the typical (average) ones, and allow us broaden our inferences to the entire collectivity level .
Each of the anthropometric sizes was subje cted to a one-dimensional statistic processing, according to the methodology known in the mathematical statistics [4], calculation being computerized, according to a table-computing programme – Microsoft EXCEL.

Results of the anthropometric investigation were efficiently used to elaborate the anthropometric standards and the size systems for garments aimed to maximize the wearer satisfaction and to assess the adult population from the Body Mass Index (IMC) point of view.

3. RESULTS

3.1 Anthropometric standards and clothing size standards

To elaborate the normatives, 88 dimensions were retained of the total 152 anthropometric sizes automatically extracted from the scanned bodies. The remaining dimensions, which were not retained to elaborate the normatives, can be further used to evaluate the population in terms of proportionality, posture, conformation and body mass index.

According to results of the statistical processing, standardized values could be determined for the main statistical parameters of the critical dimensions – body height (Ic), trunk perimeter (Pb), waist perimeter (Pt), hips perimeter (P_s), height classes, centralized values of the perimeters – which gave an overall image over the variability of studied anthropometrical sizes.

The standardized values of the main dimensions represent central values of the classes constituted based on the known arithmetic mean of the selection and on the inter-dimensional interval settled for each size.

Between the main/principal and the secondary dimensions measured on the body, there are some complex connections of different types, expressed by non-linear relations, yet, that can take a linear form, thus obtaining a simple linear regression equation of the form:

$$Y_1 = b_0 + b_1 x_i \quad \textbf{(1)}$$

or the multiple one:

$$Y_i = b_0 + b_1 x_1 + b_2 x_2 + \ldots\ldots\ldots\ldots + b_n x_n \quad \textbf{(2)}$$

where:

- x_i – value of the independent variable – main/principal dimension;
- Y_i – computed value of the dependent (effect) variable, which estimates correctly the measured value of the secondary dimension Y;
- $b_0 \ldots b_n$ – coefficients of the regression equation.

The secondary body dimensions have been computed according to the mathematical model taking the form:

$$y = bo + b1\ Ic + b2\ Pb + b3\ Pt \ \text{ sau } \ y = bo + b1\ Ic + b2\ Pb + b3\ Ps \quad \textbf{(3)}$$

where:

- I_c = body height average value (cm),
- P_b = trunk circumference average value (cm),
- P_t = waist perimeter average value (cm),
- P_s = hips perimeter average value (cm),
- bo, b1, b2, b3 = coefficients of the regression line equation.

Within the project, based on the primary anthropometric data statistically processed, drafts of two anthropometrical standards were elaborated, at present found in the public debate period:

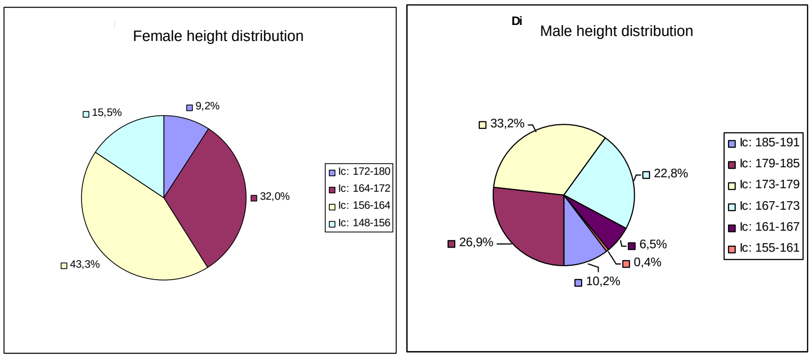
- Draft SR 13544 – Clothing. Body dimensions and men clothing sizes
- Draft SR 13545 – Clothing. Body dimensions and women clothing sizes

Combining the characterizing main and secondary dimensions, 220 typo-dimensional variants resulted for the Romanian female population and 360 for the Romanian male population.

The standardized values of the female body height, within the $\Delta Ic = 8$ cm inter-dimensional interval, are – 158 cm, 160 cm, 168 cm and 176 cm.

The standardized values of the male body height, within the $\Delta Ic = 6$ cm inter-dimensional interval, are – 158 cm, 164 cm, 170 cm, 176 cm, 182 cm and 188 cm.

The height distribution, according to the standardized male and female values, is given in the fig. 3. graphic.



a) b)

Figure 3 – Percent distribution of standardized body height values for a) women, b) men

Analyzing the graphics, we notice that the highest representativeness (43.3%) in the studied selection belongs to the female population in the 148-156cm height interval, followed by the 156-164cm height interval (32.0%), while for men the highest representativeness (33.2%) is taken by male in the 173-179cm height interval, followed by the 179-185cm height interval (26.9%) and the 167-173cm height interval (22.8%).

To define the dimensional typology – variants of bodies – we considered the occurring frequency, within the selection, of the different value combinations possible for the main dimensions. The suggestion of the standardized values, in terms of trunk circumference and hips circumference for women, respectively waist circumference for men, as well as the body-type definition – were settled after the analysis on the relative occurrence of the Pt-Pb difference for men and of the Pş-Pb difference for women, illustrated in table 1 and table 2.

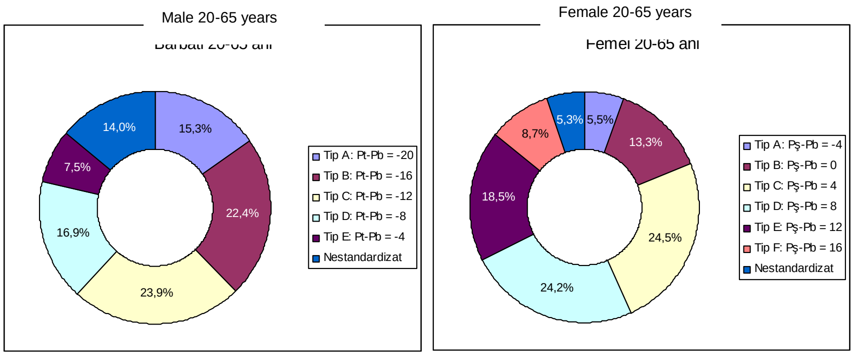
Table 1 – Standardized variants of the Pb, respectively Pt, for the men body types

Clothing sizes		42	44	46	48	50	52	54	56	58	60	64	66
Body type	Pb / Pt-Pb	84	88	92	96	100	104	108	112	116	120	126	132
A	- 20	64	68	72	76	80	84	88	92	96	100	106	112
B	- 16	68	72	76	80	84	88	92	96	100	104	110	116
C	*- 12*	*72*	*76*	*80*	*84*	*88*	*92*	*96*	*100*	*104*	*108*	*114*	*120*
D	- 8	76	80	84	88	92	96	100	104	108	112	118	124
E	- 4	80	84	88	92	96	100	104	108	112	116	122	128
Inter-dimensional interval		4 cm										6 cm	

Table 2 – Standardized variants of the Pb, respectively Pş, for the women body types

Clothing sizes		40	42	44	46	48	50	52	54	56	58	60
Body type	Pb / Pş-Pb	80	84	88	92	96	100	104	110	116	122	128
A	-4	-	-	-	-	-	-	100	106	112	118	124
B	0	80	84	88	92	96	100	104	110	116	122	128
C	*4*	*84*	*88*	*92*	*96*	*100*	*104*	*108*	*114*	*120*	*126*	*132*
D	*8*	*88*	*92*	*96*	*100*	*104*	*108*	*112*	*118*	*124*	*130*	*136*
E	12	92	96	100	104	108	112	116	122	128	134	140
F	16	96	100	104	108	112	116	-	-	-	-	-
Inter-dimensional interval		4 cm							6 cm			

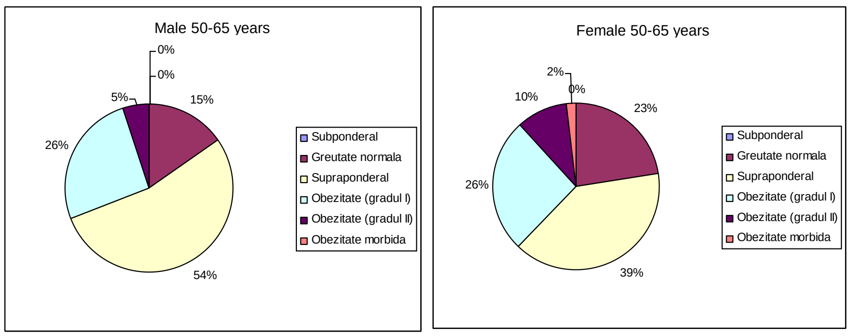
The standardized body types are the ones with the highest occurrence. The graphical representation of the relative frequency, per male and female body types in total selection , is given in graph 4a and 4b.



a) b)

Figure 4. Distribution on body types in total selection for a) men, b) women

Population assessment according to the IMC – the anthropometrical data can be used for the IMC computing, useful in the health-state assessment for the same population.
The percent distribution of the subjects in the selection, depending on the IMC, is re presented in graph 5a and 5b.

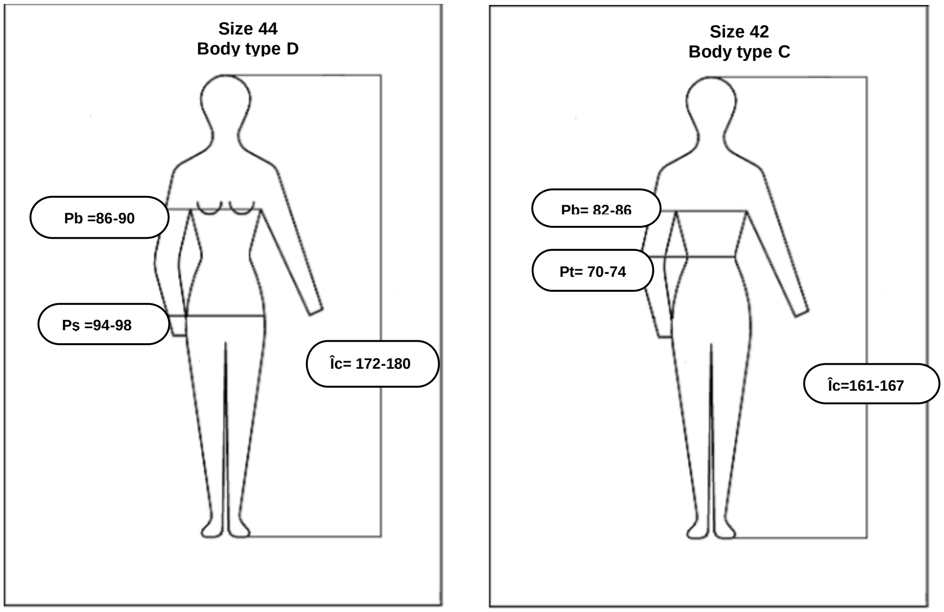


a) b)

Figure 5. Percent distribution of subjects according to the IMC a) for men and b) for women

As can be noticed, the overweight percent is high both for men (54%), and for women (39%).

The standard offers information over the way the sizes are determined for each clothing item, too, according to the standardized pictographs of the potential future wearer body, onto which the main dimensions are marked, expressed in centimeters. The standardized pictograph is part of the product label that, besides the basic dimensions and size, can also contain other additional information . In figure 6a) and 6b), examples of such standard pictographs are illustrated for a female coat, respectively a male coat.



a) b)

Figure 6. Standard pictographs a) for a woman coat and b) for a man coat

4. CONCLUSIONS

The check on the results correctness was done by a calculation of the population degree of satisfactio n. This was amounted to 85%. What we call the population degree of satisfaction (P_N), considering a system of body types, is the absolute or relative number of persons to whom the clothing items executed according to the dimensional typology fitted accordi ngly.

The digitized anthropometric data can be applied, by means of an inter and multi -disciplinary collaboration, to various professional subjects, such as the anthropometry studies, the customized designing of the clothing items, design of medical devices, ergonomic design of the automotive industry, in aeronautics and e-commerce.

The anthropometric data find a special applicability in the health management area, considering the aspect of the metabolic imbalance, including hyper-glycemia, dislipidemy and hypertension.

5. REFERENCES

1. Simmons K.P, & Istook, C.L. (2003). Body measurement technique: Comparing 3D body scanning and anthropometric methods for apparel applications, Journal of Fashion Marketing and Management 7(3), 306-332
2. Human Solutions – Utilization Manual XFIT Army ScanDB
3. Human Solutions – ScanWorX – User's Guide

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

PRACTICAL CONTRIBUTIONS TO THE STUDY OF ASSEMBLY'S RESISTANCE MADE WITH WARP KNITS

Ioan Oana, Dorina Oana, Florentina Kenyeres, Anca Simon

University of Oradea, Romania

oanaioanpavel@yahoo.com

Abstract: Assembly resistance is one of the major influence factors of stitching quality. Is defined as "stretching or friction resistance call". Tenacity is the force registered at breakage stitch in his weakest point. The stitching abrasion is the number of abrasion cycle required for eye mesh destruction of stitch.
Key words:: Stitch tenacity, abrasion resistance, satin yarn clothing, consumption, fashion, price, quality, brand

1.INTRODUCERE

The main factors affecting the strength of the assembly are:

- eam-related factors:

• stitch type - in general an assembly is made with an elastic seam with chain type which is stronger than one assembly made with a rigid seam, like a simple type of seam;
• stitch density (distance) - a higher density favors resistance, but if the values are too high, can lead to destruction of material and hence lower resistance assembly;
• wire voltage - is preferably a stronger tension of thread, but with care not to produce stitch curling.

- Sewing related factors:

• wire resistance - in terms of wire resistance, loop resistance has a greater influence on strength assembly than strength in straight wire.
The resistance of assemblage should be equal to that of the assembled material so as to obtain a balanced set that will withstand the stresses to which the product will be subjected during wear. For this reason the choice of qualitative and quantitative factors should be weighted influence to avoid an unnecessary assembly supra-reinforcement.
Presentation of comparative experimental values for the resistance assembly .
Starting from the principle that a set obtained by sewing must provide a similar resistance to rolling and assembling the sewing area, developed experimental study below compares the strength of assembled materials with virtually determined resistance for the assembly line.
Assembly resistance was determined for charmeuse warp knits and satin, realized from polifibrouse and monofibrouse yarn made from polyester and polyamide are characterized in the previous chapter. Experimental values for resistance assemblies were obtained when were tested for resistance to sliding stitch ASTM D 434, using the test machine Tinius Olsen HK5 T type. These values are presented in the Annex, together with values for resistance to sliding in the seam. Principle of testing the chosen parameters was widely described in the previous chapter. Mean practical data obtained are centralized for all four types of knitted studied in Table 1, along with strength and elongation at break for knits with and without assembly.

Table 1. Experimental values determined for the resistance assembly

Knit code	Test samples with assembly		Test samples without assembly		Assembly strength [N]
	Breaking strength [N]	Elongation at break [mm]	Breaking strength [N]	Elongation at break [mm]	
P275 30	273,75	28,13	522,22	37,86	280,45
P275 45	281,175	34,5	582,15	43,85	282,16
P275 60	300,70	44,16	620,63	54,41	309,78
P275 90	265,59	21,93	615,81	34,35	246,6
P26 30	361,18	35,75	390,21	35,39	367,37
P26 45	229,28	35,37	341,81	43,13	312,5
P26 60	353,38	40,30	529,71	41,00	366,63
P26 90	291,98	27,46	527,69	30,16	329,27
R25 30	274,26	45,51	355,60	50,88	279,5
R25 45	237,70	46,01	439,48	53,02	262
R25 60	171,85	40,92	683,84	67,99	177,23
R25 90	151,55	38,115	477,25	57,26	155,94
R20 30	152,78	50,53	179,70	45,87	280,73
R20 45	139,47	50,91	193,98	46,25	143,5
R20 60	143,69	53,58	188,08	54,51	146,24
R20 90	162,43	51,12	199,01	47,14	167,13

For charmeuse knitting from polifibrouse yarn polyester P27 5, assembly resistance varies relatively uniform with the test angle. The maximum is recorded for angle of 60°, while the minimum value is found for the angle of 90°.

Figure 1 illustrates the change in assembly resistance compared with the resistance deter mined for knit without assembly.

The presented chart underlines similar behavior of assembly, for the four test directions. Also apparent is that the knit resistance is superior to assembly resistance, resistance values as double knitting material, regardless of test direction. This indicates that the assembly is less resistant compared to knit. Therefore, it was found during test and assembly surrender first, at relatively low values.

In this case, for the test directions of 30° and 45° it was obtained clo se values for assembly resistance and knit resistance, suggesting that these assemblies are balanced. For 60° and 90° angles, appear significant differences between the two values, again raising the problem of insufficient resistance against knit assembly. In terms of assembly resistance variations depending on the angle assembly of knit in assembly layout, it can see a uniform reaction to the stretching request, the range exceeding 50N. One can therefore conclude that the directions of 30° and 45° are opti mal for achieving a balanced assembly.

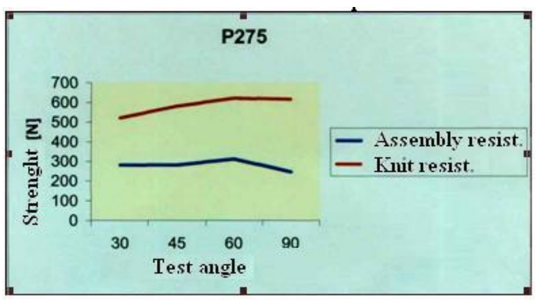


Figure 1. Resistance assembly variation with angle test for P275 knitting

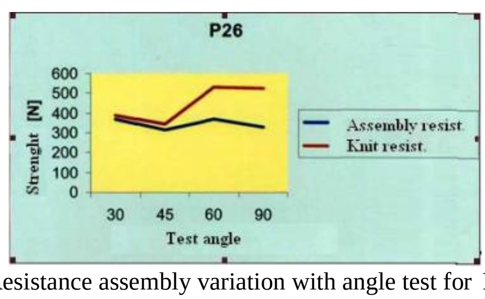


Figure 2. Resistance assembly variation with angle test for P26 knitting

Figure 3 shows a graph compared to the assembly resistance for k nitted fabrics made from yarns of PES. The graph shows that the resistance of the assembly has two different knits, satin knit being superior in this regard. The biggest differences are found for directions 30° and 90°, approximately 25% from the upper value. For the other two directions are not so big differences, of 9.5% and 15.5%.

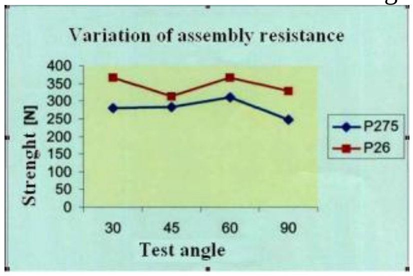


Figure 3. Graphic compared to variation of assembly resistance for knitted fabrics made from PES yarn

The charmeuse knit made from R25 polyamide yarn is characterized by a s teady decrease of assembly resistance for the four test directions. This decrease is more pronounced for the last two lines of knit arrangement of the assembly, reaching to the resistance assembly angle of 90° to almost half of the corresponding angle of 30°. From the comparison chart shown in Figure.4 result the best situation in which the assembly and knit resistance is similar for the direction of 30°. Moreover, the assembly is significantly less resistant than the material.

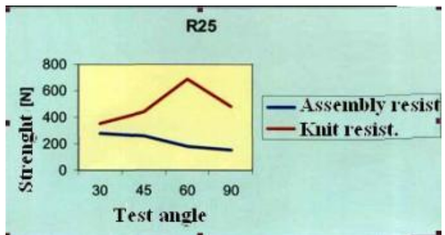


Figure 4. Resistance assembly variation with angle test for R25 knitting

Polyamide yarn satin R20 knit is only showing a situation distinct from the other knits. We must not forget that this is only made from knitted monofibrouse yarn, which in addition have in plus and is more sensitive. Figure 5 shows the resistance variation with test angle assembly for this type of knit. It may be noted that the direction of 30° the assembly resistance is greater than the knitting material, having a value of 280N, while resistance knit it about 180N. This indicates that the assembly is too strong in that case. It should also be stressed again during testing of the assembly behavior of satin knit R20, when it was found broken and tear knits and then assembling.

On the rest resistance test on the remaining lines of assembly is much smaller, about half of the maximum recorded values are for the direction of 30°. Knit resistance differences are not great and so is the preferred the assembly of R20 knit in the direction of 45°, 60° and 90°. Moreover, the assembly reaction direction of 45° and 60° is identical, the values are almost equal.

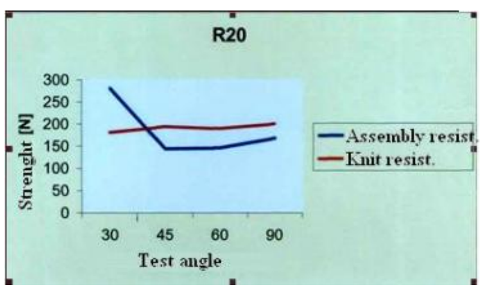


Figure 5. Resistance assembly variation with angle test for R20 knitting

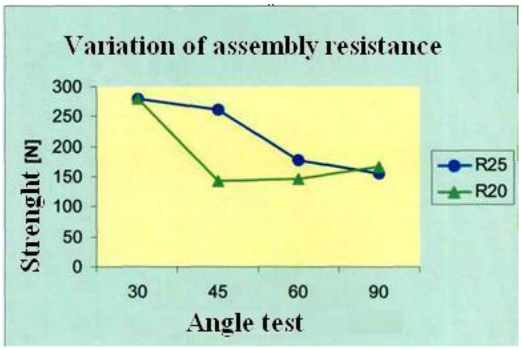


Figure 6. Graphic variation versus resistance assembly for knitted fabrics made from AP yarn

A chart when compared to assembly resistance of polyamide yarn knits shown in Figure 6 shows that these knits have a similar reaction direction of 30° and 90°, while the other two corners are distinct differences in the value test. If in test angle o f 60° the two values are close to assembly resistance, the difference being about 17% for the test angle of 45° this difference reaches 45%. It can be concluded that optimal assembly is obtained for R25 knit.

2. CONCLUSION

Can assert that the used assemb ly resistance used by 301 seam is achieved in most of cases, being inferior for the studied knitted resistance. In these cases, the primary findings presented, it is clear that the assembly is not adequate in terms of product reliability and maintainabilit y. This situation initially advertised in changing the type (class) of used seam. Another way to remedy the deficiencies could be using a sewing thread with a lower fine or as a resistance wire, especially in the upper loop of specific wire used for study.

There are also knits, respectively assembly lines which are balanced in terms of resistance. These directions are given priority in product design sectioning lines, which can form the basis of new product lines of stylistic development, but also the reint erpretation of existing ones to optimize sewing problems and product reliability and maintainability.

3. REFERENCES

1. Cacoveanu, Mariana – Proiectarea tiparelor în designul vestimentar, Ed. Clusium, Cluj - Napoca, 2003.
2. Ciontea, Gh., - Utilajul şi tehnologia meseriei, EDP, Bucureşti, 1993.
3. Ciontea, Gh., - Utilajul şi tehnologia meseriei, EDP, Bucureşti, 1995.
4. Filipescu, Emilia – Construcţia modelelor produselor de îmbrăcăminte din blană şi piele naturală pentru bărbaţi, Ed. Performantica, Iaşi, 2002.
5. Loghin, Carmen – Tehnologii şi utilaje în confecţii textile, Ed. Performantica, Iaşi, 2003.
6. Mitu, S., Mitu, Mihaela – Bazele tehnologiei confecţiilor textile vol. I şi II, Ed. "Gh. Asachi ", Iaşi, 1998.
7. Nicolaiov, P. – Tratamente umidotermice pentru confecţii textile, Ed. Performantica, Iaşi, 2004.
8. Papaghiuc, Viorica, Ionescu, Irina, Florea, Adela – Proiectarea sistemelor de fabricaţie pentru produse de îmbrăcăminte, Ed. Performantica, Iaşi, 2004.
9. Papaghiuc, Viorica – Procese şi utilaje pentru asamblări neconvenţionale şi tratamente de finisare în industria confecţiilor textile, Ed. Performantica, Iaşi, 2005.
10. Papaghiuc, Viorica, Creţu, Mioara – Tehnici de înnobilare a suprafeţelor textile prin coasere, Ed . Performantica, Iaşi, 2007.
11. Pintilie, Ecaterina, Loghin, Carmen – Maşini de cusut în lanţ, Ed. "Gh. Asachi", Iaşi, 2001.
12. Potoran, I. – Tehnologii şi utilaje modern în industria îmbrăcămintei, ET, Bucureşti, 1969.
13. Potoran, I., Predoiu, C. – Procese şi maşini în confecţii, ET, Bucureşti, 1985.
14. Preda, C., Cioară, Lucica, Preda, Sidora, Leon, Ana -Lăcrimioara – Structura şi calitatea materialelor pentru produse de îmbrăcăminte, Ed. Performantica, Iaşi, 2004.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

CONSIDERATION ABOUT THE FABRICS' BREAKING ELONGATION FOR SWELLING MODULAR SYSTEM PART I

ALEXANDRU POPA, ADINA BUCEVSCHI, ERZSEBET AIRINEI, MONICA PUSTIANU, IONEL BARBU

"Aurel Vlaicu" University of Arad, ROMANIA

Corresponding author: Popa Alexandru, alexpopaarad@yahoo.com

Abstract: This paper is part of a research agreement between "Aurel Vlaicu" University and The National Research - Development Institute for Textile and Leather, Bucharest, about a swelling modular system for tactics simulations of sea fight. In the paper are tacked some aspects about the estimation of fabrics' parameters with a specific computer program. By solving the problem, we have the main parameters of the fabric.
Keywords: yarns, structure parameters, fabric, sea fight, breaking elongation, warp.

1. INTRODUCTION

The targets are used for navy firing, on worldwide. The shells are warship - warship missile and ground - warship missile. Concomitant training is made by the artillery on ship aboard using artillery shells with different calibres. For this firing is necessary impermeable textile target. So, the usability is large, three kind of targets are imposed:

- floating targets for missile
- floating targets for artillery shell
- air target for artillery shell.

The systems must be building to satisfy the specific operational necessity in tactic utilization. The Navy actually uses some floating target systems for naval missile firing and artillery pieces. These systems are made by metallic pieces with difficult construction that need supplementary human and financial maintenance efforts.
Because of the high price of metallic target, the waiting and transport charges, the Romanian Navy specialists' apply a modern target system for the missil e.

2. GENERAL INFORMATION

The propose target system has a new conception utilized in NATO: the conventional metallic target is replaced by a textile one that is waterproof and weatherproof, proof against UV -ray, hydrolysis, abrasion, chemical products resistance , micro organisms, bacterium, mouldiness.
The object of this paper made in PNCDI in collaboration with The National Research - Development Institute for Textile and Leather Bucharest is the design of the structure parameters of the fabrics for the swelling modular system for tactics simulations of sea fight. [1]

3. EXPERIMENTAL PART

The fabrics for swelling modular system for tactics simulations of sea fight are made by yarns that were analysed in The National Research - Development Institute for Textile and Leather laboratories.
There were made some analysis term for yarns:

- x_1 - breaking strength, N
- x_2 - breaking elongation, %
- x_3 - loop breaking strength, N
- x_4 - knot breaking strength, N
- x_5 - knot elongation, %
- x_6 - twist, twisting/meter
- x_7 - yarn count, tex
- x_8 - dimension changes at hot air, at 3 minutes;
- x_9 - dimension changes at hot air, at 10 minutes

In this paper was aimed the following:

- y_7 - the breaking elongation on warp direction, %;

The regression and correlation analysis attend to the description and research of the dependence of two or more variables. The regression attends to the dependence between the variables and the correlation study the dependence degree.

The correlation analysis shows the measure in which the mathematical function, named mathematical model, describe the system behaviour.

A program made by research staff from Textile Department was use for experimental data processing. The results are presented [2].

The simple regression equations are obtained in this form:

$$y = a x^2 + b x + c \qquad \textbf{(1)}$$

where: a - x^2 coefficient in regression equation;
b - x coefficient in regression equation;
c - constant term.

Physic- mechanical parameters for yarns are measured and the mean values are presented in table no. 1.

Table 1: Parameters' values

No.	Cod notation	Value	U.M.	Correlation coefficients y_7
1	x_1	3,248	N	0,852
2	x_2	32,53	%	0,919
3	x_3	5,466	N	0,777
4	x_4	2,756	N	0,713
5	x_5	22,9	%	0,941
6	x_6	881,6	twist/m	0,796
7	x_7	9	tex	0,999
8	x_8	428	%	0,791
9	x_9	405,1	%	0,815

The mean values for the breaking elongation of the fabric on warp direction are presented in table no. 2.

Table 2: Breaking elongation value

Breaking elongation, % warp direction
40,05

The correlation coefficients calculated with the program are presented in table no. 1
The correlation between the breaking elongation of the fabric on warp direction and the yarns characteristics is presented in figures no 1-9.

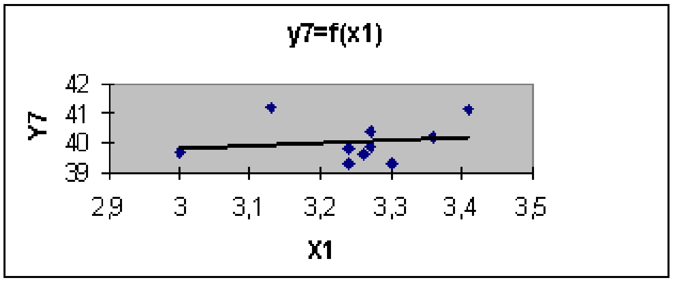


Figure 1: The dependence between the fabri c' breaking elongation on warp direction and the breaking strength of the yarns

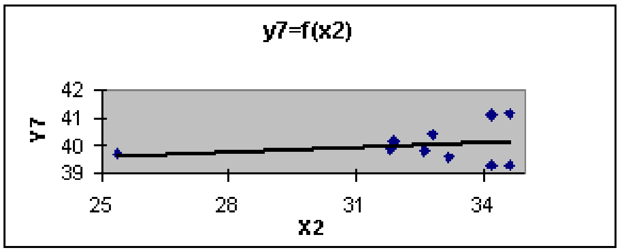


Figure 2: The dependence between the fabric' breaking elongation on warp direction and the breaking elongation of the yarns.

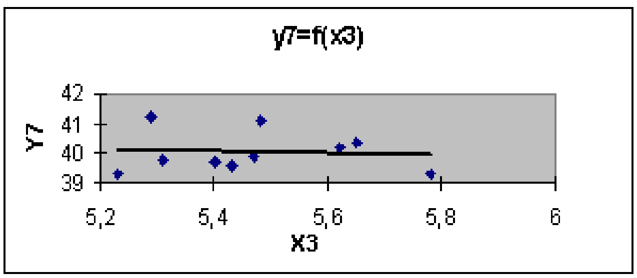


Figure 3: The dependence between the fabric' breaking elongation on warp direction and the loop breaking strength of the yarns.

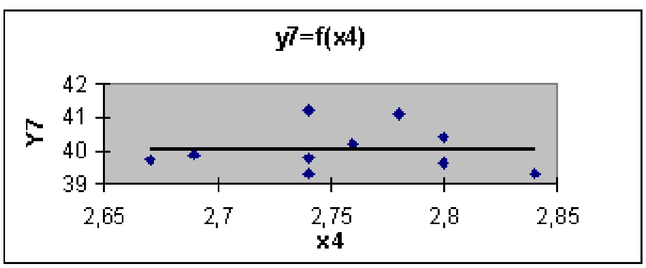


Figure 4: The dependence between the fabric' breaking elongation on warp direction and the yarns' knot breaking strength

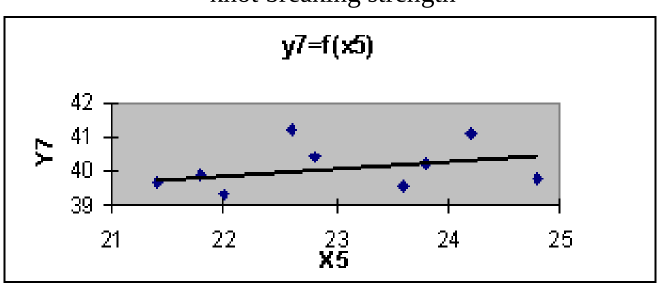


Figure 5: The dependence between the fabric' breaking elongation on warp direction and the yarns' knot elongation

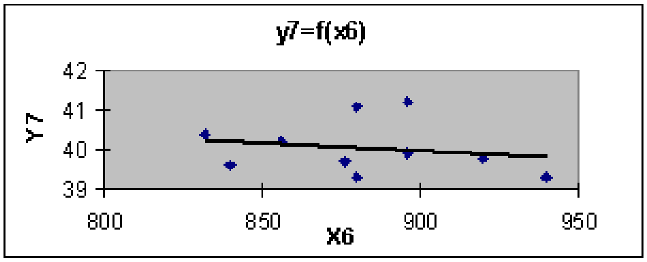


Figure 6: The dependence between the fabric' breaking elongation on warp direction and the yarns' twist

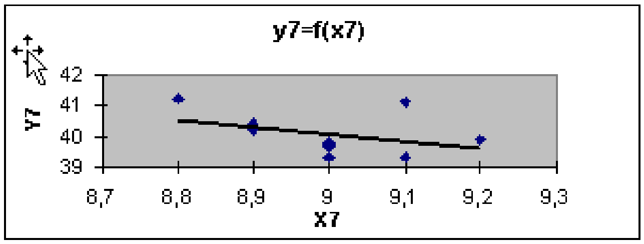


Figure 7: The dependence between the fabric' breaking elongation on warp d irection and the yarns' count

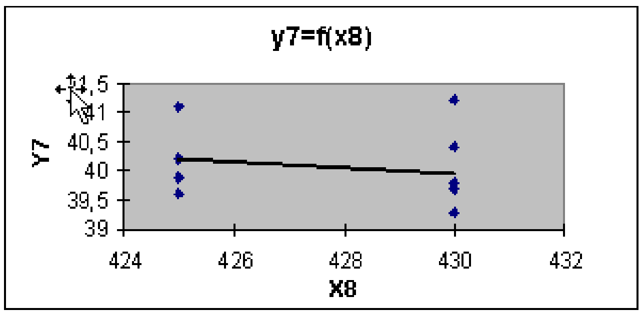


Figure 8: The dependence between the fabric' breaking elongation on warp direction and the yarns' dimension changes at hot air, at 3 minutes

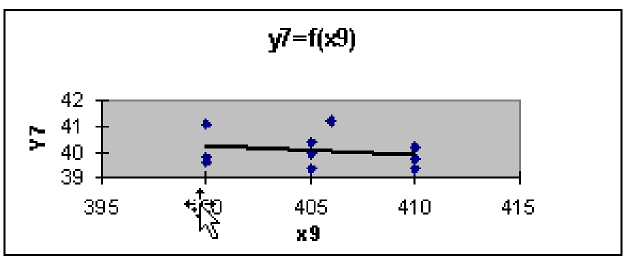


Figure 9: The dependence between the fabric' breaking elongation on warp direc tion and the yarns' dimension changes at hot air, at 10 minutes

4. CONCLUSUIONS

The regression equation obtained by rolling the program are:

$$y = 0{,}8971x + 37{,}136$$
$$y = 0{,}0544x + 38{,}28$$
$$y = -0{,}2967x + 41{,}672$$
$$y = -0{,}1664x + 40{,}509$$
$$y = 0{,}2012x + 35{,}443$$
$$y = -0{,}0039x + 43{,}513$$
$$y = -2{,}3333x + 61{,}05$$
$$y = -0{,}05x + 61{,}45$$
$$y = -0{,}0355x + 54{,}412$$

5. REFERENCES

1. Research contract no. 81/2003 in PNCDI, INVENT Program, Textile product with large performances for aeronautic field, The National Research - Development Institute for Textile and Leather, Bucharest and the "Aurel Vlaicu" University

2. Bona, M.(1993). *Statistical methods for the textile industry*, Editura Textilia, Italy

3. Mihail, Raul., "Introduction in the strategy of experimentation with application fr om chemical technology", Scientific and Enciclopedic Printing House, Bucuresti

4. Ciocoiu, M., Cascaval., "Program packages for mathematical modelling of textile processes", Iasi, 1996

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

CONSIDERATION ABOUT THE FABRICS' BREAKING ELONGATION FOR SWELLING MODULAR SYSTEM PART II

Alexandru Popa[1], Adina Bucevschi[1], Erzsebet Airinei[1], Monica Pustianu[1], Ionel Barbu[1]

[1]*"Aurel Vlaicu" University of Arad, ROMANIA*

Corresponding author: Popa Alexandru, alexpopaarad@yahoo.com

Abstract: This paper is part of a research agreement between "Aurel Vlaicu" University and The National Research - Development Institute for Textile and Leather, Bucharest, about a swelling modular system for tactics simulations of sea fight.In the paper are tacked some aspects about the estimation of fabrics' parameters with a specific computer program.By solving the problem, we have the main parameters of the fabric.
Keywords: yarns, structure parameters, fabric, sea fight, breaking elongation, weft

1. INTRODUCTION

The paper is an analysis in 2D systems of the influence of yarn's characteristics about the breaking elongation on weft direction.

2. EXPERIMENTAL PART:

There were made some analysis term for yarns:
- x_1 - breaking strength, N
- x_2 - breaking elongation, %
- x_3 - loop breaking strength, N
- x_4 - knot breaking strength, N
- x_5 - knot elongation, %
- x_6 - twist, twisting/meter
- x_7 - yarn count, tex
- x_8 - dimension changes at hot air, at 3 minutes;
- x_9 - dimension changes at hot air, at 10 minutes

In this paper was aimed the following:
- y_8 - the breaking elongation on weft direction, %;

The regression and correlation analysis attend to the description and research of the dependence of two or more variables. The regression attends to the dependence between the variables and the correlation study the dependence degree.

The correlation analysis shows the measure in which the mathematical function, named mathematical model, describe the system behaviour.

A program made by research staff from Textile Department was use for experimental data processing. The results are presented [2].

The simple regression equations are obtained in this form:

$$y = a x^2 + b x + c \quad (1)$$

where: a - x^2 coefficient in regression equation;
b - x coefficient in regression equation;

c - constant term.

Physic- mechanical parameters for yarns are measured and the mean values are presented in table no. 1.

Table 1: Parameters' values

No.	Cod notation	Value	U.M.
1	x_1	3,248	N
2	x_2	32,53	%
3	x_3	5,466	N
4	x_4	2,756	N
5	x_5	22,9	%
6	x_6	881,6	twist/m
7	x_7	9	tex
8	x_8	428	%
9	x_9	405,1	%

The mean values for the breaking elongation of the fabric on welt direction are presented in table no. 2.

Table 2: Breaking elongation value

Breaking elongation, weft direction %
39,07

The correlation coefficients calculated with the program are presented in table no. 3.

Table 3: The values of the correlation coefficients

	Correlation coefficients
	y_8
x_1	0,921
x_2	0,986
x_3	0,792
x_4	0,896
x_5	0,953
x_6	0,808
x_7	0,852
x_8	0,797
x_9	0,949

The correlation between the breaking elongation of the fabric on weft direction and the yarns characteristics is presented in figures no 1 -9.

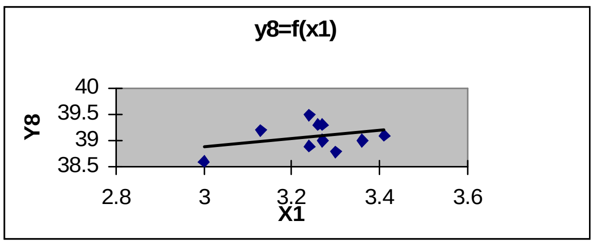


Figure 1: The dependence between the fabric' breaking elongation on weft direction and the breaking strength of the yarns.

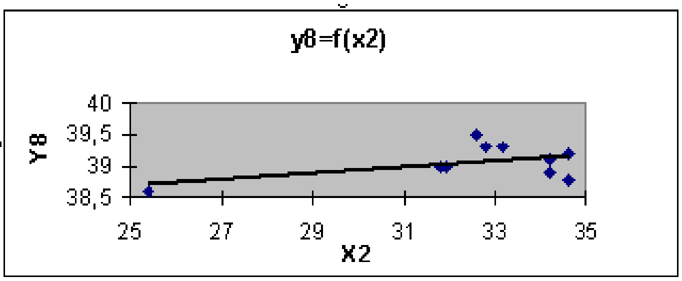


Figure 2: The dependence between the fabric' breaking elongation on weft direction and the breaking elongation of the yarns

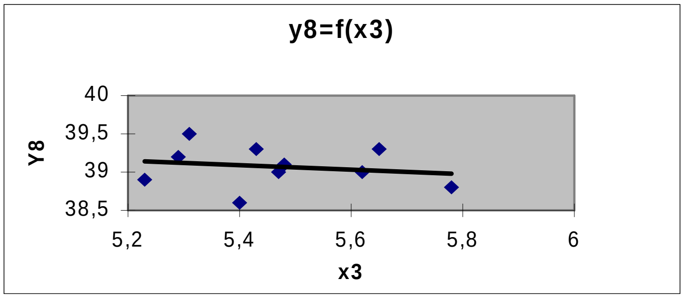


Figure 3: The dependence between the fabric' breaking elongation on weft direction and the loop breaking strength of the yarns.

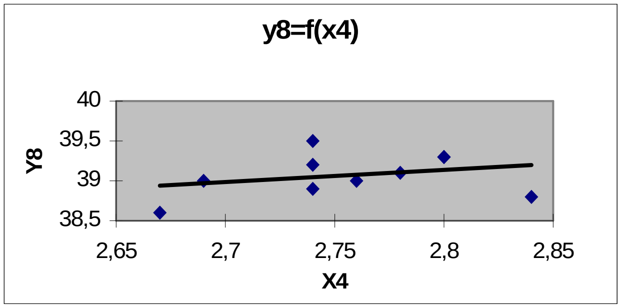


Figure 4: The dependence between the fabric' breaking elongation on weft direction and the yarns' knot breaking strength

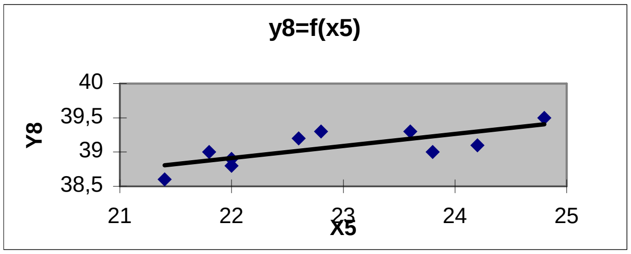


Figure 5: The dependence between the fabric' breaking elongation on weft direction and the yarns' knot elongation

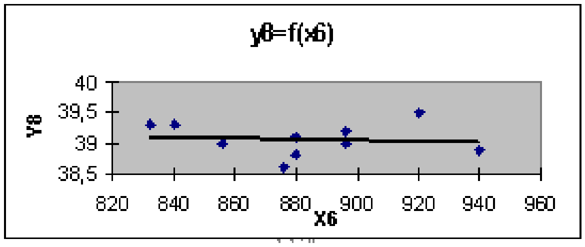


Figure 6: The dependence between the fabric' breaking elongation on weft direction and the yarns' twist

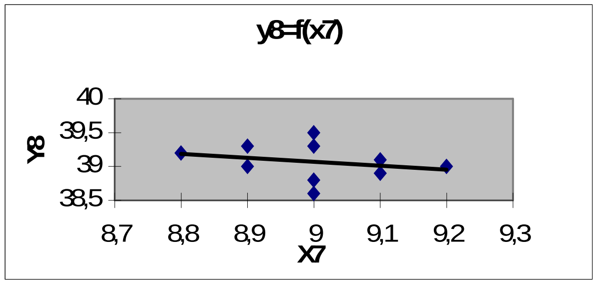


Figure 7: The dependence between the fabric' breaking elongation on weft direction and the yarns' count

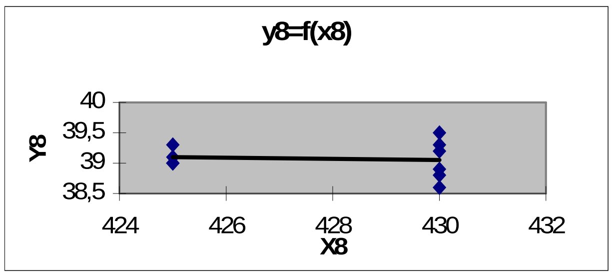


Figure 8: The dependence between the fabric' breaking elongation on weft direction and the yarns' dimension changes at hot air, at 3 minutes

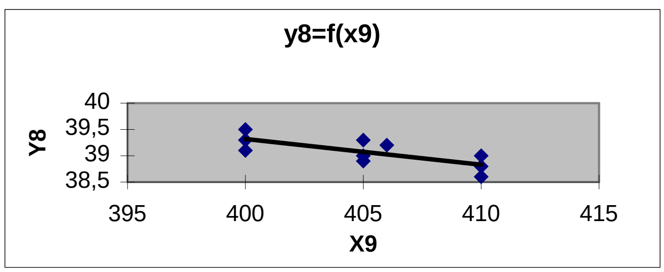


Figure 9: The dependence between the fabric' breaking elongation on weft direction and the yarns' dimension changes at hot air, at 10 minutes

3. CONCLUSIONS:

The regression equation obtained by rolling the program are:

$y = 0,7481x + 36,64$

$y = 0,0477x + 37,518$

$y = -0,2937x + 40,676$

$y = 1,5308x + 34,851$

$y = 0,1757x + 35,046$

$y = -0,0009x + 39,825$

$y = -0,5833x + 44,32$

$y = -0,01x + 43,35$

$y = -0,0488x + 58,855$

The breaking elongation on the warp direction for the analyzed fabric is bigger than the weft direction one.

The breaking elongation of the fabric on warp direction is high influenced by the breaking elongation of the yarn, the yarns' knot elongation , the yarns' count and less influenced by the other yarns' characteristics.

4. REFERENCES

1. Research contract no. 81/2003 in PNCDI, I NVENT Program, Textile product with large performances for aeronautic field, The National Research - Development Institute for Textile and Leather, Bucharest and the "Aurel Vlaicu" University

2. Bona, M. *Statistical methods for the textile industry,* Editura Textilia, Italy, 1993

3. Mihail, Raul., "Introduction in the strategy of experimentation with application from chemical technology", Scientific and Enciclopedic Printing House, Bucuresti

4. Ciocoiu, M., Cascaval., "Program packages for mathematical modelling of textile processes", Iasi, 1996

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

GENERAL ASPECTS BETWEEN PARAMETERS AND TEXTILE MATERIALS DURING HIGH FREQUENCY WELDING

Aurel POPP[1]

[1] *Technical University"Gheorghe Asachi" , Faculty of Textile and Leather Industrial Management, Iaşi, ROMANIA*

Corresponding author: Popp Aurel E-mail address: aurelpopp@yahoo.com, apopp@tex.tuiasi.com

Abstract: The interactions between parameters and the welding quality occurred during some test in the early stages of the high frequency welding. When the materials reach the melting point hard segments produced when a total cohesion of the two fabrics result in an enhanced peeling force. Electrode displacement curve is an ideal monitoring parameter which can directly reflect spot weld nugget formation in resistance welding process. The current resistance welding quality monitoring systems based on electrode displ acement curve mainly focus on the high frequency information of the curve, such as the curve's shape. Variation of the curve that represents process consistency is little studied. Based on measured electrode displacement curve, statistical process control method is introduced to analyze the process consistency by employing moving range chart. The moving range method implemented the resistance welding process monitoring through providing the high frequency information of the curve. The results of this resear ch will enhance the understanding of the electrode displacement curve, and help systematically design better resistance welding quality systems.
Keywords: high frequency welding; quality control; electrode displacement curve; moving range chart

1. THE INFLUENCE OF PARAMETERS ON MATERIAL DURING THE WELDING PROCES

High frequency welding process is the major joining technique in the textile industry due to its high speed and relatively low cost. The quality of the high frequency welding determines the durab ility and reliability of the final product. Although welding is widely used, it is difficult to ensure the consistency of welding quality in real production.
To reduce the risk of part failures, manufacturers have to extra more welds than originally design ed welds numbers. Therefore, it is desirable to control weld quality immediately by adjusting input variables when defective welds have been detected in the assembly line. It is urgent and necessary to develop a process control method to evaluate welding q uality consistency.
Many researchers have used different sensors to collect various signals that can indirectly reflect weld quality, such as voltage, current, dynamic resistance, electrode force, electrode displacement. By comparing the measured signals w ith desired signals, these methods can assess the weld quality.
Electrode displacement, which gives good indication of thermal expansion, melting, and expulsion, has proven to be a particularly useful signal to monitor the welding quality. It is believed t hat the amount of thermal expansion melting, and expulsion can be corrected to the slope and magnitude of the displacement curve. A number of control systems have been developed based on maximum electrode displacement or its changing rates.
As we know, there are two kinds of frequency characteristics in electrode displacement curve, low frequency and high frequency. The high frequency aspect of the electrode displacement curve, variation of the curve, which represents process stability and consistency, is l ittle studied. It will greatly improve the resistance welding quality control by combining the low frequency and high frequency characteristics together.

2. THE EFFECTS OF PARAMETERS ON MATERIALS DURING WELDING PROCES

Knowing the basic principal of high frequency welding we can control and specify the technological parameters of this welding process. The parameters are strongly linked between one another, the factors that influence them and the values that give the strongest bonding of the materials used in the final clothing product

The most important parameters for the process of resistance welding with high frequency are:

- Welding time, t(s);
- Pressing force, P (N) or pressure over a region p(N/m^2);
- Power electrode developed, P_e (W).

2.1. Welding time

The amount of time in which two materials are welded together it's a very important parameter. This thermal process is causing the productivity of the operation and on the other side is giving the final product the quality needed for being competitive on the market.

The welding time is further constituted in two sequences. Heating time,(t_h)which are corresponding to the time when the materials are subjected to a high frequency electric field, until the fabric reach the optimum temperature for welding and then pressing. Cooling time**,** (t_c), this is necessary for the better bonding of the materials after the pressing process and the separation of the electrode from the surface of the materials. This time is influenced by the structural characteristics of the electrodes.

The heating time influence the dielectric losses in a proportional value. In this case we can see the influence of the heating time over the dielectric loss in efficiency when welding thick PVC films. The efficiency dielectric loss K_D is the relation between, the quality of heat produces by the phenomenon of dielectric loss and energy for powering the electrodes, where the thickness of the fabric is very important. An increase in time of the action of high frequency fields leads to decrease of K_D, which allows observation of 3 seconds to specify an upper limit of the range of variation of this parameter for welding PVC film.

The value of the heating time, t_h, provide information on welding capacity of high frequency for textiles. Under this criterion we can reveal that:

- easy Welded materials, **for t_h** <5s;
- difficult welded materials, **for** t_h = 5–10s;
- materials then can be welded, **for t_h**>10s;

2.2. Pressing force

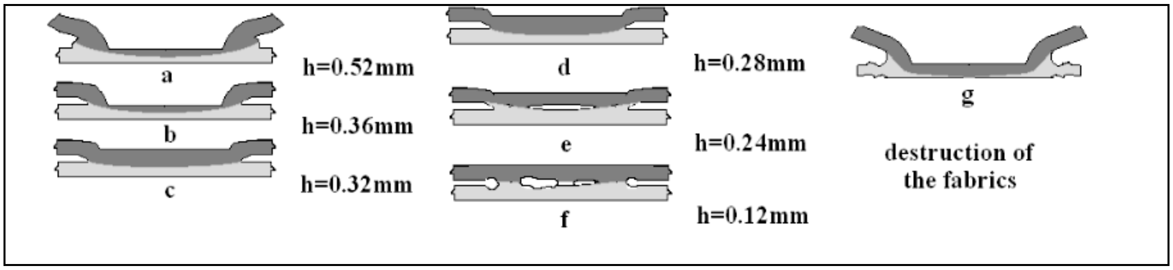
Effect of mechanical pressing is the result in most construction of variants for this type of equipments, in which the drive electrode above a certain pressing force (P). Under the action of the high frequency the materials reach a temperature of flow and move in a fluid state viscous when the macromolecules become in a relative mobility. From here begin pressing phases so that macromolecules at the contact surface overlapping generating the new intermolecular link which will enhance the phase of cooling.

If in the thermal adhesive process the pressure is in the range 0 **-** 0.980747 (bar) the welding with high frequency have much higher values, and between 0.980747 **-** 49.037333 (bar) according to chemical structure and morphology of the material processed.

Another parameter that is has to be correlated with the course of the mobile electrode is the pressing force (or both electrodes is if pressing bilateral), consisting of motion in the upper plane surface of the material and advance the depth of the fabrics movement, (t_h).In analogy with the sewing process we can make a parallel observation between this movement of active travel advance from the sewing machine and the needle.

Importance of proper advance movement in correlation with the value of other parameters resulting microstructure is shown in the (Fig.1), the welding area is where the PVC film is obtained under the following conditions: v = 27.12 MHz, T = 4s, On = 700W, 'advance the depth of fabrics (h) variable, like presented in Fig. 1-g working parameters are: t = 10s, On = 800 W, h = 0.14 mm.

Figure 1. Microstructure of the welded area



In the first two cases (a, b) the pressure generated by the hydraulic pomp is high, the welding on the edge of the welding appear a protrusions due to the molten material . In the next two cases (c, d) can be considered the optimal effects where the welded edge is less visible, decreasing thickness remain within acceptable limits and section welding, have a compact appearance.

In the cases (e, f) discontinuities can be observed in the welding area because of air inclusions, the line separating the layers are visible, we can't record a decrease in thickness. Due to a wrong correlation with other parameters (t_h, P_e) in the case (g) it's revealed a sharp deterioration in the welded materials, a dimensioning of the margins and the effect of removing of layers.

There are authors which, imply that the active course of the electrode (electrodes) has to be measured by the distance that they have when are in stationary position and they have a high frequency magnetic field between them.

Experimental researches have shown the following:

- if the distance between electrodes is 10% of the thickness of the joint tensile strength is reduced by 95%;
- if the distance between electrodes is 50% of the thickness of the joint tensile strength is reduced by 40%;
- if the range that is 70-75% of the thickness of the joint tensile strength equals the strength of raw material;

2.3. The output power of the electrodes

Although the process of heat generation by dielectric loss phenomenon will be analyzed extensively, to define power as technological parameter requires some initial clarification. High frequency welding electrodes are the two boards of the condenser, which have between them a dielectric material (textile) which is processed. Based on these considerations, the power developed is calculated with:

$$P_e = 0.566 \cdot 10^{-12} \cdot V \cdot \varepsilon_r \cdot tg\,\delta \cdot \nu \cdot E^2, \text{ (W)} \quad (1)$$

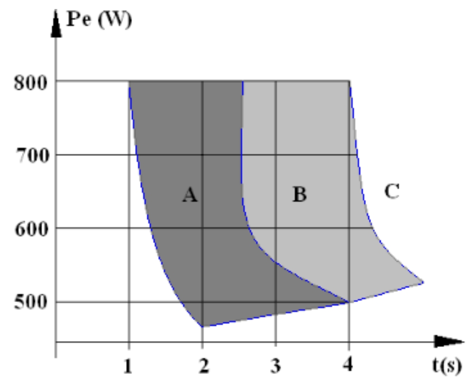
where:

V -represents the volume of the dielectric material (m^3);
ε_r -relative dielectric permittivity;
tg δ -tangent of loss angle;
ν -alternative current frequency, (Hz);
E -electric field strength between electrodes, (V/m)
P_e Power is required to:

- heating the materials (dielectrics) between the electrodes in a given time, up to a certain temperature;
- heating required for phase transformations, polymorphic or change status
- initiating chemical reactions;
- heat losses into the environment;

In Fig.2 are highlighted areas of strength variation on the time of welding (example refers to assemble PVC film, thickness of 0.3 mm).

Figure 2. Variation of power in a period of time $P_e = f(t)$

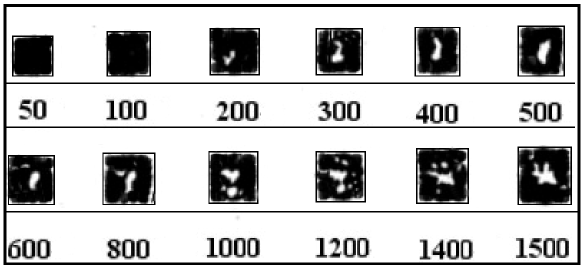


In the (A) area process carried out in good conditions, it is considered the field of welding. In the (B) area welding takes place but there is risk of degradation of the assembly, line due to inc rease edge effect and thickness reduction. Frequency of splitting the top layer increases. The same material welding area (A) can be extended by proper adjustment of the pressing force and the electrodes course. In the(C) area welding is not possible due t o the emergence of the phenomenon of breakdown material and electrodes.
An important quality indicator for welded joints is tensile strength (R). Tensile strength during high frequency assembly through the PVC film with thickness of 0.3 (mm) depending on the welding time (t) the next values of power is required. Resistance value increases significantly during the period of 2 - 3 (s), the power range is 600-700 (W). With the increasing duration of high frequency electric field (3 - 4s), and of power, increased resistance is negligible. It has even lower resistance at 800(W) of power, a phenomenon due to degradation of the assembly line occurred (low weight, oversize edges, drilling the top layer).
The literature recommends using a parameter of power (W/cm^2), defined as the power required for welding a material with an area of 1 cm^2 thickness of 1 mm. Experimentally established that when PVC is specific power of 25 (W/cm^2).

2.4. The measurement of the electrodes wear

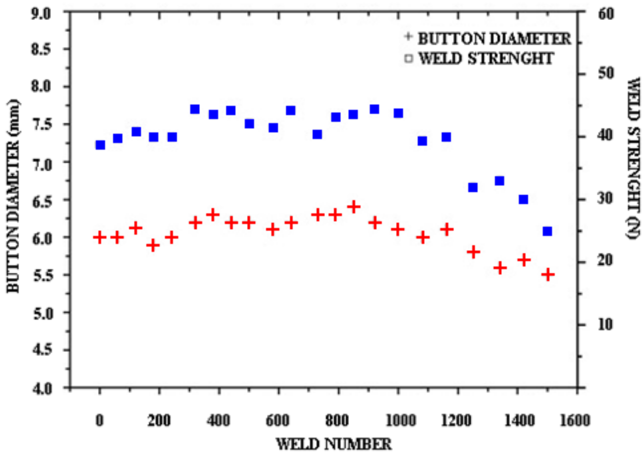
With the increase of advanced high strength materials in the textile industry, electrode assembly often occurred in this industry. Non-uniform current density distribution will become more and more irregular when electrode wear is occurred. The constriction in the current flow will cause excessive heating. Electrode wear will result in localized surface melting and damaging electrode. As the electrode further erode, the electrode face diameter increases and the average pressure and current densities decrease. As a result, undersize welds will form. In addition to the electrode mushroom, the surface roughness of the electrode face substantially increases.
In order to analyze the effect of electrode wear on spot weld quality a lot of experiments were performed in this paper 0.6 (mm) thick PVC materials are used in this study. Electrode wear experiment was carried out at the constant welding parameters (welding current: 10(A), welding time: 10 cycle and hold time: 5 cycle, and force: 20 (N)) and with 20(mm) pitch between the welds. Weld quality is evaluated by peel test. Weld strength limit is 40 (N) for a good weld. Carbon imprint method was used to measure electrode face conditions and face diameters at different weld numbers. Electrode life was defined as the weld numbers when weld strength fell to below 8 0% of the average value at the start of the electrode life test. In Fig.4 is shown the surface appearance of electrode wear. Carbon imprints of electrode face can measure the real mechanical contact area between electrode -to-material interfaces. As shown in Fig.4 electrode face diameter increased with weld numbers increasing. Electrode pitting, shown as white regions on the carbon imprints, began to emerge at about 200 welds and continuously increased. As shown, weld surface shape and electrode face appeara nce became more irregular and rough at 1000 welds.

Figure 4. Electrode face area variation every certain numbers of welds using carbon imprint.



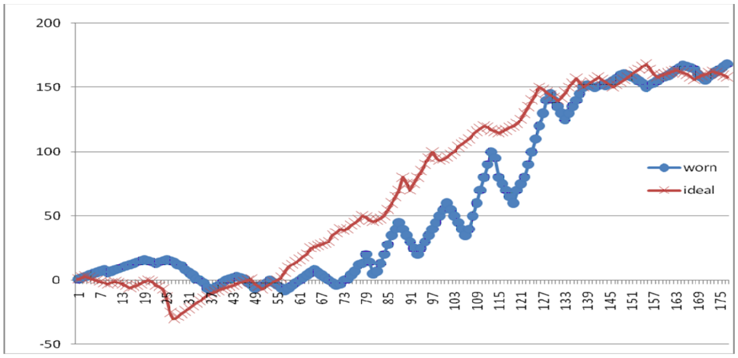
Weld strength and weld button diameter (measured through peel test) at different weld numbers are shown in Fig.5. When weld numbers exceed 1000, both weld strength and weld button size start to decline. From above experimental results, it clearly showed that as the electrod e wear occurred, the welding size and weld strength started to decrease. Finally weld strength could not meet the requirements of joint quality.

Figure 5. Weld strength and button diameter variation every certain numbers of welds



In practical production, the electrode wear must be detected in time in order to acquir e good welding quality of the high strength textile materials. Two practical electrode displacement curves are shown in Fig 6.

Figure 6.Different displacement curves (ideal and worn).



Electrode wear will produce the little heat due to the larger ele ctrode face diameter and smaller current densities. The acquired electrode displacement curve of electrode wear will be lower than the ideal displacement curve. Electrode displacement curve is very close to the normal electrode displacement curve. It is difficult to differentiate the electrode wear condition with normal condition by focus on the shape of electrode displacement curve only.

When there is electrode wear happens, electrode wear will result in localized surface melting and damaging of the copper electrode. The welding process will become unstable and inconsistency. The variation of the electrode displacement curve will become large while the curve's shape is similar with the normal. It is a main characteristic of the electrode wear displacement c urve. MR charts of electrode displacement curves in Fig.6 are shown in Fig.7 and Fig.8 . For these movement charts, n=5, D_3=0 and D_4=2.515.

Figure 7. Movement chart of normal electrode displacement curves.

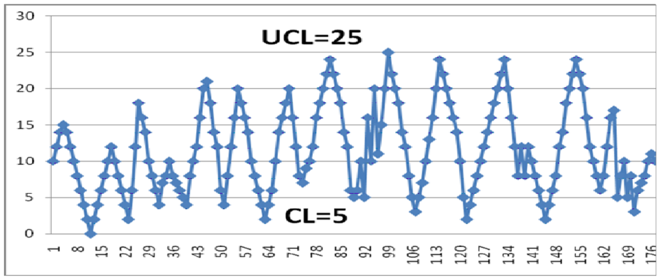
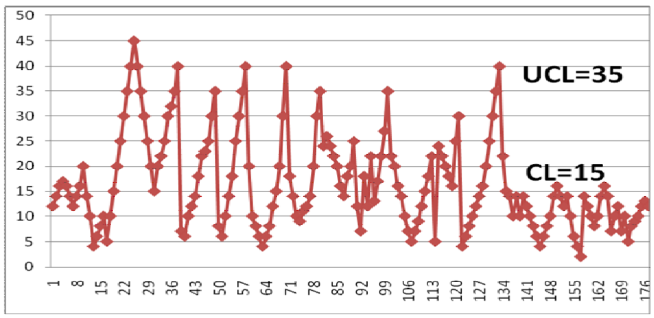


Figure 8. Movement chart of worn electrode displacement curves.



Normal and wear curves are very close to each other while movement charts of electrode displacement curves are obviously different. Let's take a look at these two movement charts. Some statistical indexes of ideal and wear variation curves were calculated in Table 1.

Table1. Statistical indexes of ideal and wear variation curves.

Mm	Mean	Variance	Maximum	Minimum	Range
Ideal	11.82	5.86	21	2	19
Worn	14.52	11.14	46	0	45

Ideal variation was in statistical control from the view, while wear variation was out of control correspondingly. This was because that worn electrode caused by non -uniform current distribution and irregular cap shape led to the weld quality variation. The electrode wear weld quality was detected based on MR chart of electrode displacement curve.

3.CONCLUSIONS

High frequency welding process is a major joining technique of the future textile industry due to its high speed and relatively low cost. The quality welding of the resistance welds determines the durability and reliability of the final product. Although resistance welding is widely used, it is difficult to ensure the consistency of welding quality in real production.

This study provides a new approach to analyze the curve's high frequency characteristics. Computer technology was introduced to analyze the process consistency by employing movement charts. The moving range method implemented the high frequency welding process monitoring through providing the high frequency information of the curve. It will greatly improve the resistance welding quality control by combining the low frequency and high frequency characteristics together. A welding process under electrode wear condition was employed as a practical example to illustrate the implementation procedure and prove the effectiveness of the methodology. The results of this research

will enhance the understanding of the electrode displacement curve, and help systematically design better high frequency welding quality systems.
Due to restrictions of material the usage of high frequency as welding agent is recommended to assemble simple materials (PVC film, polyamide textile surfaces) or composite materials (textile surfaces coated with polyurethane).

4. REFERENCES

1. Mitu, S, Mitu, M.(2005). *Bazele tehnologiei confecţiilor*, Vol. I şi Vol. II, Editura Performantica, Iasi, 2005;
2. Cary, H.C.(1998). *Modern Welding Technology*, 4th ed., New Jersey Prentice-Hall.
3. Martin, D.C. (1971). *High Frequency Resistance Welding*, Welding Research Council Bulletin Series, New York.
4. Rudd, W.C.(1957). *High-frequency resistance welding*, Welding J.
5. ***(1996).Laboratoire de Génie Electrique, Université Paul Sabatier Toulouse Cedex France.
6. Dehelean, D (1997). Sudare prin topire,Editura Sudura, Timisoara, Romania,1997;
7. *** (1991). American Welding Society (8th ed.), Welding Handbook, Welding Processes **vol. 2**, AWS Miami.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

A NEW EUROPEAN STANDARD FOR SIZE LABELING IN CLOTHING ?

dr. ing. Viorica PORAV, dr.ing. Liliana DOBLE

Oradea University; Oradea. România emai: viorica.porav@gmail.com

Oradea University; Oradea. România email : liadoble@yahoo.com

Abstract: A draft standard labeling system, now out to consultation among the countries that make up the European Standards body, CEN, could mean the imminent end of size confusion, both for individual shopper and for companies that have to cater for multifarious national markets. The proposed Standard is intented to bring two main benefits to the shopper. Firstly, it will make it easier to buy clothes while traveling abroad or on business – or from increasingly important international e-commerce and catalogue sector. Secondly, it will relate the size of a garment to actual body measurements, rather than using an arbitrary numbering system.
Keywords : size label, size numbering system, standard labeling system, clothing size Conversion.

1. LABELLING SYSTEM TODAY

With international business, the size informations are confused, for the buyers.
In different countries in the world, there are different sizes for the same body measurement.
Clothing sizes in the United States are different than those found in most other countries. If you are a visitor from another country shopping for clothes in the USA, it might be useful to know the differences in USA sizes.[5]

Women's Dresses and Suits (Junior Sizes)

European	28	30	32	34	36	38	40	42
UK	3	5	7	9	11	13	15	17
Japan	0	2	4	6	8	10	12	14
USA	1	3	5	7	9	11	13	15

Women's Dresses and Suits (Misses Sizes)

USA	FRANCE	UK	ITALY	GERMANY	RO
8	**38**	**10**	**42**	**36**	**42**
10	**40**	**12**	**44**	**38**	**44**
12	**42**	**14**	**46**	**40**	**46**
14	**44**	**16**	**48**	**42**	**48**
16	**46**	**18**	**50**	**44**	**50**
18	**48**	**20**	**52**	**46**	**52**
20	**50**	**22**	**54**	**48**	**54**

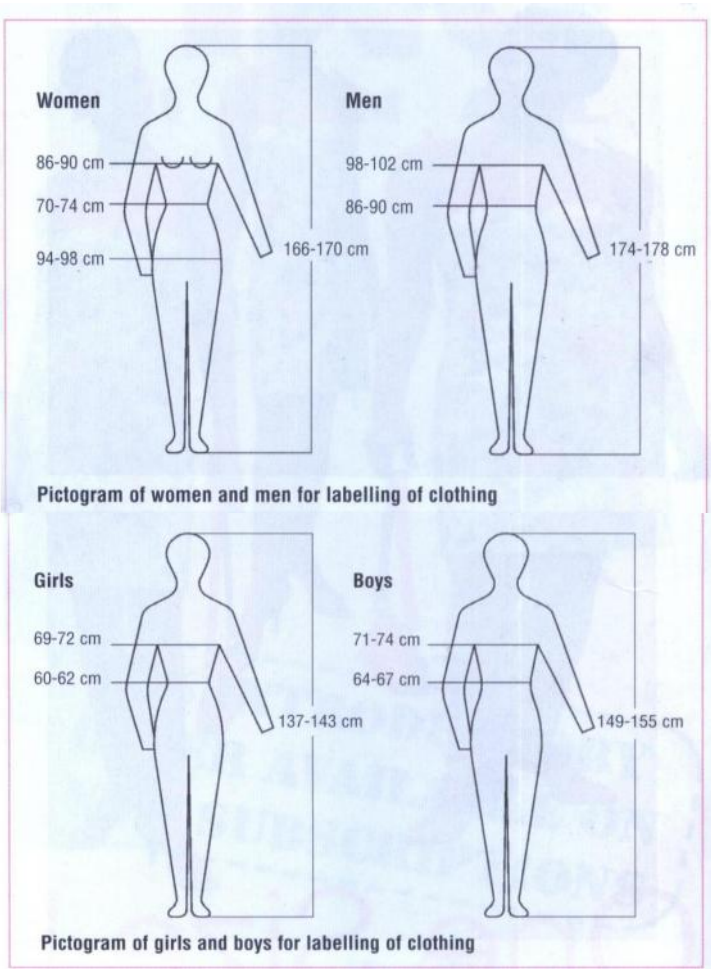
Mens Suits and Shirts

USA	EUROPEAN SIZES	UK
32	**42**	**32**
34	**44**	**34**
36	**46**	**36**
38	**48**	**38**
40	**50**	**40**
42	**52**	**42**
44	**54**	**44**

The same situation is also for men's and children's clothes. Haw it is possible to manage this ?
According to the Department for Trade and Industry, the average UK woman is 162 centimeters tall and weighs 66.7 kilograms. This corresponds to a Body Mass Index of 25.2 kilograms/meters², which is slightly less than the average British man's, and less than the average American fem ale's.
The average UK male stands, is 176 centimeters tall and weighs 80 kilograms with a Body Mass Index of 26.0 kg/m².
The average American woman's weight has increased 5 kilograms (7 %) in the 10 years between the gathering of statistics, while her he ight has remained about the same. Ten years ago a weight of 69 kg and height 162 cm. Now, it's 74 kg and 162 cm.
Men have have also increased their weight by an average of 4 kilograms (6 %), from 82 to 86 kilograms, while remaining essentially the same h eight 176 centimeters.[4]
The average Canadian woman's weight is 69.4 kg and height is 161 cm., and the male's weighs 82.7 kg, and is 174 cm. tall.
In Mexic, for example, the average Mexican males are 166 cm. tall and females are 150 cm. It was not possible to find national weight average.[4] [5].

2. HOW IT POSSIBLE TO MANAGE THIS SITUATION IN EUROP COUNTRIS ?

The new Standard target is to unify the informations on labels in all the countries.
On the new label, the shopper will see a pictogram of fem ale or male body, with key measurements indicated in centimeters. Already agreed by the CEN sub -committee are primary measurement, and a range of secondary measurements, for each type of garment. Retailers applying the Standard would always display the primary measurement, but would have option of also showing one more from the list of secondary measurements. For example, the primary measurement on a shirt would be the collar girth. The secondary measurement one might be sleeve length. The primary measureme nt on a women's skirt would be the waist and the secondary one might be hips. Separate criteria for children's wear have also been agreed. [1]
Several countries are in process of conducting sizing surveys of their populations, (anthropometrics studies) and the Standard while setting norms for the fit of the garment (such as the neck/chest ratio in a shirt), deliberately allows some latitude, to adjust the fit to the peculiarities of each national market, or for the designer's individual cult.
All this is very positive, but CEN, the International Organization for Standardization (ISO) and British Standards Institution (BSI), admits there has been dissent.
Parts one and two of BS EN 13402 [1], relate to the pictogram and the primary dimensions, and ha ve seen consensus achieved. Part three, which is part now in draft, relates to the intervals betweens sizes, and here national expectations have to be overcome.[1]
The draft is based on 4 cm. intervals for most garments (1cm. for shirt collars), and this conflicts with an existing 5 cm. norm in some countries.[1]



Several countries are waiting for outcome of their national sizing surveys, and of commercial consultations, before committing themselves and this makes the timing of implementation difficul t to predict. Using the three-dimensional (3D) measurement is possible to have kuickly this results.[6]

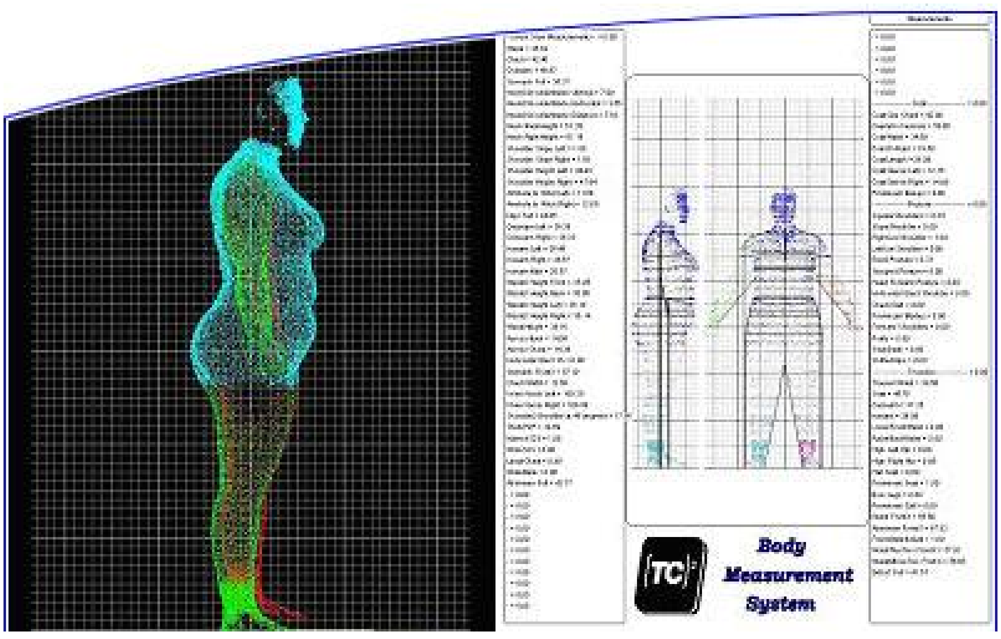


Figure 2 Gird Projection feature for Screen Viewing and Printouts

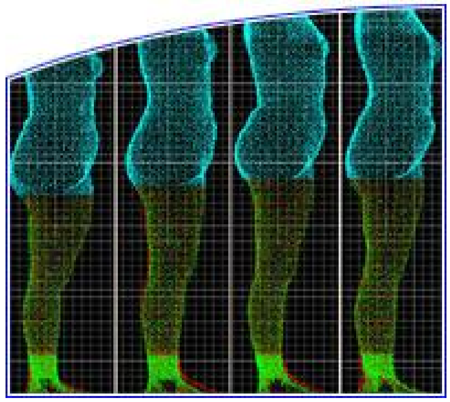


Figure 3 Comparison of scan images

3D measurement cleary offer much more surf ace information than traditional dimension measurement with the centimeters tape or two-dimensional photographs. A variety of methods are available to generate 3D images such as laser scans, stereo-photogrammetry,infrafed imagind and even CT. However each of these methods contain inherent limitations and as such no systems are in common clinical use.[4]

Further complication in the committee process has been created by the expansion of the European Union, which has added several new countries to CEN.

A fourth part of the Standard–still a distant prospect–would convert each size into a 4–digit code [1] that could be more easily processed by computer systems controlling manufacture, logistics and merchandising.

The need for harmonizing sizes on clothes labels o riginated from continental mail–order companies, selling across three or four different countries, dealing with clothing sizes.[1]

The attraction for shoppers is fewer wrong–fitting items, making for an easier shopping process. Size harmonization will reduce the number of returns and customer dissatisfaction.This is good news for retailers because if shoppers find clothes ill–fitting, they often never shop there again.

The European Association of National Organizations of Textile Retailers (AEDT), which r epresents textile retailers in Europe, recognizes that there is a problem with the current sizing system.[1]

AEDT is convinced that the present system of size indication is confusing for the whole clothing chain. In reality, present sizes do not refer to c oncrete measurements of persons.[3] A good system for closing sizes will make buyng clothes easier and ensure that consumers are able to find what they want. The Association has agreed the first and second part of the Standard, but awaits its member's assessment of their country data before taking a view on the third part.

3. CONCLUSIONS

One clear disadvantage of the Standard is that it will no be mandatory –raising the possibility of more confusion on the high street, not less. That is, unless the European Un ion adopts is as part of its Metrication Directive, as is has already forced retailers to sell in grammes rather than pounds – ounces. There is a real chance this will happen.

In the meantime, there is the question of implementation. How well will shoppers take to the new label ? This is especially an issue in the UK, where most people have no idea of their measurements in centimeters, being still wholly loyal to feet and inches. From the beginning, will be one first phase, with dual-labelling, in wich the size label would show the traditional size prominently, with the new Standard formula below.

4. REFERENCES

[1] John Scrimshaw.*One Size Really Migyht Fit All*. Fashion Business International 2004

[2] * * * Fashion Size Made-in –Italy.com

[3] Frenk Moore. Fashion Business International 2003

[4] * * * sizeusa.com

[5] * * *usatourist.com

[6] Proc. ACM/IEEE Design Automation Conference DAC. *Electronic textile modeling and optimization.* New Orleans LA ,2002

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

STUDY ON WASTE REDUCTION IN DIFFERENT SE CTIONS OF GARMENTS MANUFACTURING PROCESS

Mohammad Faizur Rahman[1], Sheikh Abdullah Shadid [2] A.B.M. Sohail Ud Doulah[2]

[1]*Dept. of Textile Technology, Ahsanullah University of Science & Technology (AUST), Dhaka, Bangladesh,* *rashedtex@gmail.com*
[2] *Dept. of Textile Technology, Ahsanullah University of Science & Technology (AUST), Dhaka, Bangladesh,* *sheikhshadid@gmail.com,*
[2] *Dept. of Textile Technology, Ahsanullah Univer sity of Science & Technology (AUST), Dhaka, Bangladesh,* *sdoulah@yahoo.com*

Corresponding author: Mohammad Faizur Rahmana, *rashedtex@gmail.com*

Abstract : Garment is the final product produced from different fibres (natural and manmade). Garments are manufactured through a sequence like pattern making, grading, sample making, marker making, cutting, sewing, finishing etc. Huge wastages are caused in different sections of garments manufacturing process. Such wastages reduce the profit of the factory. So, wastages need to be minimized in different sections of garment manufacturing. If the wastage is minimized the RMG (Readymade Garment) sector will be capable to produce product at lower cost and the orders will be increased. This study shows the causes of wastages and wastage minimizing process in garments manufacturing. Mainly the wastage occurred in garments manufacturing due to lacking of technical knowhow of employees, la cking of trained and skilled workers, carelessness of management and workers etc. The possible means of reducing of these wastages are use of new technology and machineries in production line, employment of skilled people, providing training to workers, ar rangement of regular audit etc.
Key words: waste reduction, garments, manufacturing process

1.INTRODUCTION

Reduction of wastage in different section of garments manufacturing is very important & essential. During garments production, wastage may occur in different sections such as cutting, sewing, finishing etc. If the wastage is more than the assumed percentage in different section, factory can face a high amount of loss. So the management should follow some particular procedure to minimize this wastage.

1.1 Objective of the study:

2. To identify about wastages in different sections of garments processing.
3. To identify the causes of wastage.
4. To identify possible waste minimizing process.
5. To compare the wastage percentage in different garments manufacturing un its.

2.METHODOLOGY:

Methods followed to perform a job or conducting activities to complete a task is called methodology. In conducting this study both qualitative and quantitative methods were used. For data collection questionnaire, observation and interview techniques have been used. To conduct this study, necessary information collected from the following 11 (eleven) garments manufacturing factories of Bangladesh.

Table 1. Information collected from garments manufacturing factories of Bangladesh

Sl No	Factory Name	Location	Type	No of Line
01	Salna textile mills	Gazipur	Knit	8
02	Abonti composite mills	Narayangonj	Knit	10
03	Concept knitting industry	Tongi, Gazipur	Knit	6
04	One composite	Gazipur	Knit	6
05	Royal Bangla garments	Mirpur, Dhaka	Knit	5
06	Fops garments	Narayangonj	Knit	6
07	Nahida garments Ltd.	Dhaka	Woven	11
08	Astras garments Ltd.	Dhaka	Woven	11
09	Pastel garments Ltd.	Dhaka	Woven	10
10	Regal garments Ltd.	Dhaka	Woven	10
11	Viyellatex	Tongi, Gazipur	Knit	7

All the data are collected and analyzed by Ms Excel. The incorrect and biased data are deleted from database.

3. THEORETICAL ASPECT:

3.1 Garments:

Garments are the second need of the basic needs of human. Once men used leafs, barks and animal skin to protect their body from environment conditions when yarn and fabrics are unknown to human. It is difficult to say the exact time of the use of fabric for human clothing.

3.2 RMG:

Garment industry large scale production of readymade garments (RMG) in organized factories is a relatively new phenomenon in Bangladesh. Until early sixties, individual tailors made garments as per specifications provided by individual customers who supplied the fabrics. The domestic market for readymade garment, excepting children wears and men's knit underwear was virtually non-existent in Bangladesh until the sixties. At present Bangladesh exporting such items in a huge quantity per year.

3.3 The bangladesh garment industry:

For Bangladesh, the readymade garment export industry has been the proverbial goose that lays the golden eggs for over fifteen years now. The sector now dominates the modern economy in export earnings, secondary impact and employment generated. The garments sector of Bangladesh is the 76% foreign currency earner.

3.4 Export markets for bangladesh apparels

Table 2. Value of total apparel export for the year 2008-2009: Total export in Million USD

Total		**BGMEA**	**BKMEA**
Woven	**5918.51**	**5918.51**	**Nil**
Knit	*4570.64	**1828.25	2742.38
Sweater	1858.62	1858.62	Nil
Total	12347.77	9605.37	2742.38
Percentage		**77.79**	**22.2**

N.B. * Quantity other than sweater and ** BGMEA share has been calculated 40%.

3.5 Sequence of garments manufacturing or flow chart of garments:

The garment production processing steps and techniques involved in t he manufacturing garments for the large scale of production in industrial basis for business purposes is called garments manufacturing technology. Garments factories are classified according to their product types are as follows: Garments Factory----

Sl. no	Factory name	Wastage%
01	Nadia garments Ltd.	1
02	Astras garments Ltd.	2
03	Regal garments Ltd.	0
04	Pastal apparels Ltd.	2

1. Woven Garment Factory.
2. Knit Garments factory
3. Sweater Garments Factory

3.5.1 Garments manufacturing process: stepwise garments manufacturing sequence on industrial basis is given below:

Design / Sketch → Pattern Design → Sample Making → Production Pattern → Grading → Marker Making → Spreading → Cutting → Sorting/Bundling → Sewing/Assembling → Inspection → Pressing/ Finishing → Final Inspection → Packing → Dispatch
This is the Basic Production Flowchart of a Garment . In advance some of the process can be added or removed.

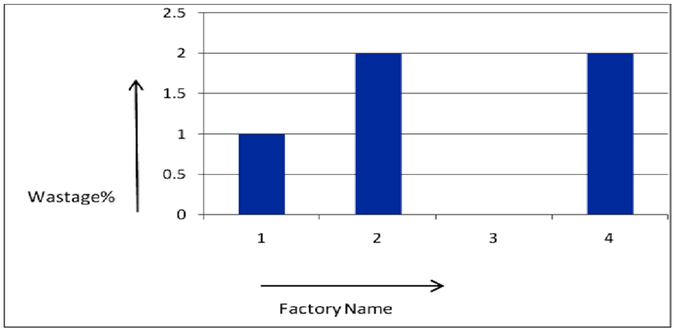
3.6 Wastages: loss resulting from breakage, delay, handling, leakage, shrinkage etc. of goods or material.

3.7 What are garments wastages? fabric/remnants, sewing thread , trimmings, samples , cutting or scraps, mill ends

4.ANALYSIS AND FINDINGS:

Analysis and findings is the most important part of a report. The collected data and information are analyzed to get an accurate result. Sometimes results are presented using different groups, table etc. Collected data (garments manufacturing section-wise) from different garment factories:

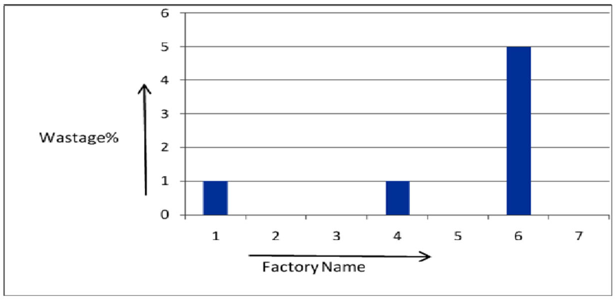
4.1 Purchase wastage (Woven garments):



Comment:
From the above graph it can be said that purchase wastage of Regal garments is the least. Cause Regal garment maintain proper purchase inspection.

4.2 Purchase wastage (Knit garment s):

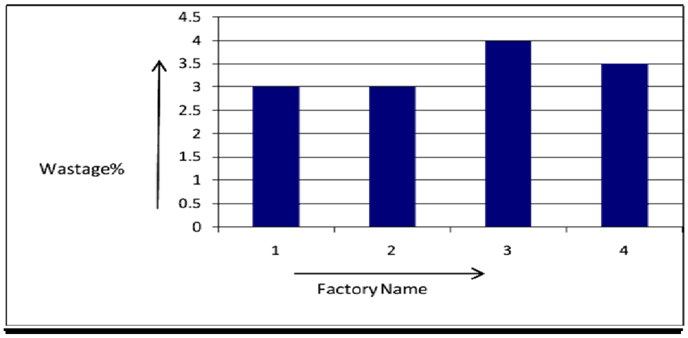
Sl. no	Factory name	Wastage%
01	Salna textile mills	1
02	Abonti composite mills	0
03	Concept knitting indutry	0
04	Viyellatex	1
05	One composite	0
06	Fops. garments	5
07	Royal Bangla garments	0



Comment:
The purchase inspection of Fops garments not properly maintained. Otherwise it is impossible.

4.3 Cutting wastage (Woven garments):

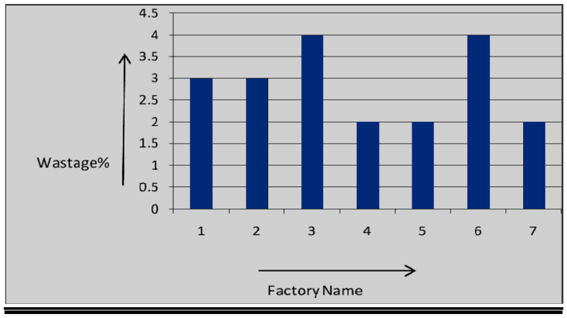
Sl. no	Factory name	Wastage%
01	Nadia garments Ltd.	3
02	Astras garments Ltd.	3
03	Regal garments Ltd.	4
04	Pastal apparels Ltd.	3.5



Comment:
Among the four garment factories, Nadia & Astras garments have same cutting wastage%. But Regal garments has the highest. Because Regal garments not use CAD software & cutting people are not so skilled & sincere.

4.4 Cutting wastage (Knit garments):

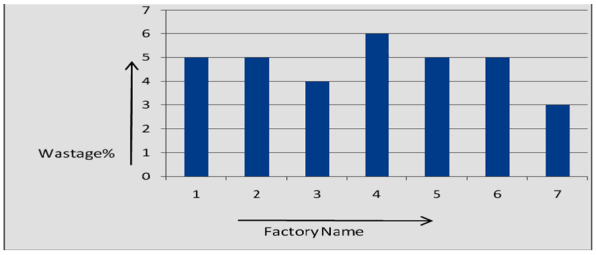
Sl. no	**Factory name**	**Wastage%**
01	Salna textile mills	3
02	Abonti composite mills	3
03	Concept knitting indutry	4
04	Viyellatex	2
05	One composite	2
06	Fops garments	4
07	Royal Bangla garments	2



Comment:
Concept knitting Ltd. & Fops garments has more cutting wastage. Because they do not use CAD software. And cutting pepol are not skilled & sincere.

4.5 Sewing wastage (Woven garments):

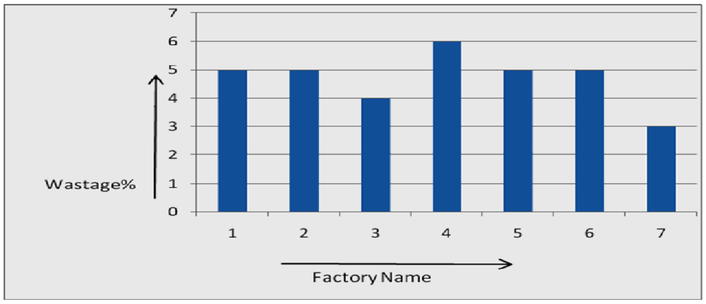
Sl. no	Factory name	Wastage%
01	Nadia garments Ltd.	3
02	Astras garments Ltd.	2
03	Regal garments Ltd.	3
04	Pastal apparels Ltd.	5



Comment:
Astras garment sewing wastage low. Here workers are more efficient& accurate line balancing. But Pastal
garments has the highest, Because may be due to improper audit & supervision of operacation etc.

4.6 Sewing wastage (Knit garments):

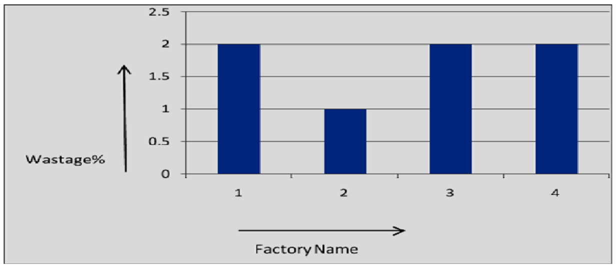
Sl. no	Factory name	Wastage%
01	Salna textile mills	5
02	Abonti composite	5
03	Concept knitting	4
04	Viyella	6
05	One composite	5
06	Fops garments	5
07	Royal Bangla	3



Comment: Royal Bangla garments has low sewing wastage because they maintained worker training program.

4.7 Finishing wastage (Woven garments):

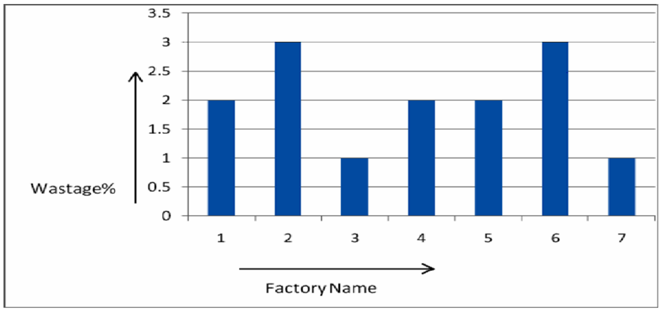
Sl. no	Factory name	Wastage%
01	Nadia garments Ltd.	2
02	Astras garments Ltd.	1
03	Regal garments Ltd.	2
04	Pastal apparels Ltd.	2



Comment: Here Astras garment has low finishing wastage because their sewing quality is more accurate & proper inspection maintained.

4.8 Finishing wastage (Knit garments):

Sl. no	Factory name	Wastage%
01	Salna textile mills	2
02	Abonti composite mills	3
03	Concept knitting indutry	1
04	Viyella	2
05	One composite	2
06	Fops garments	3
07	Royal Bangla garments	1



Comment: Here Abonti composite & K.G. garments face more wastage because their worker is not enough skilled & sincere.

5. MAJOR FINDINGS

The following causes for occurring wastages in garment manufacturing process have been found:

- Lack of technological capabilities of employees of factory.
- Carelessness of management.
- Carelessness of worker.
- Necessity of trained employees.
- Lack of skilled workers (especially in swing section).
- Lack of regular audits in wastage occurring sections.

- Communication gap.
- Lack in proper inspection.
- Lack of awareness in the wastage occurring sections.
- Not following compliance factors in the factory.

Most of the factories maintain no standard procedure for different operations as well as quality control.

6. RECOMMENDATIONS

To reduce wastages in garment manufacturing process, the following jobs can be done:
1. Conduct a waste audit.
2. Improve fabric cutting efficiency.
3. Recycle garment waste

7. CONCLUSION:

Wastage is a major problem in garments sector that reduces the profit. A lot of garment factories do not follow standard methods to reduce waste. In this study the main focus was on waste reducing of garments manufacturing. Waste reduction is not an easy task; it is related with different factors. The researchers think if any factory will follow or maintain recommendations/suggestions (mentioned in the point 6.0) the wastage would be reduced in that factory.

8. REFERENCES:

www.associatedcontent.com
Introduction to Clothing Production Management, A. J. Chuter.
Garments and Technology, Prof. M. A. Kashem.
www.sdlatlas.com
www.fibre2fashion.com
www.tex.in
www.textileclass.com

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

OPTIMIZATION OF SMART CLOTHES SYSTEM

Ingrida Sahta[1], Mg. sc. ing., Ilze Baltina[2], Dr. sc. ing., Juris Blums[3], Dr. phys

[1-2]*Riga Technical University, Institute of Textile Material Technologies and Design, Riga, LATVIA*
[3]*Riga Technical University, Institute of Technical Physics, Riga, LATVIA*

Corresponding author: Ingrida Sahta, ingrida.sahta@rtu.lv

Abstract: The research is dedicated to microclimate regulatory vest with an integrated electrical system, which is also composed Peltier elements, and cooling function is based on the heat conductivity in solids [5]. In the experiments with thermoelectric modules - Peltier elements - and the different thickness of copper, bronze and steel threads and different density fabrics, as well as copper foil, it is observed that the copper foil provides the necessary heat removal, which, in turn, provides favorable conditions for the cooling. To verify microclimate regulatory vests compliance with the general requirements of article, it is scheduled an assessment at physiologically - hygienic point of wearing by the appropriate operating conditions.

Key words: Smart Clothes, Microclimate, Electrical System, Solar cells, Peltier elements

1. INTRODUCTION

Human microclimate is an important factor in maintaining of optimal capacity for work and feeling of comfort. High heat conditions may cause health problems, as well as psychiatric problems, which can lead not only to the reduction in quality of work, but also to the human vital organ dysfunction. The garment with integrated Peltier elements is one of the human microclimate regulatory solution. [1]

It is known already discovered and patented smart clothes and other articles, with integrated thermoelectric converters. Here should be mentioned articles with several thermoelectric modules [3]; with integrated heat exchanger with piping system [4] and with air conditioners [6]. Systems differ in terms of power source selection; both of the solution the heat removal from Thermoelectrical module cold side, but also of the cooling type the warm side. The following products are presented both advantages and disadvantages of the integration to wear appropriate products, such as additional weight of clothes, a limited vapor and air permeability, a lot of different components, which may cause structural instability and complexity by integration in the smart clothes.

The above mentioned cooling garment manufacturing experience serves as the basis for cooling garment prototype concept and research.

2. DEVELOPMENT OF MICROCLIMATE REGULATORY CLOTHES

2.1 Concept of the system

The target of microclimate regulatory clothes prototype is to perform the cooling function of bearer. The appropriate dress for such a task is considered to be the vest - the shape provides both cooling elements in the configuration of the corresponding body region, but also simple textile technology performance for such a model.

The aim for this research: to create a microclimate control system, which would not contain a liquid or gaseous fluids, but the heat draining function based on heat conduction processes in solid states, as well as the source of power should be mobile, environmentally friendly form of energy.

The smart clothes cooling circuit schematic representation shown in the Figure 1 (with "PE" there is lettered "Peltier element").

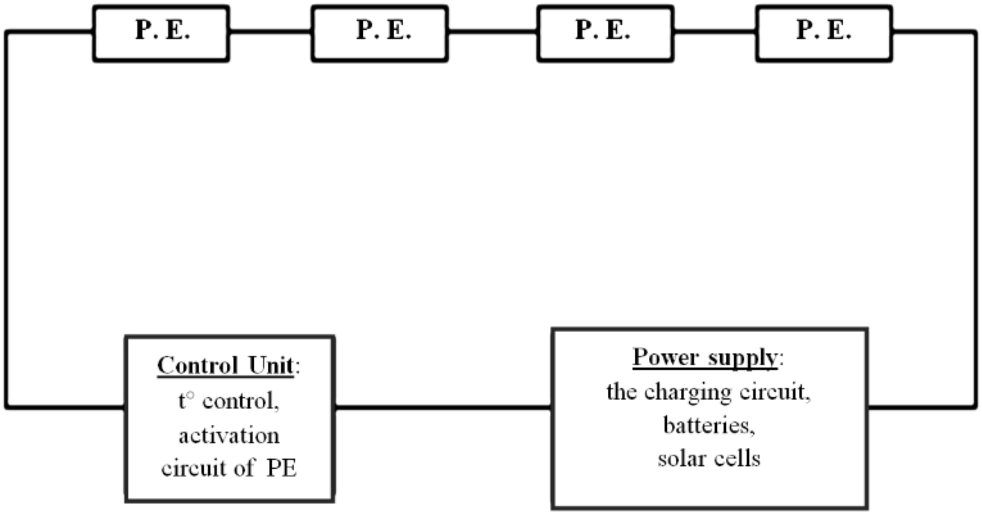


Figure 1: Scheme of cooling system

Generally the smart vest contain (Fig. 2): four Peltier coolers -3, which provide cooling effect; electronic control system with temperature sensor -1, embedded in the garment, it controls the optimal operating parameters, and solar cells -2 are used as energy source.

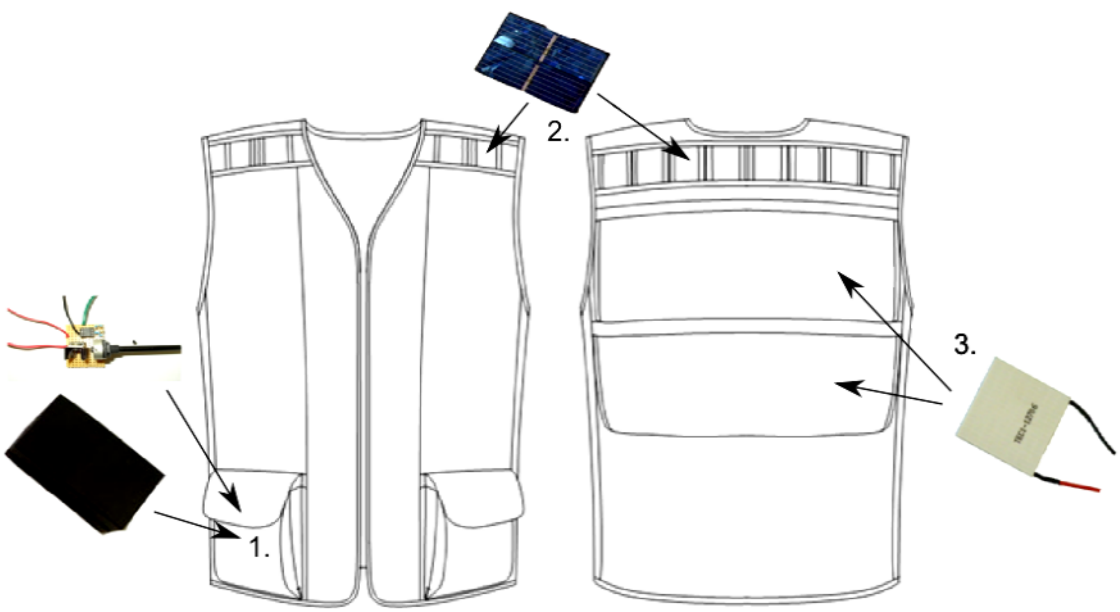


Figure 2: Overview of smart clothes prototype

Batteries, charged by solar cells, are used for stable operation of cooling system. Solar batteries are placed in a forward and back part of vest shoulders to provide the best perception of sunlight. For each of the 12 batteries provided its own space. The electronic control system, embedded in the garment, controls the optimal charging regime, the temperature of cooled garment, the level of cooling and other operating parameters.

Semiconductor Peltier element is an electrothermal converter, which operation is based on Peltier effect. Element, by the current flowing through it, creates a temperature difference or, by the temperature difference, causes a current flow [2]. Four Peltier coolers are placed on in the field of shovels on a back (Fig. 2). For each Peltier element in the garment there is designed "box". The heat, created by the current, is absorbed by the copper radiator, attached to h ot surface of the element. The knitted metal material, attached to the cold surface of the element, is used to increase cooling surfaces and for the smooth the temperature conduction (the scheme is shown in Figure 3).

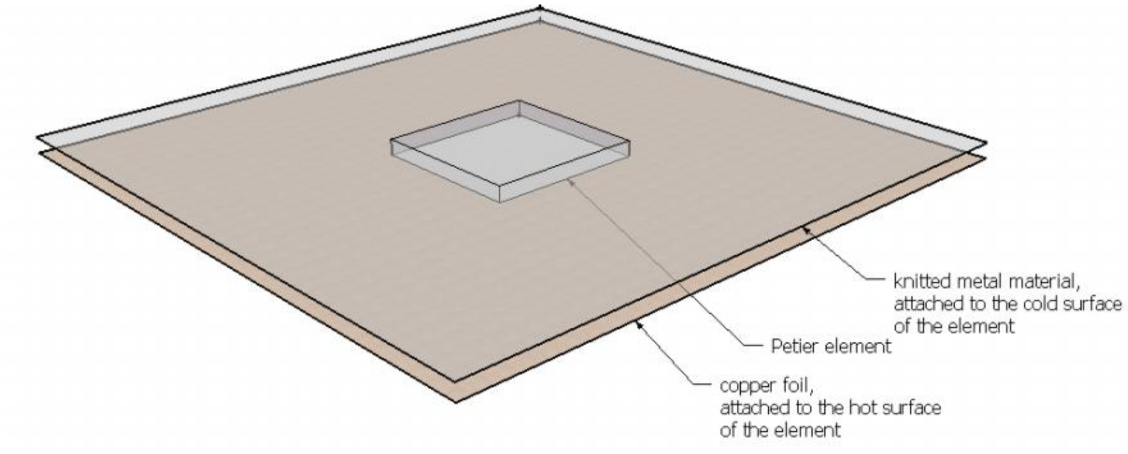


Figure 3: Peltier cooler and the accompanying materials schematic figure

2.2 Optimization of the system

Surface temperature of Peltier element depends on the power of flowing current and can reach very low values (-30° C), respectively, it can cool the nearest clothing area and create a large temperature gradient in the rest of the garment parts, which would be not desirable. Consequently, one of the research purpose are: to look for the material, which, by integrating in the garment, ensure a steady temperature regulating and at the same time - conform with the requirements of garments wearing.

In the process of the system development there is found, that the heat removal provided metal knitting material, attached to the Peltier element cold surface, is unable to provide the required cool ing effect. Therefore, there is a need to take a series of experiments for searching a suitable heat conductive material, able to provide the cooling effect of 50 ~ 60 mm away from the cold surface of the Peltier element.

Under normal environmental condi tions, the heat is best conducted by metals, in turn, textile fiber thermal conductivity is close to zero. Since the heat exchange processes affecting both the substance specific thermal conductivity and heat capacity, then further studies are taken into a ccount both the material properties. Experiment selection of copper material with thermal co nductivity coefficient of 390 W/m*K and specific heat capacity 380 J/(kg*K), for comparison - bronze with thermal conductivity coefficient of 64 W/m*K and specific heat capacity 380 J/(kg*K).

In the experiments with a thermoelectric module - Peltier element - and materials of copper and bronze with different thread thickness and density, as well as copper foil, it is observed, that the copper foil provides the necessary heat removal, but the copper mesh, which would be more suitable for the integration in clothing by its structure and properties, produce insufficient results. It is observed in the diagrams with the same thickness of thread, and density of copper and bronze meshes and copper foil. Measurement in a distance of 6 cm (Fig. 4) in away from the cold surface of the Peltier element shows, that here are not detected significant temperature changes on copper and bronze meshes. On the other hand, the curve of copper foil shows, that the temperature changes in 6 cm distance from the cold surface of the Peltier element.

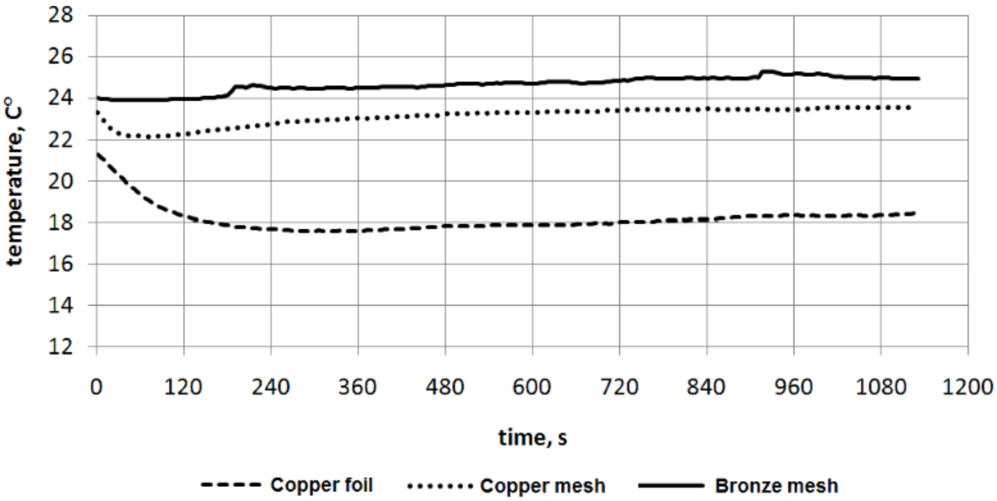


Figure 3: Measurement in a distance of 6 cm

Copper foil, attached to the element to remove heat for cooling, is able to carry out the necessar y functions of heat conduction, thereby the work of the system was provided and the target of this research: temperature control based on heat conduction processes in solid -states, was achieved. However, the problem of increasing the cooling surface, remai ns undiminished. Metal foil is a rigid, not conducting for water vapor and air, and also the movement of body limiting material, thus the foil is not suitable for the integration in garment, particularly in areas close to human skin.

To verify microclimate regulatory vests compliance with the general requirements to garment, it is scheduled an assessment at physiologically - hygienic point of wearing by the appropriate operating conditions, during activities by measuring both temperature changes in differ ent locations in space between the body and clothes and other physiological parameters (resistance, humidity etc.). This is the next step in the cooling system optimization process .

3. CONCLUSIONS

1. Copper foil provides the necessary heat removal, in 6 cm distance from the Peltier element cooling surface.
2. The copper foil have to be replaced by a material, which don't infringe clothing requirements and functions.
3. The problem area: optimization of the microclimate regulatory system and its adaptation to the clothing requirements.

The final aim of this research is to elaborate the cooling system, which does not reduce clothing requirements to be met and the functions, and in the same time ensuring effective regulation of the microclimate with Peltier element.

4. REFERENCES

1. Bansevičius R, Račkiene R, Virbalis J. A. (2007). The body Cooling System Integrated into the Clothes. *Electronics and electrical engineering*. - 2007. - No. 5 (77). – S. 3-6
2. Colinge J. P. & Colinge C. A. (2002) *Physics of semiconductor devices*, Springer US, ISBN: 978-1-4020-7018-1, 436 p.
3. Martin R. Temperature regulated clothing (2004). *United States Patent* No: US 7,186,957 B2, Reg. – 06.08.2003 10/636,511, publication: US 2004/0118831 A1 24.06.2004, Int. Cl. H05B 3/34
4. Saunders J., Jacob J. D., Gao D., Myers M. A. Thermoelectric modules and a heating and cooling apparatus incorporating same (2003). *United States Patent* No: US 6,739,138 B2, Reg. – 02.07.2002 10/186,618, publication: US 2003/0097845 29.05.2003, Int. Cl. F25B 21/02
5. Weidner R.T. (1985). *Physic,* Allyn and Bacon, USA, 961 p.

Zhixinn Li. Air conditioner for flexible material-based devices (2004). *United States Patent* No: US 6,823,678 B1, Reg. – 22.12.2003 10/743,640, publication: 30.11.2004, Int. Cl. F25B 21/02

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

METHODS FOR OBTAINING THE FORM OF PRODUCTS WHICH COVERS THE HEAD

Viorica SCOBIOALĂ, Jana RĂDVAN, Svetlana CANGAŞ

[1] ***Technical University of Moldova***

vioricascobioala@gmail.com

Abstract: This paper presents a systematization of methods of conferring spatial prosuselor head covering from dependence to influence priority factors, including the specific por: materials that are manufactured, fabicaţie technologies and construction methods. Achieving future products also covers the head and clothing products in general is assisted by computer technology hybrid applied with gr eat success in other areas such as the restoration of three-dimensional works of art: sculpture, architecture, the entire manufacturing system will size: covering computer-to-head product.
Keywords: head covering products, methods, spatial form

1. INTRODUCTION

Head covering products are constituent elements of costume, the aesthetic role of paramount importance that goes far beyond aesthetic functionality to other elements of costume that certainly intregrează image of a woman. Evolution of global fashion trends at present can not conceive suit with no head covering, is materialized in various forms and made of different materials, both for aesthetic style diversification and for functionality. Thus, the aesthetic complexity of products covering the head, carrier requirements, require further development of constructive and technological solutions to achieve without compromising the design aesthetic of their interdependence a ddressed: carrier-product-environment.

2. SPATIAL FORMS OF HEAD COVERING PRODUCTS OBTAINED BY MOLDING MATERIALS TO BE MADE THEY

Evolution spectacular performance in the manufacture of clothing products has expanded training opportunities for application in space, extending the training space of flat textile products through design-resolution technology, the creation of spatial shapes of yarn and fiber materials polymer matrix composites, transfer [2], by hydraulic methods, electrostatic and aerodynamic, a nd even the use of smart fabrics, able to memorize the shape of heat action [2].
When nature calls performed on materials (polymers, fibers, yarns, textiles flat) spatial training can be accomplished by one or more processes in fig. 1.1.
Conferring shape and its stability is ensured [3, 4, 5] by interactive activity of spinningers and weavers by providing features fibers, yarns, garment manufacturers polymeric materials needed to get finished by existing manufacturing technologies.

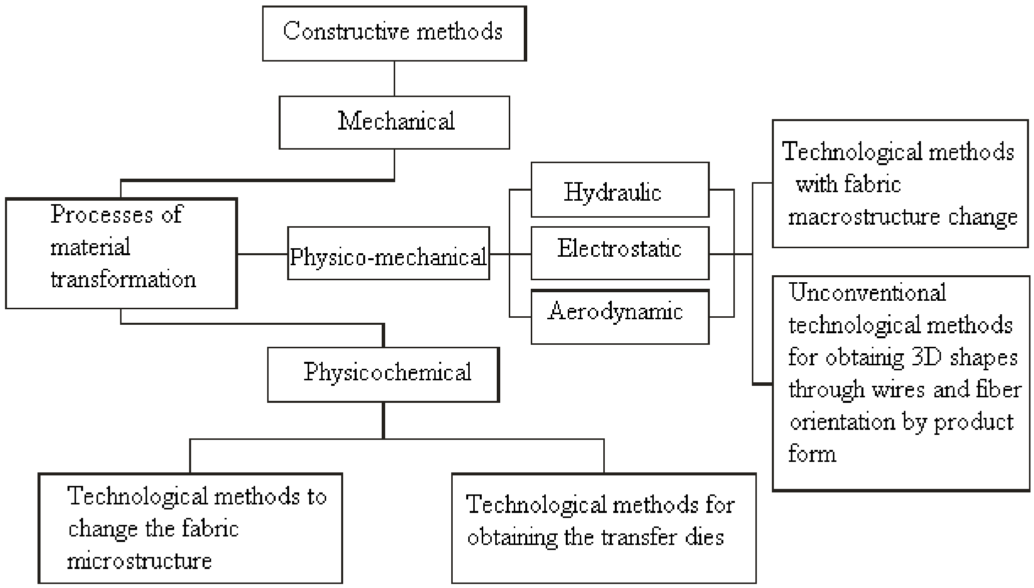


Figure 1.1. Procedures for processing materials in space products

Methods space is designed by training criteria, aimed at establishing the nature of microstructure and materials that are produced as well as implications for microstructural formation of products. Figures 1.2 and 1.3 are synthesized these processes [1, 2, 3, 4, 5].

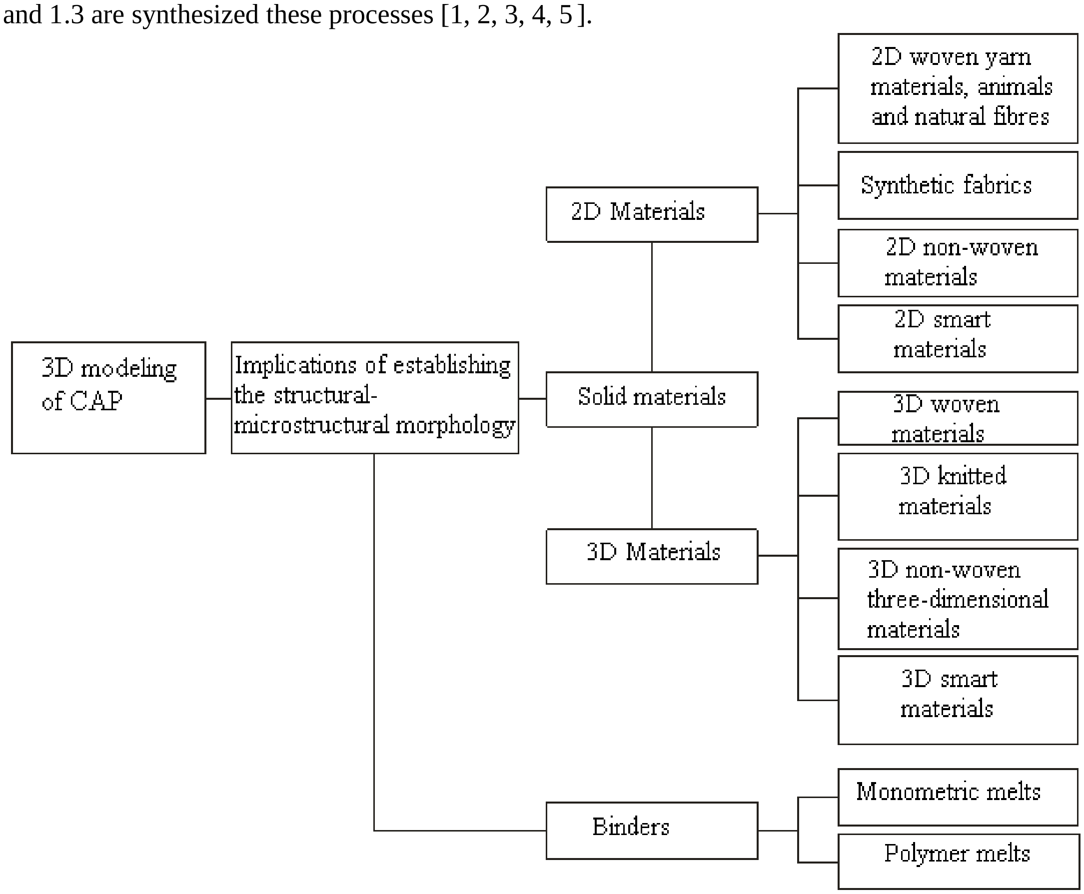


Figure 1.2. Establishing the structural-morphological implications 3D microstructural

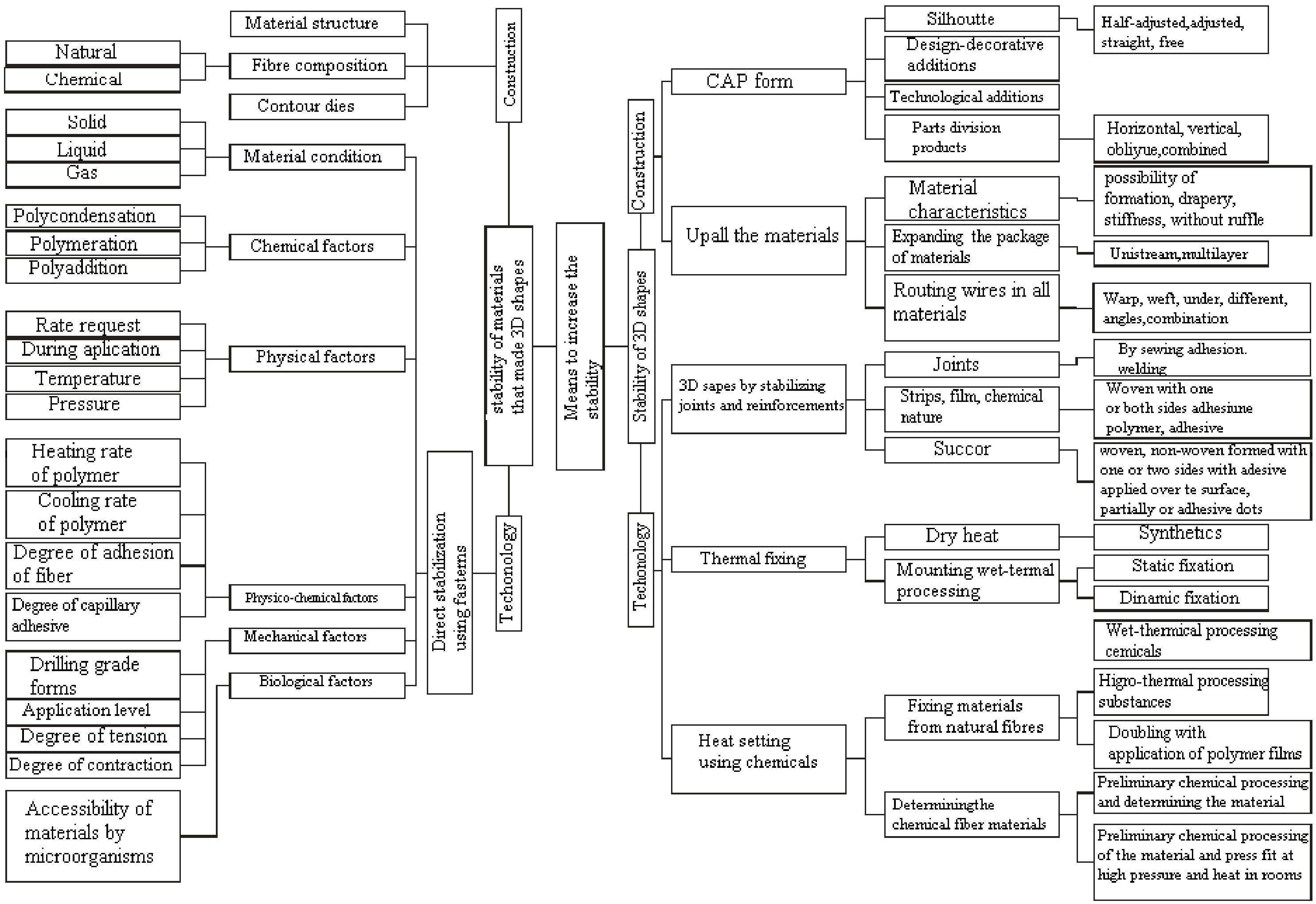


Figure 1.3 Implications of establishing macrostructure-dimensional

Training space is quantified by the degree of stability of shape. The stable form of clothing products garment means the ability to withstand the cyclic nature differently, without resi dual deformations accumulate [3].

Improve product stability and shape of product -oriented elements:

• *reduce forces that cause deformations occurring during operation, leading to change shape, increasing the stability of fixation;*

• *wrought forms of materials* [6].

Ways to increase the stability of the forms can be classified according to s tructural-morphological implications of the establishment of:

• *a means to ensure stability of material that will make up the 3D shape;*

• *means of ensuring stability of 3D shape created.*

Stability of materials that will make up the 3D shapes is determin ed by:

- *means construction*, dependent on:

• fiber composition, structure materials, contour molds.

- *technological means:*

• direct stabilization using fasteners;

• by chemical factors:

- *degree of polycondensation polymers*
- *the degree of polymerization of polymers*
- *polyaddition polymers*, etc..

That depends on factors determining the form are:

• physical factors:

- *speed of application;*
- *application period;*
- *temperature;*
- *pressure.*

• physical factors chemical:

- *heating rate of polymer;*
- *polymer cooling rate;*
- *the degree of adhesion to yarns, fibers;*
- *adhesive capillary degree of fiber materials.*

• mechanical factors:

- *degree of preformare forms;*
- *application level;*
- *degree of tension;*
- *contraction.*

3. DESIGN AND TECHNOLOGICAL METHODS TO OBTAIN FORM PRODUCTS COVERING HEAD

Design products that covers the head space can be diversified through constructive modeling methods:

• without changing the basic construction;

• to change shape;

• the main element modeling spaţialităţii change its shape;

• modeling with auxiliary elements.

Technological means to increase stability of 3D shapes are classified by: - stabilizing the joints and reinforcement forms - heat setting - using thermal chemical fixation (fig. 1.4).

4. CONCLUSIONS

1. Shape space covering products can be obtained by both methods for modeling materials that are produced in the strains that can withstand, and by settlement construction and technology.
2. Decision for the application of a method or another should be reported with reference to objective aesthetic that aims to be achieved.
3. It is important to identify the materials needed and their conformity with the benchmark characteristics.

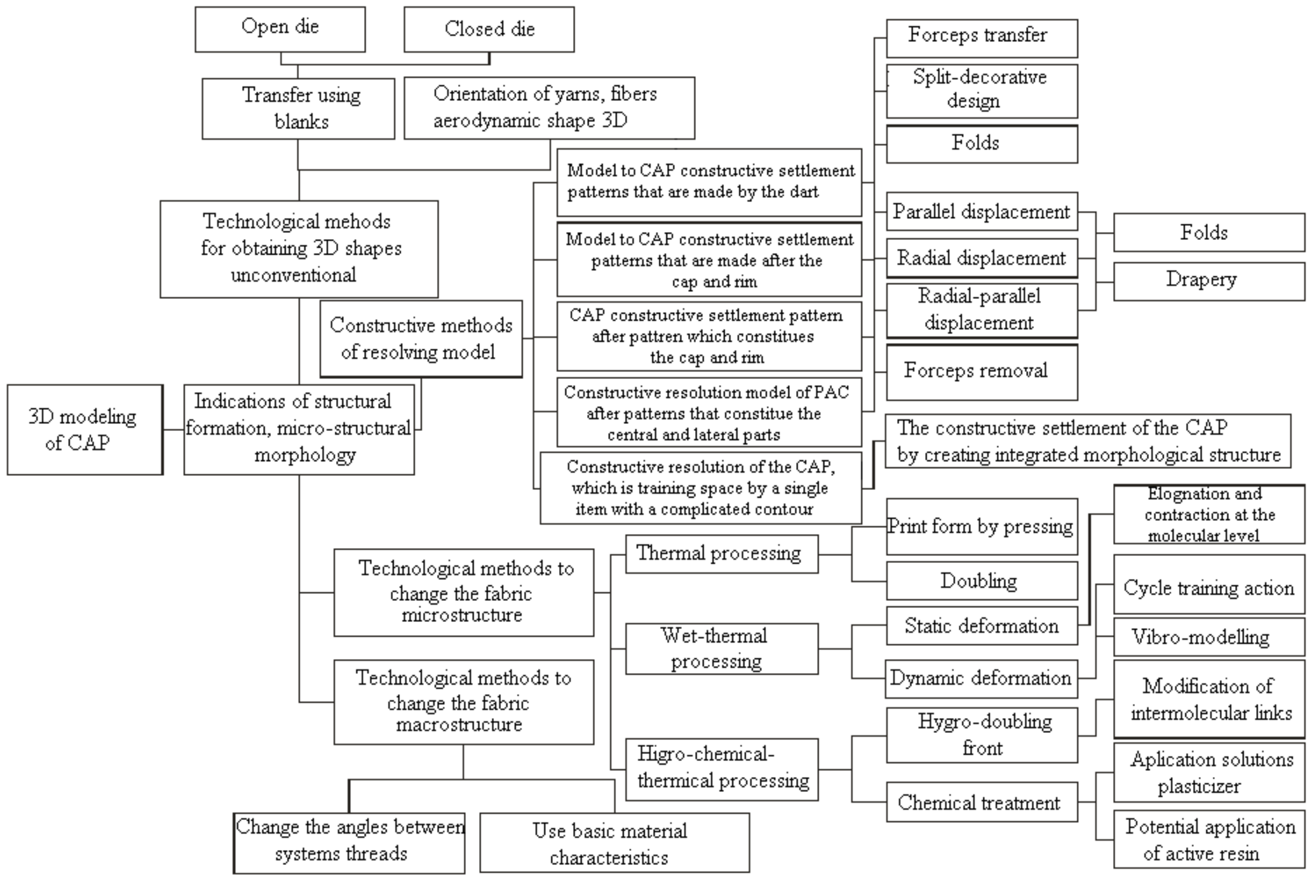


Fig.1.4. Means for mounting the three-dimensional forms of head covering products

4. Future space forms of apparel products and certainly the head covering is where computer technology: computer-to-garment.

5. REFERENCES

1. Cerepenico, A. P., Diablova, L. D. (1987). *Oţenca cacestva proţessa scleivania detalei odejdî po obobşcennomu criteriu.* Revista IZVUZ, nr. 5, pag. 94-98
2. Ciobanu, L. (2003). *Contribuţii la dezvoltarea şi realizarea tricoturilor cu destinaţii tehnice*. Rezumat al tezei de doctorat. Iaşi
3. Drăgulănescu N. (1996). *De la calitate controlată la calitatea totală*. Ed Alternative, Bucureşti
4. Florea A. (1998). *Cercetări privind evaluarea complexă a calităţii materiilor prime destinate* confecţionării produselor de îmbrăcăminte. Teză de doctorat, Iaşi
5. Kleptov, A.D., Melihov, E.N. (1980). Primenenie metoda povîşenia formoustoicivosti detali mujscovo costiuma. Revista Şveinaia promîşlenosti, nr. 3, pag. 21 -22
6. Kleptov, A.D., Melihov, E.N. (1980). Razrabotca metoda povîşenia formoustoicivosti. Revista Şveinaia promîşlenosti, nr. 2, pag. 35-37
7. Scobioală, V. (2005). Contribuţii privind îmbunătăţirea calităţii produselor de îmbrăcăminte pentru femei. Teză de doctorat. Iaşi.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

DEFECTS AND QUALITY OPTIMISATION OF CORE -SPUN YARN CONTAINING SPANDEX

Subrata Kumar Saha

Ahsanullah University of Science and Technolog , Dhaka, Bangladesh.

Corresponding author: Subrata Saha, Email: subratatex@yahoo.com

Abstract: Filament-core yarns are produced to take advantage of both filament and staple fibre properties. They offer good strength and uniformity without sacrificing the staple fibre yarn -like surface characteristics. Core-spun yarns containing spandex provide fabric designers with broad possibilities, because such stretchable yarns ca n be constructed with a wide range of properties using virtually any type of hard fibres as the cover yarn. However, a disadvantage of the core yarns is that the staple fibre sheath may slip along the filament when being pulled to pass over or when being rubbed by machine parts during further mechanical processes. But it is very easy to produce core-spun yarn containing spandex in a conventional ring frame after doing some modification of the machine. By taking some measure it is possible to make good quali ty core-spun yarn containing spandex.
Key words: Elastomeric, Spandex, Quality control, Quality control, Yarn defect.

1. INTRODUCTION

Core-spinning is a process by which fibres are twisted around an existing yarn, either filament or staple spun yarn, t o produce a sheath–core structure in which the already formed yarn is the core. Core -spun yarns are two-component structure with Core and sheath. Generally continuous filament yarn is used as core and the staple fibres used as sheath covering [1]. The chief aim of using core yarn is to take advantage of the different properties of its both components; the filament improves yarn strength and also permits the use of lower twist level, while the sheath provides the staple fibre yarn appearance and surface physical properties. The technique for the preparation of core-spun yarn is very simple and the selection of core and cover materials can be made from a variety of fibres with predetermined end use. Nylon and polyester continuous filament are the common core m aterial.

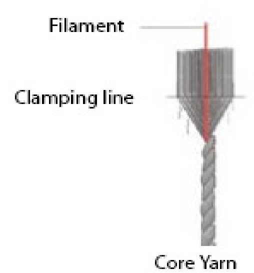


Figure 1: Filament feed in core yarn production

2. PROPERTIES OF SPANDEX:

Core-spun yarns containing Spandex provide fabric designers with broad possibilities, because such stretchable yarns can be constructed with a wide range of properties using virtually any type of "hard" fibres as the cover yarn. LYCRA is the registered trademark for DuPont's elastane yarn of coalesced filament with high stretch and recovery power. Spandex yarn or lycra has variable properties which ensure its high utility as the core in elastic core -spun yarn. These include:

- High modulus (power at stretch)
- Fine and very fine yarn counts
- Capacity to heat set
- Clear, dull and bright lusters
- Capacity to dye, if required

3. BASIC REQUIREMENT TO PRODUCE CORE-SPUN YARN CONTAINING SPANDEX:

1. Uniform, high quality roving.
2. Spinning draft below 30.
3. Accurately adjusted rings and travellers and plumbed (aligned) spindles.
4. Maintained spinning aprons, drafting rollers and cost strictly.
5. Replaced slipping or worn gears and sprockets.
6. Excellent cleaning devices to prevent fly deposits
7. Sufficient light to easily detect any breaks of the extremely fine spandex yarns

Spandex is a continuous filament yarn. It must be handled carefully to prevent damage. Spandex tubes should not be bumper, thrown or mishandled in any away. Care in unpacking is requ ired to avoid scuffing the shoulders.

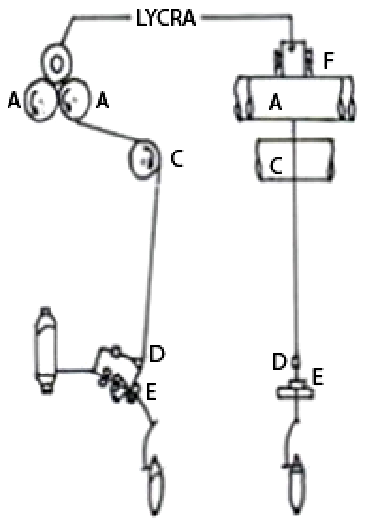


Figure 2: Schematic of core-spinning

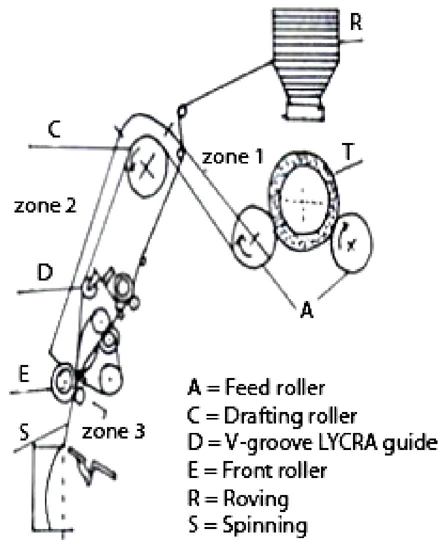


Figure 3: Arrangement of core spinning with spandex on cotton system

4. CONVENTIONAL SPINNING FRAME MODIFICATION :

To produce elastic core-spun yarns conventional spinning frames must be modified with a positive feed-roller system. “V” groove guides to feed Spandex yarn to the fron t roller under controlled, uniform stretch and proper position relative to the “hard” fibre roving.

4.1. Draft Control:

This mechanism consists of 2 positiv ely driven feed rollers (Fig - 2) that serve as a cradle for the tubes of spandex to deliver the yarn a t predetermined feed rollers can be adjusted to give the desired draft or stretch ratio. A suitable arrangement for drafting and spinning with spandex on c otton system is shown in Fig - 3.

4.2. Feed roller:

Smooth surface rollers must be used to give ade quate yarn to surface friction so that slippage is minimized at the contact points with the yarn tubes. Chrome plated steel rollers are preferred for smoothness, but other type can be used, such as electrical conduit, aluminium, stainless steel or PVC tubing [2]. To prevent draft back feed rollers diameters should be large enough to allow yarn to contact at least 90 mm of roller surface after leaving the tube. Roller diameters of 60 mm to 100 mm are recommended to ensure adequate surface contact. The feed r ollers can be located on the frame either above or below the roving creel.

5. CORE-SPAN DEFECTS:

A serious defect can occur in core spun yarns is “sheath voids”, which is characterized by length of spandex yarn without covering. Such defects are caused by breaks in the hard-fibre roving as it is fed from the front drafting roller while the spandex yarn end continues to run. At the point of the break the “Pneumafil” unit or the scavenger rollers pick up the fibre until the spandex yarn and roving again combine themselves to continue core spinning. This results in a “sheath voids” even though the end appears to be spinning continuously. Other common problem with core-spun yarns made in a ring spinning frame is the slippage of the staple fibres relative to the filament, which haves a length of bare filament with a clump of fibre in one end. This effect is known as ‘strip -back’. This fault may lead to incomplete core coverage and results in end breakage in subsequent processing. A high level of twist is normally needed to build up the necessary cohesion between the sheath and the core components. The high twist reduces the production speed and thereby increase the production cost.

6. PROCESS AND QUALITY CONTROL:

6.1. Alignment with roving:

The core must be positively and selectively positioned with respect to the roving as it is fed to the front roller and the correct alignment must be maintained throughout spinning. This should be ensured otherwise it may result:

- Core voids.
- Ply twisting of spandex and roving with consequent variable yarn bulk.
- Grin-through.

6.2 Traveller:

A heavier traveller must be used in core spinning than would be required in spinning an equivalent yarn number from hard fibre, to prevent contraction of the core yarn and non uniform bulking of the cover yarn. The traveller must not be so heavy; however that it places excessive drag on the yarn at the ring.

6.3 Drafting aprons:

Drafting aprons should be adjusted to deliver the roving to the bottom front drafting roller directly below the nip.

6.4 Grin-through:

This defect is an incomplete covering of the core of spandex and caused by improper position of the core versus roving, forming a large ‘V’ between the cores and roving under the front roller. By adjusting the core and roving fed position this effect can be controlled.

6.5 Level of twist:

Lighter twist than those used in conventional yarns provides better cover in core spun yarn. High twist spinning will break up the yarn twist to the nip of the front roller, increase hard yarn tension and improve coverage of the core yarn. The exact twist should be chosen by considering yarn number, fibre type and the intended end use.

6.6 Twist setting:

Twist levels should be on the high side, it is often necessary to set twist of the core-spun yarn to prevent snarling; however the twist should be set at low temperatures to maintain the physical properties of the spandex core. Steaming at 65^0 to 75^0C in saturated steam has proven satisfactory to set twist of lively yarns [3]. The steaming time depends on the size of the steamed bobbins and on the performance of the available heat set machine.

6.7 Draft of spandex:

The drafts in core-spinning depend on the type, the decitex and the pre-stretch of spandex. The real, total draft (TD) of the spandex core in a spun yarn includes both the gear draft (GD, machine draft) and the winding pre-stretch of the spandex yarn on its tube. The draft of the spandex core in the spun yarn is always higher than the gear draft (GD) applied in the spinning frame.

TD = GD {1+ (% Pre – stretch of LYCRA) / 100}

Table: Draft chart for various types of spandex

Spandex count (Denier)	Draft Range	Typical core-spun yarn count (Ne)
10	1.8 – 2.2	60 - 100
20	2.0 – 2.5	40 – 60
30	2.2 – 2.8	30 – 60
40	3.2 – 3.5	20 – 50
70	3.5 – 3.8	10 – 20
140	3.8 – 4.0	6

The optimum output (spinning speed) of good core yarn can not be reached by setting low number of turns per meter and highest drafts. There is a limit to spindle speed for every draft depending on the staple applied in the cover, yarn count and its twist factor. There are also limits concerning the traveller speed. For better result the traveller speed should not exceed 26 m/sec in spinning with spandex with cotton. The choice of the highest draft for the optimum production should a lso take into account the end use of the core-spun yarn and its performance in the subsequent process – knitting or weaving and garment wear.

7. SPANDEX STORAGE TIME:

The best performance of spandex in spinning is obtained with a relatively fresh yarn. Thus , mill storage time of spandex tubes should not exceed:

- 4 month of age for 44 decitex
- 6 month of age for 78 to 156 decitex spandex yarn

For the optimum processing of spandex it is recommended the following point:

- avoid an excess of yarn stock
- place order for no more than 4 to 6 weeks production needs
- apply the “first in- first out” stock turnover

8. CONCLUSION:

Most of the core-spun yarn defects can be controlled by machine operators. Usually defects are found at the beginning or end of the yarn tube or whe re a break is replaced on a spinning frame. Operators should inspect the yarn carefully from the spinning bobbin when knotting and ensure good core-spun yarn is being used to repair the break. Fault free core -spun yarn is desirable to everyone. Good quality core-spun yarn containing spandex production is possible by considering above mentioned quality parameter.

References

1. Ching-Iuan Su and Hsiao-Ying Yang (2004), Structure and Elasticity of Fine Elastomeric Yarns, *Textile Research Journal*, vol-74, no.-12, p-1041-1044, ISSN: 0040-5174
2. Ching-Iuan Su, Meei-Chyi Maa and Hsiao-Ying Yang (2004), Structure and Performance of Elastic Core-Spun Yarn, *Textile Research Journal*,vol-74, no.-7, p-607-610, ISSN: 0040-5174
3. Michael Smith (2008), Spinning soft core yarn on ring spinning machine, *Spinnovation*, vol-24, no.-7, p-5-8.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

CRISPIN DYNAMICS 3D – SOLUTION FOR SHOEMAKERS

Drişcu Mariana[1]

[1] *Institution name, Faculty of Textile, Leather and Industrial Management,*
"Gh.Asachi" Technical University, Iaşi

Corresponding author: Drişcu Mariana, mcocea@tex.tuiasi.ro

Abstract: This paper presents the basic function for footwear de signing using the system CRISPIN Dynamics 3D. This is a system CAD/CAM for footwear. This offers new solutions for shoemakers. These are the key issues - this is why CRISPIN Dynamics have developed a range of quality software products to give you the shoemaker a major advantage in shoemaking.
Key words: design, footwear, last, solid corp, cloud data, style, line.

INTRODUCTION

By classic methodology, designing footwear is a very complex and laborious activity. That is because classic methodology requires many graphic executions using manual means, which consume lot of the producer's time. Moreover, the results of this classical methodology may contain many inaccuracies with the most unpleasant consequences for the footwear producer. Thus, the costumer that buys a footwear product by taking in consideration the characteristics written on the product (size, with) can notice after a period that the product has flaws because of the inadequate design. In order to avoid this kind of situations, the strictest sci entific criteria must be followed when one designs a footwear product. The decisive step in this way has been made some time ago, when, as a result of powerful technical development and massive implementation of electronically calculus systems and informatics, CAD (Computer Assisted Design) Systems were used in footwear industry. One of the most important uses of calculus systems in footwear design is interactive designing by using the CAD system.

These are the key issues - this is why CRISPIN *Dynamics* have developed a range of quality software products to give you the shoemaker a major advantage in shoemaking
This paper presents the basic function for footwear designing using the system CRISPIN *Dynamics* 3D. This is a system CAD/CAM for footwear. This offers new solutions for shoemakers.

ABOUT FOR CRISPIN DYNAMICS CAD SUITE

This application offer functions for creating realistic looking designs of the footwear products and flatten the styles for development in 2D. There are also facilities to re -centre front and back guide lines, change foot (no need to re-digitize) and set the correct heel height and roll. You can create guidelines to save with the last and extend the last for a boot design. The last type can also be changed to a type that allows the entire last surface to be used for a design.
The applications in the suite are:

- **LastMaker -** a program providing the means to design and modify lasts with outputs to various 3D file formats.
- **ShoeDesign -** a program for designing uppers on 3D lasts provided by **ModelTracer** or **LastMaker**. Create realistic looking designs and flatten the styles for development in **Engineer**.

Using this function on execute many operations for creation an footwear products. Base function are following:

1. RECORDING THE SHAPE OF THE LAST FORMAT 'POINT CLOUD DATA'

Recording the shape of the last format 'point cloud data' on execute with the application **ModelTacer**.

Figure 1, Digitising the shape of the last

The way the **ModelTracer** works is by recording 'point cloud data' and some control lines with individual points on each side of the last. The process moves in discrete steps with each step being named, along with a visual prompt at the top of the **Edit Panel** on the left. Some of the steps are optional and need to be selected in the **Configuration** dialogue if they are not to be skipped. Three registration points are first recorded so that the lasts position in space is fixed. As the last is turned to digitize each side and possibly the bottom, picking these points each time will 'tell' the program where the last is. With these three points recorded two centre lines are digitize a point at a time. The program can now differentiate the two sides of the last. For each side the feather line and a top line have to be recorded (fig. 2, fig. 3).

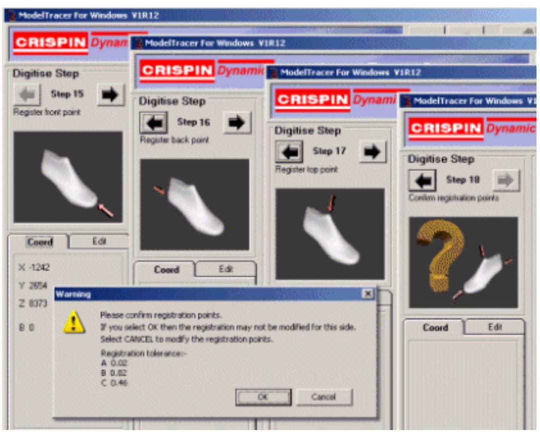


Figure 2, The steps for digitizing the base points

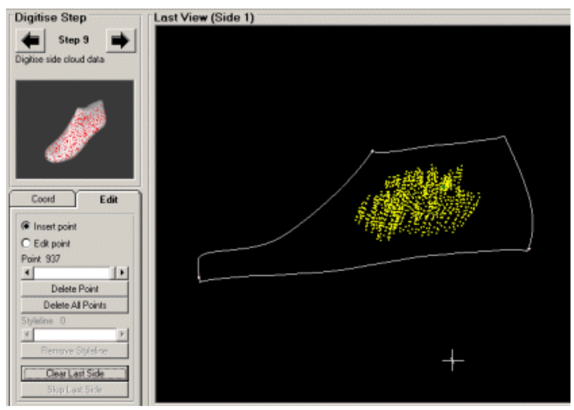


Figure 3, The steps for creating point cloud data

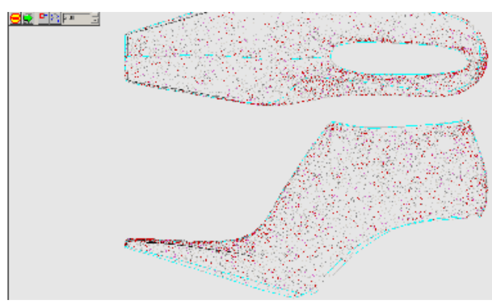


Figure 4, The first step in cloud data conversion

1.2. CLOUD DATA CONVERSION

The last part of the conversion process is the same for all the imported formats. The options are only available in the **Last** module. In the cases the conversion results in a **Crispin 3D** last data file with the extension '***.lst**'.

Once you select either one of the three cloud data formats the display will be something like figure no. 4.

After a few seconds processing time the result will be something like figure no. 5: This part of the conversion process allows you to select and do additional smoothing, if necessary, to any of the vertical lines either by cursor clicking on a line near the feather line or with the help of arrows. Starting from the back centre line the two blue arrows allow you to step through or around the last from one vertical line to the next, in either direction. When you reach a line that needs extra smoothing click on the 'hammer icon'. You can only do this once for each vertical line. Having smoothed any lines that look like they needed it, click the green arrow to continue. A lot of processing is required in this next stage which creates the 3D mesh, so it can take several seconds to complete (fig. 6).

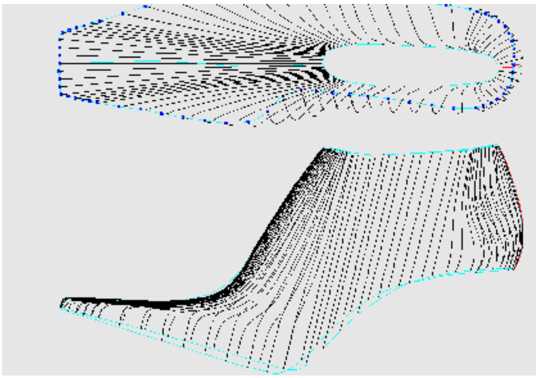


Figure 5, *The second step in cloud data conversion*

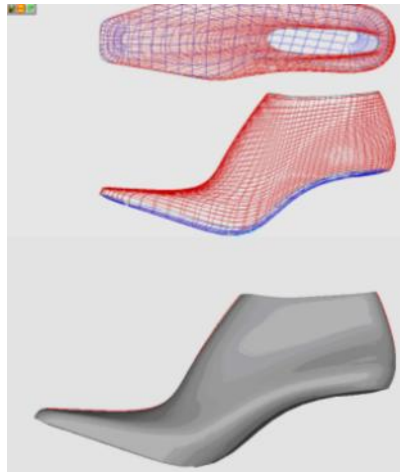


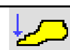
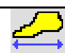
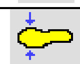
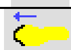
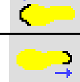
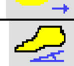
Figure. 6, The next step for creating 3D mesh and format

2. THE STUDYS OF THE SHOE LAST

2.1 Modify Last

This option provides the facility to reshape a last in a number of ways by adjusting specific dimensions (table nr. 1).

Table nr. 1

Parameter geometric	Signification	Field for variation [mm]
Toe Spring		-3.0 to 3.0
Heel Height		-3.0 to 3.0
Stick Length		-10.0 to 10.0
Bottom Length		-10.0 to 10.0
Width		-3.0 to 3.0
Upper Girth		-10.0 to 10.0
Bottom Girth		-3.0 to 3.0
Bottom Toe		-5.0 to 5.0
Bottom Heel		-5.0 to 5.0
Wedge Angle		-3.0 to 3

2.2 Orientation

Use options from the **Orientation** tools to adjust the last position. There following are:

Change foot.

Allows you to change the foot of the last. If, for example, you have digitised the **Right** foot simply selecting this icon will automatically change the last to the **Left** foot or vice versa.

Heel Height

Change the **Heel Height** or **Pitch** of the last (fig. 7). To adjust the heel height click on the up or down arrow in the height 'spin-box'. A side view of the last will appear with the 'floor' displayed. A red double arrow shows where the heel height is being adjusted relative to the floor. The value can be changed by using the up/down arrows, in steps of one millimeter, or simply typed in.

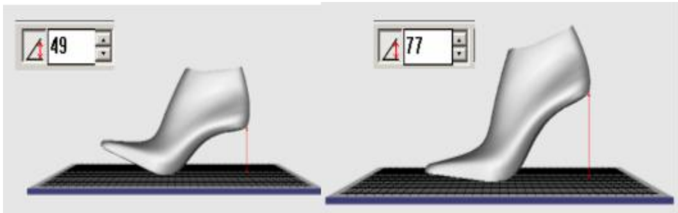


Figure 7, Change the Heel Height or Pitch of the **last**

2.3 Last Extension

This option provides the facility to extend any last (cone) using height settings, shape editing and measurements to a boot shape (fig. 8).

The functions of the command are following:

Height Sections: This first field provides the possibility to add a number of sections (up to 5), with heights defined in the field below, that define the shape and height of the last. Both fields are 'spin-boxes', the height value can only be increased in steps of 1.0mm.

Side and front view: Use these two buttons to show the last side or front view to help with editing the extension width.

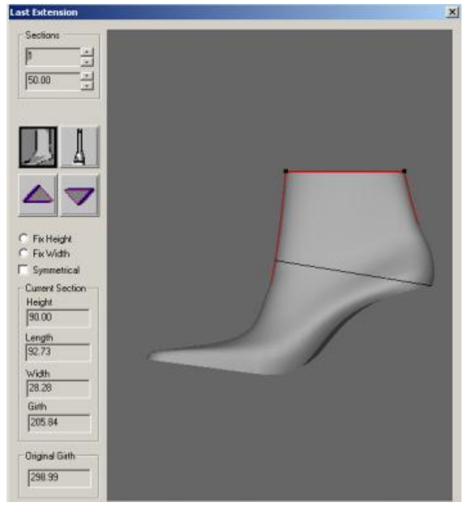


Figure. 8, Window of the function Last Extension

2.4 Editing the shape of the extension:

The shape of the extension can be edited, at each of the section lines, using the left mouse button on the small black squares. When selected the marker turns red and you can now move it left, right, up and down. However, there are two check boxes on the left side panel that can lock either direction. This very useful if you only want to change the width without disturbing the height or vice versa. The **Symmetrical** check box forces the opposite edit point to move by the same amount as the one you are moving. This is especially for the front view where changes in the shape of the last extension need to be symmetrical.

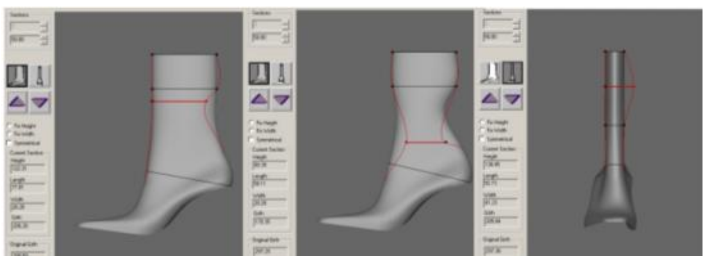


Figure 9, Editing of the extension last

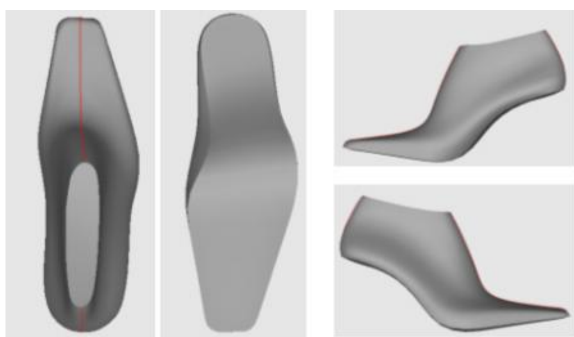


Figure 10, Creating the view of the last

2.5 View Control

You can click on the 6 small arrows on this image to rotate your last/design. The slide bar will change the speed of rotation (fig. 10).

The speed of rotation also depends on design size, so it is useful sometimes to alter the speed. Hopefully the dialogue itself more or less explains how it works. The only feature that perhaps needs comment is the slider at the right side. This adjusts the speed at which the design responds to clicks on the direction arrows on the control. The problem is that when you just have a last displayed the controls will spin it too fast, when you have a complex design it will be slower. The slide setting allows you to compensate.

2.6 Last Flattening

Flattening is the process that turns the 3D dimensional last and design into 2D data, to be used in a program like **Crispin 2D** to create and then grade pattern pieces. The operation on execute using the window flattening. The type for flattening are:

1. Half and full

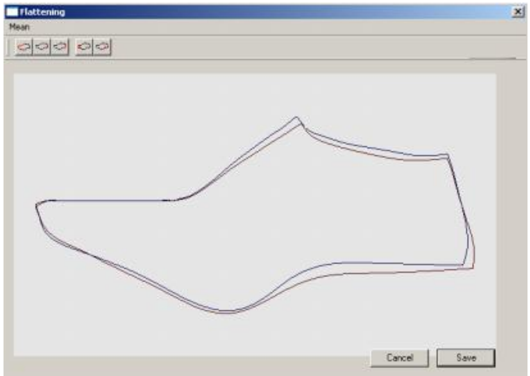


Figure 11, Flatening the part inside and outside of the last

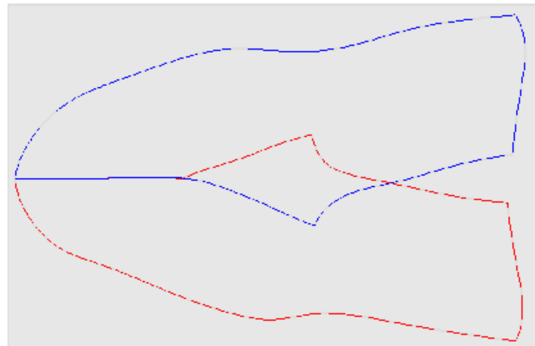


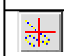
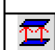
Figure 12, Flatening full

Splits the form down the back centre-line, and splits the forepart centre-line along its entire length, allowing the separate inside and outside forms to be superimposed. The relative positioning of the **inside** and **outside** forms and their **orientation** are with the '**Vamp Points**' of the two forms co-incident (fig. 11).

3. DRAW LINES, CREATE PANELS

In this phase in the design of a shoe you draw the style on the last surface , create panels and apply detail like textures. There are also facilities for you to create 3D features and accessories like stitch rows, buckles and logos. The base function for creating 3D design is presenting in the follow table 2 and the operation in tables 3:

TABLE NR. 2

Icon	Function
	**Surface Draw**
	**Projected draw** - (Draw and project back to surface)
	**Stream line draw** - (Draw and project back to surface)
	**Creating the shapes**
	**Edit Line**
	**Move or Duplicate Line(s)**
	**Mirror Line(s)**
	**Margin Line(s)**
	**Offset Line**

Draw the style on the last surface. **Style-lines** are generated on the last surface with this 'user friendly' software product allowing new designs to be achieved in minimum time whilst achieving an accurate representation of the shoe.

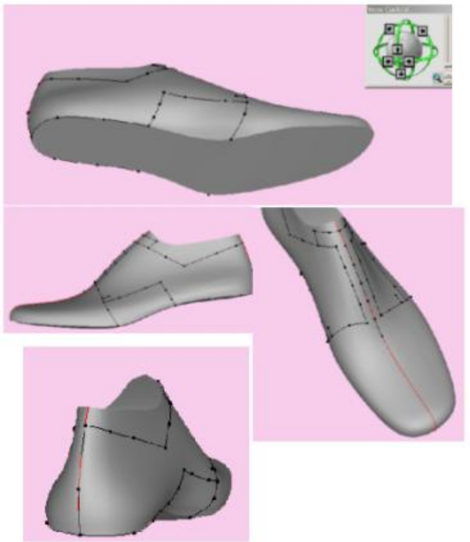


Figure 14, Create the panels

Figure 13, Draw the style lines

4. Basic sole

The **Basic** sole is intended to simulate orthodox/conventional men's and ladies sole/heel units. A basic sole can be edited either by values or by drawing profiles and the result can be saved and used with another design on the same or a different last. To aid visualization of the sole, welt features, like stitching or the appearance of 'stitch down' construction can be used, with insole and mid-sole and also 3D tread (emboss) patterns on the sole bottom.

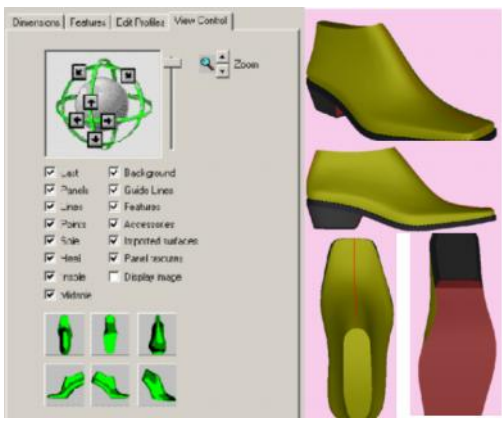


Figure 16, Create the basic sole

5. CONCLUSION

In this work on present the programmed for creating 3d upper design of the last. This system brings cutting-edge CAD/CAM technology to footwear designers providing benefits through all stages of their product development process. Major benefits include the ability to visualize a design for appraisal and the transfer of the design into **CRISPIN 2D** pattern development products. This allows increased productivity, shorter lead times, accurate interpretation of 3D designs in 2D and a reduction in the number of samples needed before approval of the design.

6. REFERENCE

1. Drişcu, M. and Mihai, A., (2008) *Proiectarea încălţămintei cu sistemul CRISPIN DYNAMICS CAD SUITE Engineer*, Editura Performantica, Iasi, 2008

2. Drişcu, M and Mihai, A, (2008) *Approximated the cloud of the shoe last point by a set of developable stripes*, *TMCR*, Iasi, 2008

3. Mariana Driscu, Harnagea Florentina, (2008) *Crispin Dynamics Engineer an Instrument for Making the Footwear Parts, Quality management in higher education* , Proceedings of The 5Th International Seminar on the Quality Management in Higher Education, 12-14 Iunie 2008, Tulcea, Iasi,

4. Mălureanu, G. and Mihai, A. *Bazele proiectarii încălţămintei*, Editura Performantica, Iaşi, 2003

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

ASPECTS REGARDING THE PATTERN MAKING OF FRAME HANDBAGS

Florentina Harnagea, Marta Cătălina Harnagra, Cristina Secan

[1,2] *"Gh. Asachi" Technical University of Iaşi, Faculty of Textile – Leather and Industrial Management*,
[3] *University of Oradea, Department of Footwear Design and Technology*

harnagea@tex.tuiasi.ro

Abstract: The paper presents the pattern-making of a frame handbag. Thus the model is analyzed, the base patterns and the cutting patterns are obtained (for a handbag with folds or frills the patterns are modified) and the prototype is realized. In order to modify the base patterns, the parallelism and radiation principles are presented.
Key words: design, handbag, master pattern, frame, cutting pattern

1. INTRODUCTION

The geometrical method, used at designing leather goods, consists in obtaining the product's patterns based on the dimensions and the size of the technological allowances necessary for manufacturing. This method is based on the descriptive geometry techniques.
The pattern making process contains the following stages:

a) *The model analysis;*
b) *The design of basic patterns and final patterns (for cutting)*;
c) *The reshaping of the basic patterns for the models that present folds or frills with regards to the model particularities*;
d) *Pattern verification*.

In order to establish the basic patterns it is necessary to know and adopt the final dimensions of the product, respectively the dimensions of length, width and height.
The paper establishes the stages at pattern making of a handbag with semicircular frame. In the first stage the model for which the patterns are established can be presented as a photo, a sketch or a product (the prototype). The model analysis has the main purpose of highlighting the constructive - esthetical and technological particularities such as:

* type of product;
* shape and dimensions of the product;
* material's nature;
* material's characteristics : thickness, elongation, shear strength etc.;
* closing system.

Therefore there are established the necessary information needed for pattern-making, the size of the technological allowances, the dimensions, the shape and the way of adding decorative elements, the stitch type and the position of folds or frills.
Thus the model sketch usually contains the frontal side which illustrates the basic dimensions necessary for the patterns design, fig. 1.

The basic dimensions for the graphic construction of the patterns are the following:

- the product length;
- the product width;
- the product height;
- the height of the anterior side of the product etc.

In the case of a frame bag (fig.1) the position of the points A, B, C and D is indicated. The BC contour is the one corresponding to the basic pattern of the anterior part.

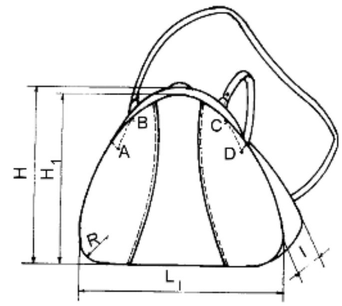


Figure 1.Initial information needed in pattern making

2. THE PATTERN MAKING OF UPPERS

It is important to choose the base pattern to which the other patterns are related. For some models this pattern can be the anterior part whereas for others can be the base or lateral part of the product.

The base pattern of a leather good is the pattern that does not include the technological allowances of the product, without the technological patterns of manufacturing, the allowances needed for processing the visible borders, the allowances for closing the uppers through sewing and the allowances for creating folds or frills.

For the bag model illustrated in fig.1 there is presented the design of the base patterns for the anterior and lateral part.

The anterior part construction, fig.2, starts with the interior cut-out of the frame corresponding to this pattern, respectively the product's width at inferior end.

The necessary dimensions for designing the base pattern of the lateral part are:

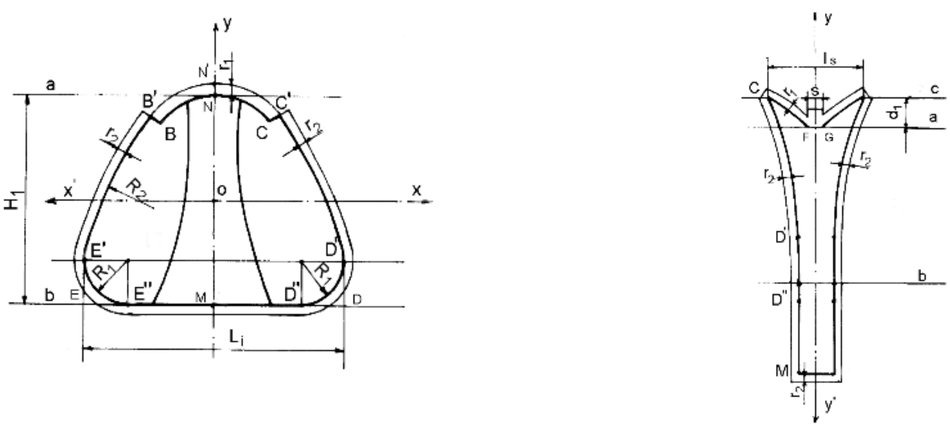
~ the inferior width (equal to the product's width);

~ the superior width; this is correlated to the frame's closing system necessary for a good functionality (usually, this width is equal to 120-150 mm);

~ over plus of the lateral part non introduced into the frame (s=8-20mm);

~ the length of the lateral part necessary for assembling with the anterior part is given by the next formula: $L=CD'+D'D''+D''M$

The base pattern of the lateral part (figure 2b) is designed starting with the over plus of material non introduced into the frame (s). In order to design the superior profile of the lateral part the interior frame is transferred at a distance d1 =30-50mm parallel to s, one side and another.



a) b)

Figure 2 The base pattern of the lateral part

The final patterns, respectively the cutting patterns, are obtained through adding technological allowances, starting with the base patterns.
The size of the technological allowances is established as function of the edge treatment, the nature and thickness of materials, and as well the type of closing through sewing.
The pattern's edges of a leather good can be treated through painting, binding, lacing or through inserting them into the frame's channel (frame products, fig.3).
The technological allowances will be lined parallel to the base pattern as function of the edge treatment.
For the presented model in fig.1 there are drawn the following allowances:

- r1 allowance, necessary for introducing into the frame's channel the superior side of the anterior part, respectively the lateral part;
- r2 allowance, necessary for sewing the inferior side of the lateral part with the posterior part (180° turned joining);
- folding allowance of the superior edge of the lateral part in the region corresponding to *s*- the joint of the two parts of frame.

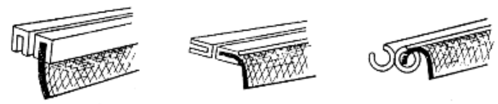


Figure 3. Ways of introducing the material's edge into the frame's channel

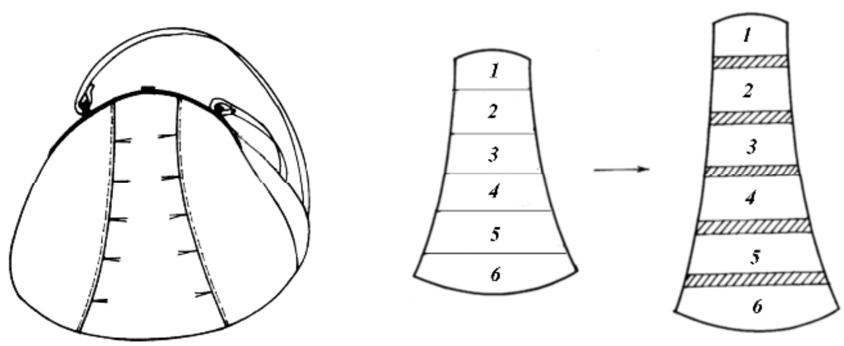
3. MODIFYING THE BASE PATTERNS

When the anterior part of the frame bags presents folds or frills it is necessary to modify the base patterns. Therefore the modification of the base patterns, respectively the graphical processing can be done with the help of some principles such as:

- the principle of parallelism;
- the principle of radiation;
- the principle of radiation-parallelism.

Thus the following steps are covered:
~ prepare the pattern or its processed area;
~ apply the principle;
~ define the spatial form.

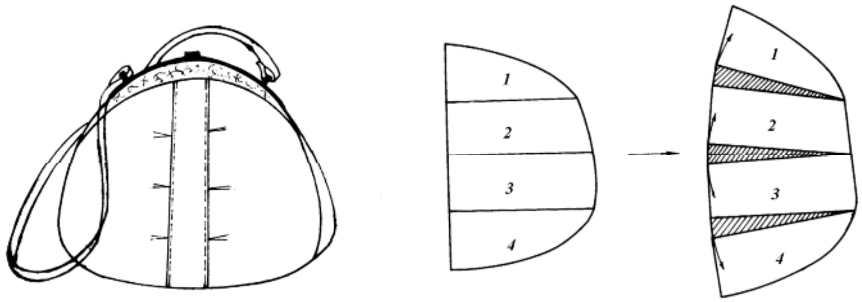
The preparation of the pattern consists in dividing its surface in a certain number of regions; the layout of regions is done so that the principles are differentiated one from another, after which the lines are finished.
The principle of parallelism is applied when between two constructive lines the surface is modified on a certain direction with the same quantity.
This principle is exemplified, fig.4a, for a component pattern of the anterior part that presents simple folds in the sewing region.
The base pattern of the anterior part is divided in six regions symbolized with 1, 2, 3, 4, 5 and 6 (fig.4b). These regions will be translated between two bordering regions with the same quantity established as function of the modification imposed to initial surface, respectively the fold's depth (fig.4c).



a) b) c)

Fig. 4. The parallelism principle applied to the base pattern

The principle of radiation refers to keeping constant the initial contour of the base pattern and modifying the opposite contour with a certain quantity. For the anterior part this principle is exemplified for a pattern that presents double folds in the closing region (fig.5a).



a) b) c)

Fig.5. The principle of radiation applied to the base pattern

This principle can be applied in two steps. Firstly the surface to be re-designed is divided in four regions 1, 2, 3 şi 4 (fig.5b), correlated to design particularities of the product. Secondly the new regions allow a radial layout, fig.5c. In this case the joining contour of the anterior part with the lateral part is maintained constant and the joining contour with the anterior part is modified.
It has to be mentioned the fact that in order to use this principle it is necessary to think of a certain ratio between the different constructive parts, ratio that must be retrieved from the modified pattern.
The principle of radiation-parallelism is applied when two initial constructive lines must modify differentially their length.

4. CONCLUSIONS

The construction of the master pattern of the anterior side takes into account the interior side of the frame and the product's width at his inferior part.
The master pattern is done with a view to the surplus of lateral side non introduced into the frame, surplus that corresponds to the joint of the two parts–anterior and posterior- of the frame.
The technological allowance of the anterior side is adopted considering the constructive type of the frame. The design of frame bags imply correct constructive parameters that lead to assuring product quality, respectively a good sizing and an easy accessibility in its interior.

5. REFERENCES

1. Nicolaeva, J.B., *Tehnologhia cojgalantereinogo I şornogo proizvodstva* , Moscova, 1990
2. F. Harnagea, *Proiectarea şi tehnologia articolelor de marochinărie,* Editura Cermi, Iaşi, 2002
3. Aura Mihai, Antonela Curteza (2005), *Designul produselor din piele şi înlocuitori* , Performantica, Iaşi, ISBN 973-730-061-0
4. Harnagea F., Secan C., Particularities of designing frame bags and zipper bags, *Buletinul I.P.Iaşi, tomul LIII (LVII)*, fasc. 5, Secţia Textile-Pielãrie, vol II, 2007, Papers presented at "The XIII Romanian Textile and Leather Conference, CORTEP 2007, p.175-180
5. Harnagea F.,*Tehnologia articolelor de marochinarie*, Performantica . Iaşi, 2002

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

APPROACHES TOWARDS DESIGNING CUSTOMISED FOOT ORTHOSES

Marta Cătălina Harnagea, Aura Mihai

"Gheorghe Asachi" Technical University of Iaşi, Textile – Leather and Industrial Management

Corresponding author: Marta Catalina Harnagea, charnagea@tex.tuiasi.ro

Abstract: The foot orthoses are orthopaedic devices which are completing the footwear product in order to synchronize the lower limb mechanics by keeping the foot in a position as appropriate as possible to its function. The functional orthoses support or correct the function of the foot/limb. This paper presents a method for computer-aided designing the foot orthoses customised to patient's requirements.

Key words: foot, orthoses, design, computer-aided techniques

1. INTRODUCTION

The orthotics elements have to accomplish and to control the dynamic characteristics of the foot and limb due with biomechanics. Many different types of foot orthoses are used to take care of biomechanical problems of the foot. Payne C. et.al expressed that "little evidence is available to guide clinicians in the selection of foot orthoses" [1]. Considering their position within footwear structure, the foot/limb orthotic devices can be grouped in two large categories:

- Inner orthotic devices or inserts ("in-shoe" devices), such as foot orthoses and insoles;
- Outer orthotic devices, such as ankle supports, soles and heels.

According with *PFOLA Technical Standards Document: Foot Orthotic Classifications, Definitions, and Summary of Manufacturing Processes Document* [2], the in-shoe foot orthotics can be grouped in following categories:

- *Anatomical Custom Foot Orthotic* (*ACFO)* is designed directly from an Anatomical Volumetric Foot Model (AVFM). AVFM is obtained by 3D foot scanning and gives which the person's three dimensional plantar foot anatomy;
- *Extrapolation System Foot Orthotic (ESFO)* is designed directly from an Extrapolated Volumetric Foot Model (EVFM). The EVFM is obtained from pressure mapping systems;
- *Library System Foot Orthotic (LSFO)* is chosen from a library of foot orthotic shapes. The clinician makes the prescription based on matching criteria with commercial shapes orthoses from data base.

With reference to foot, the mechanism of an effective foot biomechanics results from pronation and supination of the subtalar and mediotarsal joints. Glaser E et al. reported that the goal of orthotic design should be to bring the foot to function close to the neutral position of the subtalar joint and/or between the rearfoot and forefoot during standing and gait [3].
In order to successfully fulfil their functions, the foot orthotics must respond to the following topics:

- to correspond to a medical need. The medical reason for foot orthotics should be carefully investigated and the proper orthoses type is recommended by specialist/clinician.

- to accomplish precise tasks. For example, formulating a general objective such as to „reduce pain" is not relevant for choosing one orthotic device type or other. The orthotic device must act on the specific cause of pain.
- to establish how the orthotic device will be used. Periodical medical controls and checks are necessary in order to establish if the initial functions are still accomplished.

2. METHOD. CASE STUDY

The aim of this study is to present a designing methodology for a customized orthoses in case of a subject having high-arched foot. The high arch is associated with foot pain caused by excessive pressure on bone structure: heel, ball and toe. On the other hand, the high plantar pressure is caused by changes in the bone structure, by the joint limited mobility, by callosities and by poor peripheral blood circulation. The pressure, defined as a force spread over a surface area, can cause pain if the footwear does not have a good design. Custom foot orthoses are recommended in this case, but no clear guiding principles for their construction exist, and there is partial confirmation of their efficiency [4].

The *Anatomical Custom Foot Orthotic* (*ACFO)* method has been used for this study. The subject's foot has been scanned using an INFOOT 3D scanning system. Thus, the *Anatomical Volumetric Foot Model (AVFM)* has been obtained in a fast and accurate manner. In order to start the scanning process, the subject (25 year old, female) was asked to keep her foot in a half- weight bearing position. A high-arched foot has been observed on the scanned AVFM, without any other visible foot anomalies. The high- arched foot has been confirmed by taking a pressure map.

The OrthoModel software from Delcam-Crispin offers a complete solution for designing customized orthoses. In order to obtain the virtual model of the customised orthoses the following steps are covered:

1. The scanned foot (left//right) was saved with a ".stl" extension and it was opened in OrthoModel software, fig.1. The orthotic model can be edited by selecting a region and changing the height of that area. OrthoModel software will blend the changed region with the rest of the model.

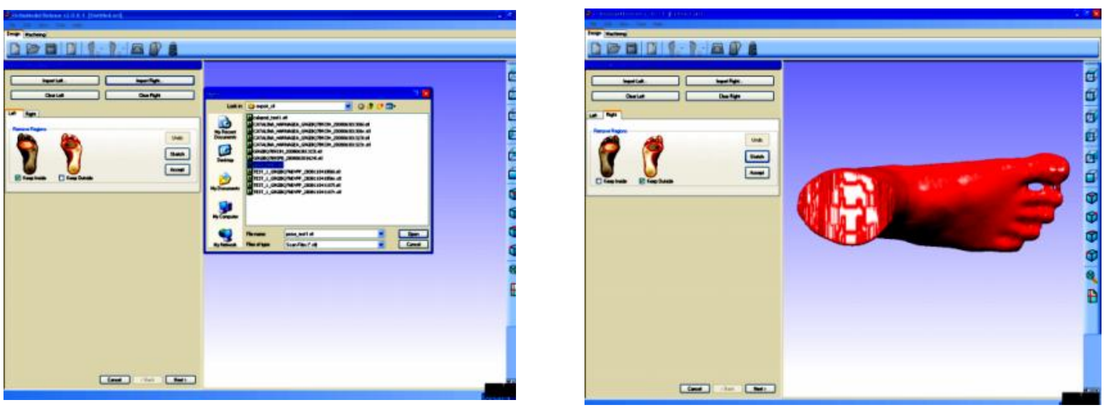


Figure 1 Selecting the foot

2. The following key points are selected: the heel point, the first metatarsal point, the fifth metatarsal point (fig.2).

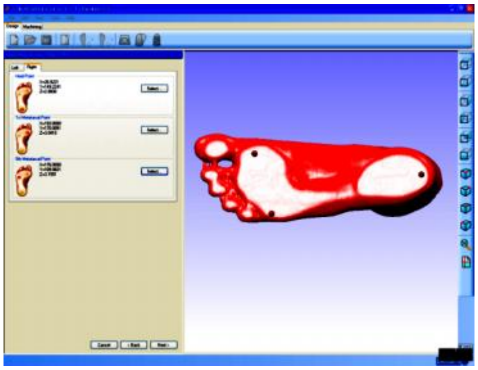


Figure 2. Selecting the key points

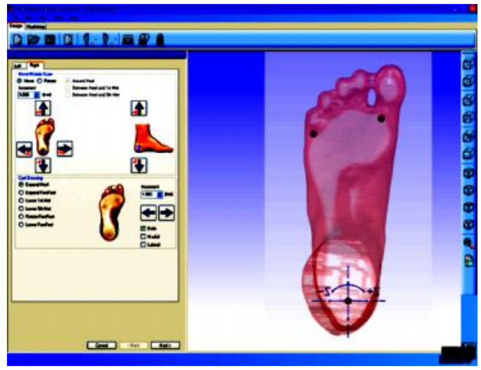


Figure 3. Re- positioning the key points

3. The points defined in the anterior step can be re-positioned as to match better the foot conformation of each foot (fig.3). Also, the scanned foot can be moved or rotated for a better positioning.

4. The scan is measured as to obtain the necessary dimensions: fore foot width, heel width, length, arch height, fig.5. By its features, the OrthoModel software automatically takes the difference between the two positions on vertical direction (oz axes) in order to calculate the arch height, so the two points do not have to be selected as a vertical distance.

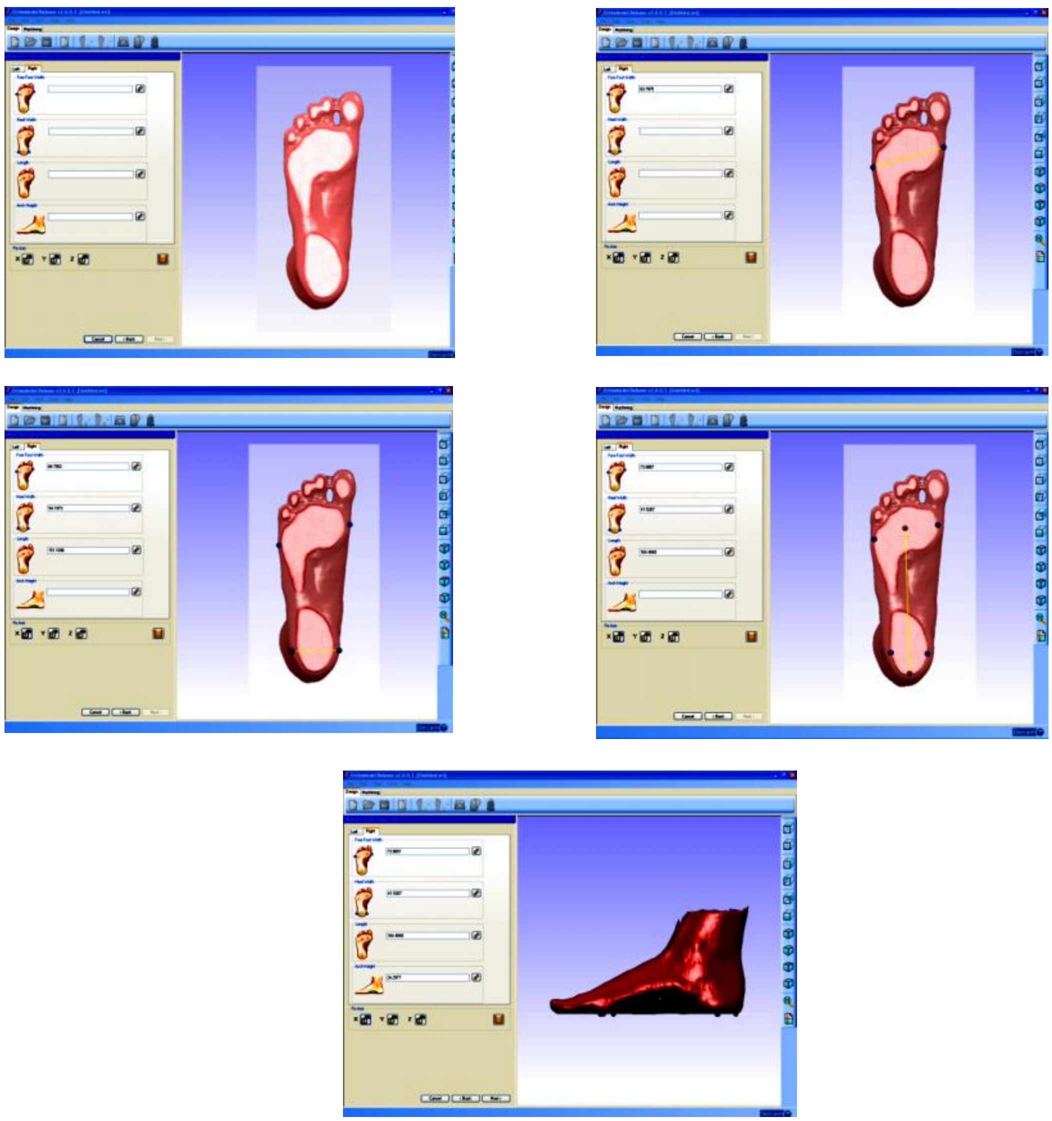


Figure 5. Foot measurements

5. The basic dimensions of the orthoses, from the anterior steps, are completed with the following information, fig.6:

- The patient's name
- Base Model: standard
- Type of foot: left/right
- Top cover (mm)
- Orthotic thickness, specified or calculated in correlation to the weight
- Grading
- Shoe size

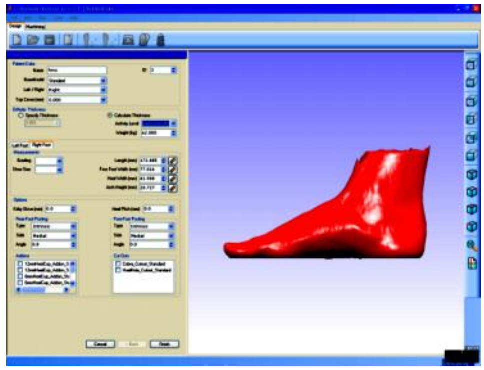


Figure 6 Additional information

Several more information can be added: Kirby skive, heel pitch, rearfoot posting as well as fore foot posting, adds on and cut outs. Based on the designing parameters established within the previous steps, t he orthotic virtual model is automatic generated by program, fig 7. The files containing numerical data of the virtual model can be saved and used with a CNC milling machine for getting the physical prototype.

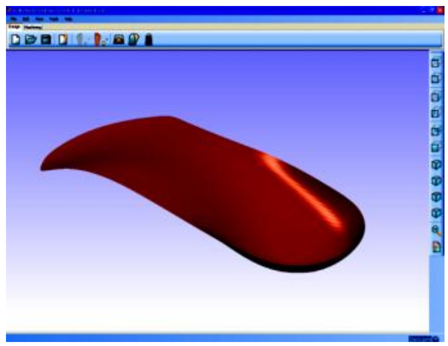


Figure7 The orthotic virtual model

3. CONCLUSIONS

High plantar foot pressures on heel and forefoot areas are an important cause for pain in case of the high-arched foot. The customised orthoses can reduce significantly the pressures within this type of foot. In order to verify how the proposed virtual orthotic model acts to accommodate the plantar pressures, future research is required, modelling and simulation. The use of in–shoe measuring devices and the dynamic measurements are extremely useful in evaluating the foot biomechanics and the results of accommodative orthotics.

The CAD software features for designing customized orthoses represent a very useful tool both for clinicians who prescribes the orthotic device and for producer who manufactures this device. The advantage of obtaining and analysing virtual orthotics models before its physical manufacturi ng is vast and opened to future developments.

4. REFERENCES

1. Payne C, Oates M, Noakes H., *Static stance response to different types of foot orthoses*, in Journal of the American Podiatric Medical Association, 2003, Vol. 93(6), pp.492 -498

2. *PFOLA Technical Standards Document: Foot Orthotic Classifications, Definitions, and Summary of Manufacturing Processes Document*, updated January 24, 2006, http://www.podiatry-arena.com/podiatry-forum/showthread.php?t=19498, accessed at 2010/01/04

3. Glaser E., Bursch D., Currie S., DC, *Theory, practice combine for custom orthoses*, BioMechanics, 2006, http://www.biomech.com/full_article/?ArticleID=414&month=9&year=2006, accessed on 2010/ 02/05

4. Burns J., Crosbie J., Ouvrier R., Hunt A., *Effective Orthotic Therapy for the Painful Cavus Foot A Randomized Controlled Trial*, Journal of the American Podiatric Medical Association, 2006, Vol. 96 No. 3, pp. 205-211

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

FOOTWEAR DESIGN AND HISTORY

M.IUHAS, FL. KENYERES
UNIVERSITY OF ORADEA

Corresponding author: Iuhas Marcela, e-mail: marcelaiuhas@yahoo.com

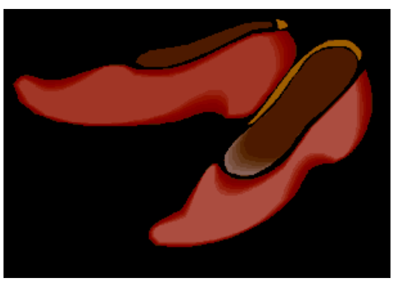
Abstract: Shoes, is a part of the whole garment, found in the earliest stages of development of human society, is linked to socio-economic life, culture and civilization of the society at a time. In the historic development of conventional footwear could be marked a few steps.

Key words: primitive sandals, Shoes,

1. INTRODUCTION

From primitive sandals to astronauts boots, the shoe left "traces" in civilization of human kind. When we talk about footwear, the first thought goes to the latest trends in fashion, textures and materials or at least to color. But history of shoe has now begun more than 26,000 years in the end of Palaeolithic age. Anthropologists have shown that the transition from primitive foot to barefoot sandals changed the human fingers and feet. Back then, none was interested on their shape and appearance, the only concern being to protect itself from bad weather. In the first stage of development of human society, shoes were made from a piece of raw leather, hides, tightly wrapped around the leg and ankle with a strap fixed to the skin. With the appearance of the first rudimentary sewing tools made from stone, bone or wood, prehistoric man was able to improve their technique to produce shoes by sewing them using tendons from livestock or thin leather straps. This type of footwear was worn by the poor even until the eleventh century and twelfth century. A variant of this type of shoes and sandals is very common in our country and known since the time of the Scythians.

2. The primitive stage



The most primitive form of footwear was consist from a piece of fur from the feed animal with the man wrap his foot that connects with tendons, intestines, animal or plant stalks. The design was simple: an oval leather pad size. Development tools allow the development of footwear construction. In hot countries mainly used sandals, and in countries with colder climates shoes covered a greater area of the foot.

2.1. Preindustrial stage

2.1.1 Antique period

For the ancient period are characterized by simple forms, sometimes majestic, but tight, both in clothing and footwear. Clothing consists of very simple pieces of fabric, draped on the body. The widespread construction of shoes were sandals, which took the form of a cork soles braided ropes or straps attached to the leg. Arising from the need to protect the foot against the action of various environmental agents, while footwear becomes strong social connotations. The first indication of the type of footwear worn by social position are Egyptian civilization. Thus, the priests wore raffia sandals with soles and straps from papyrus, being forbidden any article of leather clothing, and ordinary people walked barefoot or wore a shoe bark. Pharaohs shoes, neat work more, have sole leather, raffia or bamboo and wicker from decked with gold and pearls.

Shoe color was also used to indicate a certain social affiliation. Aristocrats wore black leather footwear, the senators and magistrates had purple shoes and noble women were entitled to wear a white leather footwear.

Between VI - XI centuries, shoes generally have the shape of a sock, without too many seams connecting as sewing techniques were not yet very developed. Design elements appear to diversify, new closures and mounting foot, leg length differenc es in report forms becoming more elongated peak, in other words one can feel the presence of elements that lead to the formation and increase of the phenomenon later called "fashionable."
The Middle and the Renaissance Ages craft production is linked to fl owering. Make art work of the designer and confectioner artist. Professional knowledge and artistic skills are transmitted from generation to generation, passing over the centuries.

For example, shoes which leg is up in the external malleolus was alm ost impossible two centuries earlier as stitching technique is not quite possible to achieve a seam strength between the base and sides. Insert a strip of leather that are sewn together with soles and uppers (what today we call frame) has made possible the emergence of new models to the so -called low-cut shoes. Origins of this real revolution in footwear product design are lost somewhere in the darkness of XIV century.
The same period dates and concerns craftsmen to make shoes as waterproof, concerns that l ed to the emergence of internal parts (inner soles, sock, frame) and manufacturing systems very similar to modern versions is the sole fixed faces by stitching.
Gradually increasing the influence of fashion often take strange forms, often in detrimeter fun ctional footwear. Thus, in the XIV century in Europe was widely tipped shoes very long, tip length is strictly

regulated by social position and go up to 75 cm, top footwear must be fitted to the shank. In the fifteenth century out of fashion tip elongated and takes his place at wide (up to 16 cm).
Using new materials for footwear allowed the man a easier trip. Instead, the soft material faces are quickly deformed and tore the heel area, which causes the stiff and to protect fingers and maintaining peak shape appeared the bombs (sec. XV - XVI). Landmarks sides are joined by stitching seams using hidden handmade with great craftsmanship by artisans. By the seventeenth century - century was not pulling faces, not yet used sock, the shape of the shoe is given by the foot.
For the fashion of XVII - XVIII century is caracterized with feature of light and richly decorated shoes..

For better stability and a longer walk for use in calculating the base area, an area which rapidly wear, overlapped layers of skin. Appeared frame to shoes for men, as ornaments and most usually applied initially meet here, then retrieved items and shoes for women.
With the ascension occurred heel shoes and stability problems of the wearer during walking. On these considerations, the top frame was a much more robust than we are accustomed today, occupying much of central and close to the product by the fingers. Required to use an item in the composition of footwear to take the request and support the foot arch, leading two centuri es later the appearance of wood or metal glenc..

At the beginning of the nineteenth - century, influenced the French Revolution, begins to dominate the simplicity and functionality, esp ecially in ordinary shoes. While the footwear worn by nobles seeking the latest trends of the time, remarked to solve rich ornamental products, costumes of the French peasant was traditionally associated to the nineteenth - early twentieth century and even wooden shoes. There is written evidence supporting his life that a man wearing three pairs of shoes: a pair of first communion until marriage, the second marriage until the last forty years until his death. Taking into account the results of recent studie s of footwear consumption market in European countries, France in particular, that an estimated four pairs of shoes a year, there is a giant leap and all but the last century.
It must be noted that in terms of comfort to wear, shoes of that period had many shortcomings, it argued for a series of scientific discoveries and restorations made in museums and conservation of leather centers. It appears that at the time the general functional abnormalities seen wearing an uncomfortable shoes were like today, hall aus valgus, rigidus hallaus and hammer toes.
Until the nineteenth - century shoes have the same form for both legs, it was not to be worn alternately deformed foot. Acquisition of the pair symmetry in the construction of lasts was a great step forward line of footwear products to ensure functionality.

ASIA

Traditional Japanese footwear has different models, including "Geta" are best known in the West. It dates from the Heian period (794-1192). Shoe soles, from wood, is supported by two horizontal slats of the same material. Slats, called "ha" are of different heights, from 4 -5 inches to keep the protected the kimono from the dust up to 10 inches for "Geta" used in the rain. Shoe string is usually black for men and red for women.

3. REFERENCES

1 Harnagea, F.(2000). *Proiectarea şi tehnologia articolelor de marochinărie* .Editura Cermi Iaşi.

2. Harnagea, F.(2002). *Tehnologia articolelor de marochinărie*; Editura Performantica Iaşi.

3. www.fashion.arts.ac.uk

4. www.shoe design

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

ISOLES FOR FOOTWEAR

Cornelia Ionescu Luca[1], Elena Chirilã[1]

[1] *"Gheorghe Asachi" Technical University of Iasi, ROMANIA*

Corresponding author: Cornelial Ionescu Luca, E-mail: cionescu@tex.tuiasi.ro

Abstract: The inner sole is the fundamental part of the footwear. Its design, the used materials nature and their characteristics, near by another component parts, allow deformations which give foots comfort. The orthopedic inner sole are manufactured using individual models which respect the anatomical particularities of the patient. These are a modern way to remove the defects of the foot or of the locomotors apparatus in the sickening case. The paper presents classification of the inner soles which are used in footwear assortments and presents some aspects about the design, the used materials, the characteristics and the using of some orthopedic inner sole and of some planting supporting used in rectifying or in prevention of some anomalies of the foot.
Key words: footwear, inner sole, manufacturing material, characteristics.

1. INTRODUCTION

The insole contains the skeleton of the footwear. Through the accuracy of the construction, it determines the smooth operation of the technology of the production as well as the good functioning of the footwear as a finished product. Through the nature of the materials and their elastic and plastic characteristics of the footwear in the time of use, the insole permits different deformities which helps creating a comfortable feeling for the foot. The use of the insole is very complex, both in dynamic or static condition. In static condition, the efforts that are manifested, tend to curve as well as they tend to spin the heel under the sole, thus requesting the junction of the insole with the sole and of the joining sides with the insole. In dynamic conditions, besides this kind of request, occurs also a request to back away horizontally, request which determines the curve and rotation of the heel in the opposite way, with similar effects on the junction of the heel and insole. In this paperwork, specifications are made over the particularities of the used insoles in the production of the assortments of footwear

2. PARTICULARITIES OF THE ISOLES FOR FOOTWEAR

The insoles for footwear can be classified in reinforced insoles with tough cardboard, insoles reinforced with injected plastic materials, flexible insoles from synthetic materials and impregnated and orthopedic insoles [1, 2, 3]. The most frequently used insoles in the footwear manufacturing, are the reinforced ones with tough cardboard and the ones reinforced with injected joint. The flexible insoles are being used in the manufacturing system in which the junction with the insole is made through sewing. The orthopedic insoles are being used in the manufacturing system, in which the junction with the insole is made through sewing. The orthopedic insoles form a special category used in the orthopedic footwear manufacturing, and is used in the idea of correcting a foot anomaly.

2.1. Insoles reinforced with the help of tough cardboard

The contour of the classic insoles is established from the planting area of last, performed in the majority of manufacturing systems. The classic insoles with tough cardboard backing are composed from the basic insole which has the size of the planting area of the late, the tough cardboard reinforcement and a joint made of wood or steel, depending on its height.

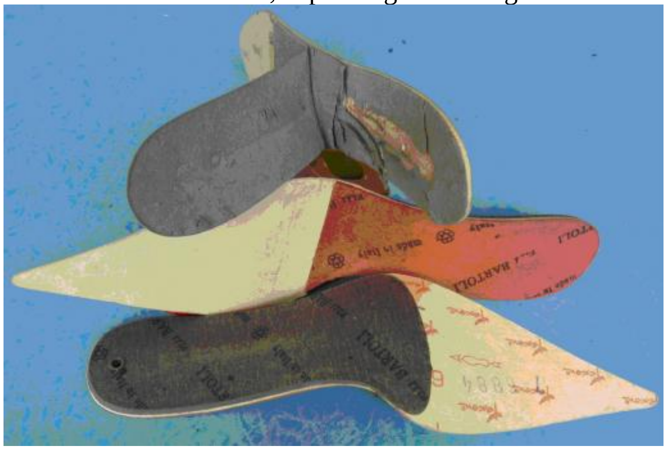


Figure 1: Insoles with tough cardboard backing for footwear

The reinforcement of the insole is projected after the curve of the insole on a approximately 60% of the portion's length, until it reaches 10-20 mm in the anterior part of the articulation lines, in the women's footwear, where the heel is higher than 3 cm. for the insole used in the footwear with a heel lower than 3 cm the reinforcement of the insole is being made in the posterior part, on a portion of approximately 25% of the insole's length. The metallic glen is a slide made of steel placed in between the insole and the insole's reinforcement after the axis of the joint, axis which passes through the center of the heel and makes an angle of $7{,}5^0$ with the longitudinal axis of the insole. The sandals are provided with a double insole insoles made of tough cardboard as for a type of footwear with a lot of cuts, with their forms and dimensions corresponding to the position of the drawn bars [2]. In the splitting of the footwear, the insole will take the form of block planting space surface. In the case of orthopedic footwear, the insole may not have also a joint. The image of before produced insole is represented in the Figure 1. At the CR system the insole surface situated by the outsole, it provides a projection of which is joined by stitching only in the heel zone, covering 25% of its length.
In the case of the insole made of leather, the elevation of the insole is obtained through the splitting of the leather as in Figure 2.

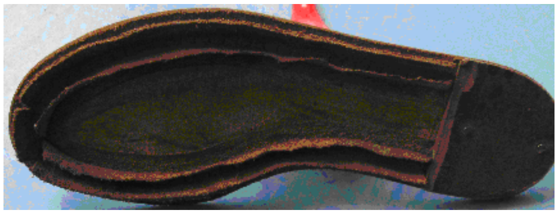


Figure 2: CR isole made of leather

Figure 3: Insole with textile false elevation

When the insoles are made of materials such as cellulose fibers it is obtained a false elevation from a tightened material, from heel to heel as in Figure 3. In another variant, the elevation of the insole is obtained by the cellulose fibers material, making insoles through injection of a false elevation from a plastic mass [1, 2], as you can see in Figure 4.
On the whole overall insole structure and its backing, the joint forms the prop for the outsole and the upper face of the footwear. In the same time, this overall must possess proprieties in order to assure the comfort feeling of the foot when wearing the footwear.

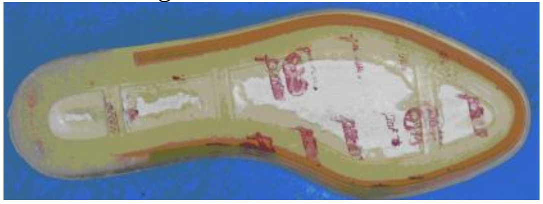


Figure 4: Insole with an elevation made with the help of plastic mass

2.2 Classic insoles reinforced with the help of a plastic mass
In the footwear production, besides the classic insoles that have tough cardboard backing, are also used insoles with injected backing. This modern technology and equipment eliminates the using of the

moulds and old insole - form equipment. Polyethylene is used for injection. This kind of insole is being obtained [1] likewise: the leather made insole is being split, the artificial outsole, the cellulose fibers type of outsole or outsole made of tough cardboard for the kind of footwear which goes to 1 -12 mm in the back of the finger joints articulation line. On one of the two split parts, a hole is made. The so prepared insole is being introduced in the mould in which the polyethylene backing of the insole will be injected. The plastic mass is injected to fill the split of the insole, so to form the joint, the backing of the joint and in the same time the special form of the insole. To ensure better stability while wearing the shoes, the insoles for the 50 mm blocks are provided with a metallic joint embedded in the injected plastic mass. These kinds of insoles are represented in Figure 5 and Figure 6.

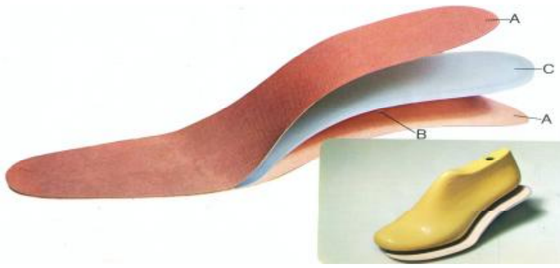


Figure 5: Insole with injected reinforcement

Figure 6: Insole with injected reinforcement with a metallic joint

The technology for obtaining these kinds of insoles is profitable in the production of large quantities of insoles. At the same time, one must keep in mind that the plantar part of the late, as well as its longitudinal curve on the posterior side must remain constant in the late models used in production within the size numbers. In other words, requires a reckoning or normalization of the late, based on heel heights.

2.3.Orthopedic insoles

Orthopaedic insoles made after individual patterns, respecting the anatomical particularities, represent a modern method of removing the defects of the foot and locomotor s system. On the other hand, these insoles can be used also in healthy people, prophylactic ally in case of prolonged activities on solid grounds such as concrete, grit stone, etc. Orthopaedic insoles, after their destination, are made from plastics with small magnetic balls, silicones rubber, polyurethanes foam lined with textile fabrics [4,5]. Magnetic insoles are based on old Chinese medicine on the links between the reflex zones of the sole with the internal organs. Walking on bare feet, the soles are massaged resulting in a fortifying of the whole body.

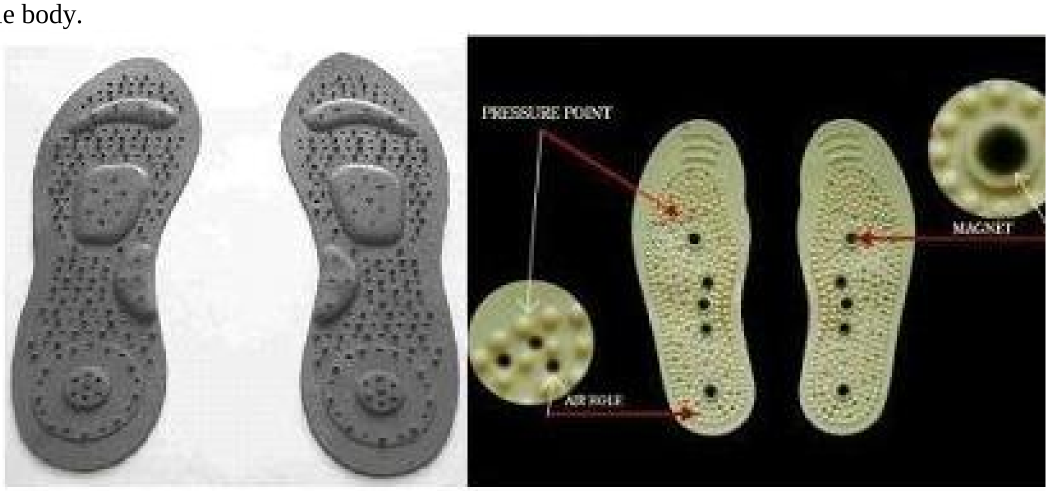


Figure 7: Magnetic insole

Magnetic insoles reproduce the pleasure of the direct contact of the sole with the natural ground. Also, they remove the tiredness and give a sensation of strength and health. They are realized from hygienic plastics in which are incorporated small magnetic balls. Also, they have small elastic thorns for massaging the soles. These small elastic thorns create a layer of air between the sole and insole. The reflex zones of the sole receive such way a double massage, magnetic and physiologic. The magnetic insole is designed for stress removal and for inducing energy of the whole body. They have a total of 5.000 Gauss magnetic bi-polar/pear and induce an uniform magnetic field on the surface of the sole.

Also they have around 250 orifices therefore the foot is permanently dry and ventilated. Figure 7. Two types of magnetic insole [6].

The magnetic insoles are introduced in a comfortable footwear with the thorns upwards. It is advised in each morning to use the magnetic insoles inside the slippers for 5-10 minutes. The direct contact between the barefoot and the magnetic insole is like a therapeutic massage. During the day, wearing the stockings too, the magnetic insoles can be used for 2-3 hours/day. In the first 10 days due to these magnetic insoles, the healthy is much improved. The feet and hands will be warmed, the edema and the tired feet sensation will disappear. Another effects are: improving of circulation and metabolic processes, intense elimination of the toxins. It might be a temporary discomfort, sleepy sensation and pain over diseased areas. The magnetic insole can be used any time or season. During winter the thorns warm up and during summer they create a layer of air for ventilation. They do not absorb the humidity and can be washed up easily.

The orthopaedic insoles from silicones rubber are light and flexible, absorb the shock, conserve the kinetic energy, prevent the pain related with a prolonged stating position of the body or to prolonged physical exercises. They are ecologic products and they are easy to be washed up.

Figure 8 represents such type of insoles [7]. They are made from silicon in the colored zones and have the perforations to enable the foot respiration.

Figure 8: Silicones rubber insoles

Orthopedic insoles made from polyurethanes foam can be produced on the large scale. They absorb the shock and protect the foot during walking. They are aimed to protect the joints of the hops, knees and foot. Figure 9 shows orthopedic insoles made by polyurethanes foam. [4, 5].

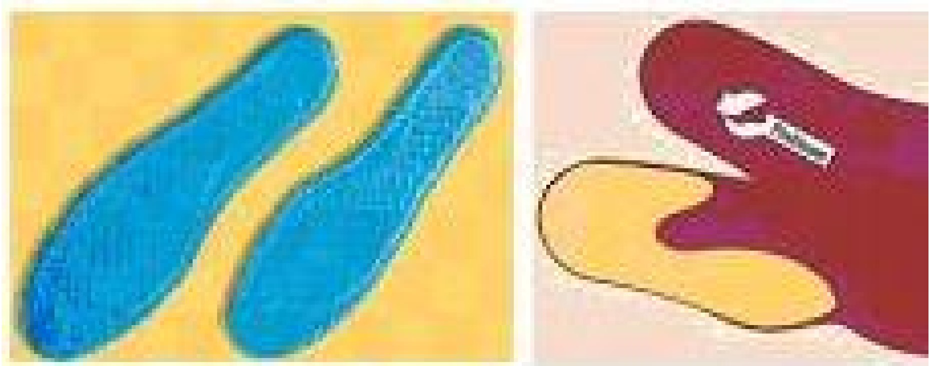


Figure 9: Orthopedic insoles from polyurethanes foam

When the insole is designed for prophylactic role of activating blood circulation, the material used are silicones rubber and foams from polyurethanes rubber. Such type of insole [8] is illustrated in Figure 10. The special pressure points activate the blood circulation.

Figure 10: Orthopaedic insole for activating blood circulation

Other types of orthopaedic insole are made from a polyurethanes foam which allows optimistic adaptation to the anatomical form of the foot. Doubled with a material of polyamide 100%, there is a high capacity of shock absorption and to keep the foot dry. They can be sticker inside the footwear, they are washable and highly hygienic Figure 11 represents such type of insole [4, 5]

Figure 11: Insoles from polyurethanes rubber and polyamide material.

One interesting category of orthopaedic insoles are those equipped with air chambers. They are made from polyurethanes foam doubled with a resistant textile fabri cs. These insoles have 4 pairs of air chambers, the natural movements of the foot are sustained by the controlled circulation of the air into the chambers. The gait becomes easier, the hips, ankles and feet are relaxed. Due to the permanent circulation of the air between the chambers of the insole, the reflex zones of the foot are massaged, the local circulation is stimulated and the general status is improved. This structure of insole has as effect the cooling of the feet. This type of insole [9] is repre sented in Figure 12.

Figure 12: Orthopaedic insoles with air chambers

These insoles have as roles: to absorb the shock, to prevent the sweating of the feet, to improve the sensory, to stimulate the reflex zones, to reduce the muscular imbalance.

Another important category of insoles are those odourless. These insoles [10] have perforations as shown in the Figure 13 which ensure the elimination of the sweat from inside and bad smelling as well.

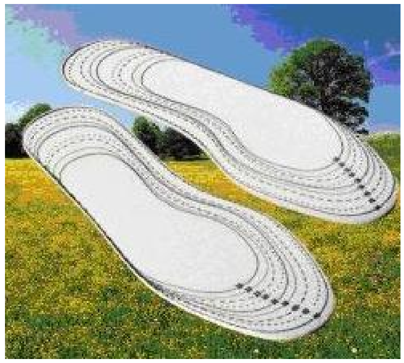


Figure 13: Fresheners insoles

3. CONCLUSIONS

- The whole ensemble of insole, insole reinforcement and joint, form the prop on which the upper shoe and the sole are being fixed. The accuracy of this ensemble determines the good technological function and the good function of the footwear, as a finished produ ct.
- The insoles, no matter of which material they consist of must ensure the comfort of the foot and from this reason, they must be: flexile, to take the irregular shape of the foot with which it is in a permanent state of contact; to be porous in ord er to absorb moisture of the foot; to permit the evaporation of the absorbed sweat, during the time that the footwear is not being used; the material used, must not be affected by foot sweat, in the idea that they must not harden up, to break or to suffer dimensional transformation through time; to have a good resistance to breaking; to resist a high amount of time in the mechanical requests from the time of wearing; to have resistance to friction; to maintain its form in time, in wearing conditions; to hav e a small density; to have a good capacity of combining stitching with sewing.
- The orthopaedic insoles are manufactured after individual patterns, respecting the anatomical particularities of the patient. They represent a modern method of removing the defects of the foot and leg.
- The orthopaedic insoles are manufactured from hygienic, washable and ecological materials.
- Some favourable effects of the use of the orthop aedic insoles are: warming of the hands and feet, vanished pain of the knees, shoulders, vertebral column, improvement of the immunity system of the body, improving of blood circulation, improved pain -free walking.

Acknowledgements. The paper is a part of an extended research undertaken under the SIMSANO Grant no.401064/2007, finance by CM MP Bucarest.

REFERENCES

1. Ionescu C., (1995). Matriţe şi procese de formare în matriţe din industria de înc ãlţãminte, Editura Cronica Iaşi ISBN 973-9206-09-3
2. Mãlureanu G., Mihai A., (2003). Bazele proiectãrii încãl ţãmintei, Editura Performantica, Iaşi, ISBN 973-8075-88-2
3. Ionescu Luca C., Volocariu R., (2005). Raw Materials for Leather and Substitutes, Editura Universitãţii din Oradea., ISBN 973-613-758-9
4. www.telestarshop.ro, Branţuri ortopedice
5. www.mx.all-biz.info, Branţuri pentru încãlţãminte
6. magazine.remediu.ro Branţuri magnetice
7. www.tehnica-medicala.ro, Branţuri din silicon
8. www.lady4ever.ro, Branţuri speciale pentru vene
9. www.euromedicagrup.ro, Branţuri PediSoft
10. www. lady4ever.ro, Branţuri Bio Blance

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE ESTABLISHMENT OF THE GLOVES FUNCTIONS DESTINA TED TO MILITARY PEOPLE

M. Malcoci[1], L. Gurau[1]

[1] *Tehnical University of Moldova, Chisinau*

Corresponding author: M. Malcoci, E-mail: mmalcoci2005@yahoo.com

Abstract: Paper contains a study made of the wide range of products type gloves, for the militar y. Considering the multiple variants of this product and the various conditions for their use, has been establishment and functions required specification clay assortment study. The bibliographic study of the functions required gloves for the military allowed the grouping of information and development of appropriate classification.
Analysis of literature arose as gloves for the military can be classified by several criteria, nam ely, conditions of use, destination, season, type of military troops, the natu re of raw material, the number of fingers present in the glove, type manjeta.
Nation's military service frameworks are being exposed to risk factors of physical, chemical, biological and mechanical. Analysis of risk factors and requirem ents imposed by users of gloves for the military, made possible the establishment of 27 functions, presented in 7 groups of functions. Knowing the required gloves for the military functions enable reduced cost of production, able to meet the increased user demands, simplifyi ng manufacturing processes, trying a new performance by increasing the threshold costs, promoting creative thinking.
Key words: gloves, military, functions, classification, risk factors

1. INTRODUCTION

Military activity is the most spectacular in the history of the peoples. They began to be studied since ancient oriental, with the advent of writing, when the leaders felt the need to write a major episodes in the history of the state. This was done not only through writing but also through artistic representations, such as the walls of temples and royal palaces in Egypt or Mesopotamia, which is where the traditional image and there was the place.
Given the importance that an armed forces constituted within a state, important decisions on military action and organizing, equipping and military leadership was solely attribute the central power regardless of its nature or historical period. From this viewpoint army gate characteristics, traits such central leadership.

2. THE CLASSIFICATION OF GLOVES FOR THE MILITARY

First of all an army uniform is an official state. Its appearance is determined by the military and is reported to upper primary levels of the company. Not the last place it occupied military uniform and accessories, especially gloves.

The literature review revealed that the gloves for the military can be classified according to several criteria, namely [1, 2]:

a. Terms of use (the company, the street, the ceremony).
b. Destination (soldiers, military, sub-officers, officers).
c. Season (summer, spring, autumn, winter).
d. The kind of military troops (cavalry, infantry, aviation, artillery, marine, special forces and

elite, etc.).

e. Nature of raw material (leather, artificial leather, textiles, combinations of materials).
f. The number of fingers present in glo ve (one finger, two fingers, five fingers).
g. Type manjeta (inseparable, separated).

3. THE OWN RISK FACTORS OF WORK ENVIRONMENT

Nation's military service frameworks are being exposed to risk factors of ph ysical, chemical, biological and mechanical (tab. 1) [3].

Table 1: The own risk factors of work environment

Nature of the risk factor	**Type of the risk factor**		**Requirements imposed gloves for the military**
1	**2**		**3**
Biological(bacte-riological arms)	Airborne microorganisms in air		-tightness;
Physical (nuclear arms)	Air temperature	High	-high capacity reception and transform moisture; - high capacity ventilation; - reduced insulation.
		Low	- high capacity of insulation; - high capacity of absorption of heat flow issued by the body; - high capacity of reflecting heat flux emitted by body; - tightness;
	High humidity		- tightness;
	Air currents		
	Aeroionizarea		- high capacity of neutralizing the positive ions; - high capacity to generate negative ions;
	Overpressure		- the existence of compensating for pressure parts;
	Vibration		-the existence parts supports, compression joints;
	Lighting	Low	-visibility;
		Brightness	-high capacity optical mitigation effects;
		Intermittent	
	Electrostatic potential		-minimum capacity of electrostatic char ge; -tightness;
	Pneumaconiogene powders		-tightness;
	Electromagnetic radiation	Infrared spectrum	-the higher capacity of reflecting infrared radiation;
		Ultraviolet	-high absorption capacity radiation ultraviolet;
		Microwave	-ability to mitigate high energy radial flow;
		High frequency	
		Low frequency	
		Laser	-high fire capability ;
	Ionizing radiation	Alpha	-abiality to mitigate high energy radial flow (depending an the thickness and density of the material);
		Beta	
		Gamma, X	-high capacity screening (quantifying the value of the coefficient of the material lead);

Continue table 1.

1	2		3
Chemical (chemical arms)	Gases, fumes, toxic or/caustic aerosol		-tightness; -high resistance to specific chemical agents; -decontamination capacity than;
	Suspended in air, gas/vapors flammable or explosive		-tightness; -minimum capacity of electrostatic charge; -decontamination capacity than;
Special character of the environment	Underground		-visibility;
	Aquatic		-tightness;
	Underwater		
	Swamp		
	Sterile, high purity		-tightness; -minimum capacity of electrostatic charge;
Mechanical	Weapons facilities	Side arms	-high resistance to mechanical stress.
		Fire arms	
		Explosive weapons	
		Weapons reaction	
		Equipment	

4. THE FUNCTIONS OF THE GLOVES FOR THE MILITARY

Design process is considered able to translate system requirements into a structural level, constructive and technological, by product features (fig. 1) [3].

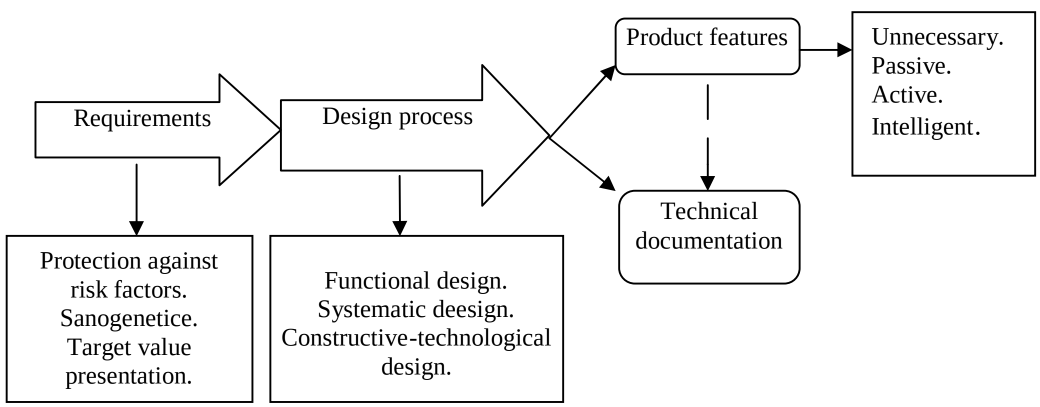


Figure 1: Systemic approach to the desi gn process

Analysis of risk factors and requirements imposed by users of gloves for the military, made possible the establishment of 27 functions, submitted by seven groups of functions (tab. 2) [3, 4, 5, 6].

Table 2. The classification functions for gloves for the military

Group functions	**Cod**	**The title**
1	**2**	**3**
Aesthetic functions	F1	Degree of novelty of the model
	F2	Compliance with lifestyle and clothing of the wearer
	F3	Product appearance and dress
	F4	Aesthetics processing technology
Ergonomic functions	F5	Dimensional correspondence
	F6	Easy in dressing-undressing
	F7	Sifting body
	F8	Minimal effort to wear.
Information functions	F9	Bearer information

Continue table 2.

1	2	3
Sanogenetice functions	F10	Thermal protection
	F11	Moisture absorption
	F12	Moisture transfer
	F13	Ventilation capacity
	F14	Psycho comfort
Safety features	F15	Body cover
	F16	Physical protection
	F17	Mechanical
	F18	Chemical
	F19	Biological
	F20	Impermiabilitate the fluid substance
	F21	Fire protection
	F22	Radioactive decontamination capability
	F23	Carrier opportunity observation by others
Reliability functions	F24	Wear resistance
	F25	Stability of shape and size
Maintenance functions	F26	Easy maintenance
	F27	Rebuilding capacity

5. CONCLUSIONS

Functions and knowledge of requirements for military gloves allow:

- reducing production costs;
- able to meet increased user requirements;
- simplification of manufacturing processes;
- attempt performances by the limited increase of costs;
- promoting creative thinking.

6. REFERENCES

1.****Legea nr. 80 din 11 iunie 1995 privind statutul cadrelor militare din România.*

2.****ГОСТ 26577-85. Перчатки и рукавицы на меховой подкладке для военнослужащих* .

3.*** (2006). *Fundamentarea sinergiei dirijate a nano-/microcomponentelor integrate în materiale textile compozite, în scopul asigurării unor funcţii inteligente ale echipamentelor de protecţie pentru medii agresive.* Program MATNANTECH-CEEX, contract nr. 105.

4. Malcoci M. (2002). *Contribuţii la diversificarea şi optimizarea produselor şi proceselor de fabricaţie în industria de marochinărie.* Teza de doctorat, Iaşi.

5. Nicolaiov P., Rusu C., Ionescu I. (1999). *Definirea funcţiilor produselor de îmbrăcăminte.* În revista Industria textilă, nr. 2.

6. Malcoci M., Pascari I. (2009). *Contribuţii la stabilirea funcţiilor produselor de marochinărie* . În Revista de Pielărie-Încălţăminte, decembrie, vol. 9, ed. 4, pag. 274-283, ISSN 1583-4433.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

3D MODELLING OF LASTS USED TO OBTAIN SPECIAL FOOTWEAR FOR PATIENTS WITH DIABETES

Mariana Păştină, Aura Mihai

„Gheorghe Asachi", Technical University of Iaşi, ROMANIA

Corresponding author: Păştină Mariana – mpastina@tex.tuiasi.ro

Abstract: The aim of this study was to develop principles of 3D modelling of lasts used to obt ain special footwear for patients with locomotion disabilities caused by diabetes. The design process and manufacture process of a personalized last are the first steps in achieving the right type of footwear for patients with diabetes. The compatibility between the foot and the last represents the key element for this kind of activity. Whatever method is used, the shape of the last is given by the shape of the foot and its dimensions (length, widths and girths). These foot dimensions are modified and trans formed into last's dimensions using 3D modelling software.
Keywords: foot, diabetics, last, footwear, 3D modelling.

1. INTRODUCTION

When they purchase a footwear product, the consumers are looking for two main characteristics: footwear appearance and its dimensional comfort. The footwear that does not correspond to the foot shape and dimensions and also it does not take over/ absorb the foot modifications that appear while walking is the main cause for prevalence and evolution of structural and functional foot anomalies. Thus, the health of the entire body is affected, too. [1].

The footwear shape and dimensions are influenced by the last's shape and dimensions. A last that is designed without a scientific basis, without considering the consumer's foot individual conformation, will lead to an unsuitable footwear product. The notion of last's shape/dimension fitted to the foot is not well defined. Further research is needed to assess the last design and its industrial application in footwear industry. The lack of information in this area determines the footwear producers to select the last on empiric basis. By doing like this, a lot of physical prototypes that suffer a series of adaptations and adjustments based only on designer's experience are required. The 3D scanning technologies and CAD solutions, developed in the recent years, allow us to reconsider the last's design process and provide both useful tools for designing personalized footwear and lasts [2, 3].

Diabetes became an important health issue, because of its growing prevalence all over the world and because of the increased number of young people diagnosed with diabetes type 2. The diabetic foot is characterized by: important morphologically modifications, sensibility caused by diabetic's neuropathies, and vascularisation with high risk of infection. Fitted footwear could solve most of the patients' problems. Some clinical and practical observations [1, 4, 5, 6], regarding special footwear requirements for diabetic subjects, have been registered:

- the material used for manufacturing must be soft, extensible, permeable, excl uding synthetics;
- the inner joining seams must be avoided, especially in the affected area;

- the width must be larger;
- the toe puff must be higher and wider;
- the closing system must be adjustable;
- the insole must accommodate high plantar pressures
- the insole cover must be detachable;
- the flexible sole and the orthopaedic heel are used;
- the classic design is preferred;
- the high boots are recommended in case of ankle's instability.

2. METHOD

Designing a new last is firstly based on foot anthropometrics and biomechanics. There are restrictive factors affecting the last's shape and dimensions: acceptable limits of foot tightening by the footwear, the modification of foot dimensions while walking, footwear constructive type, materials characteristics, and footwear manufacturing technology. Also, we have to take care of the general design requirements of the footwear. The footwear is considered as being comfortable when, throughout its shape and inner dimensions, it helps the foot to achieve its functions.

Nowadays, there are used two methods for designing the last: classic and computerized (3D). The classic method consists in designing and modelling a last by using 2D patterns and values of foot anthropometrics. The computerized method consists in 3D interactive modelling of the last; this methods has the advantage of simulating the new last before its physical manufacturing.

The development of computer techniques allows for using specialized software, like the ones of CRISPIN-DELCAM: OrthoLast, OrthoModel, OrthoDesign, OrthoTech. For this study, the Crispin-OrthoLast software has been used.

The technique of transforming an initial 3D structure into a new one, named *Free-From Deformation of Solid Geometric* represents one of the graphic procedures which modify a 3D structure by moving the grid's basic points [7]. This method was used by Mochimaru M. et al., which highlighted the difference between two 3D shapes using a deformed test grid. Two structures described by normal shapes were used in order to obtain the new deformed built grid for grading the lasts [8].

The present study suggests a new procedure of lasts' modification, by re-designing it, according with the data obtained from 3D scanning of a diabetic foot. This procedure implies several stages: 1) scanning the foot; 2) importing an initial last from data base; 3) comparing the foot against initial last; 4) modifying the last according with foot shape. The patient's foot has been scanned by using a 3D foot scanning system; respectively the INFOOT USB Standard Model IFU-S-01, provided with 8 progressive ¼' CCD cameras and four laser instruments, class 1M. The initial last has been selected accordingly to the information received regarding size and width of the patient's foot.

The initial last imported from data base (fig. 1) is subject to an interactive comparing process against the scanned foot. On these lines, by using the Compare module of OrthoLast-Delcam Crispin software, the two 3D shapes (foot and last) were brought together in the same screen (fig.2).

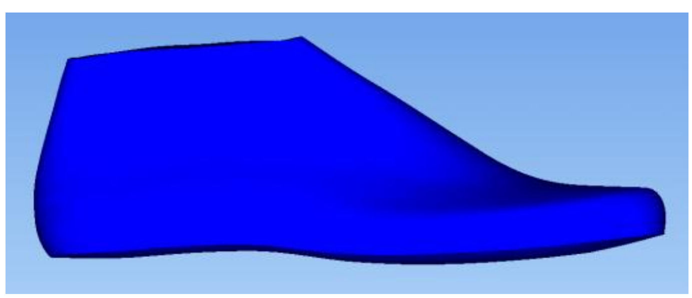


Figure 1. The initial last imported from data base

The initial last and the foot are successive moved and rotated in order to align them in the same plane (fig. 2). The chosen last must have appropriate size with foot, a small heel height and a rounded toe.

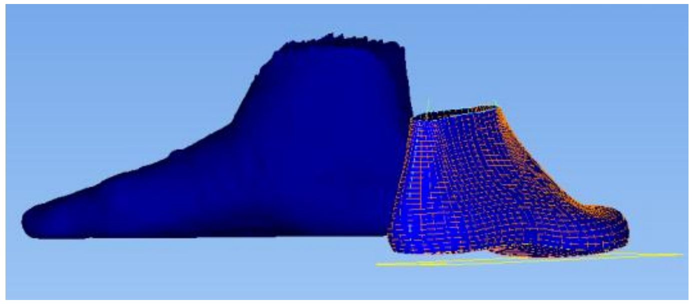


Figure 2. Last's alignment with the foot

Before the modifying process starts the last and the foot are aligned so that they are overlapping in as much points as possible (fig. 3). The two shapes have different appearances: draft solid for foot and gridded solid for last. By overlapping, it can be seen the differences between the foot and the last, therefore the last will be modified in that specific areas.

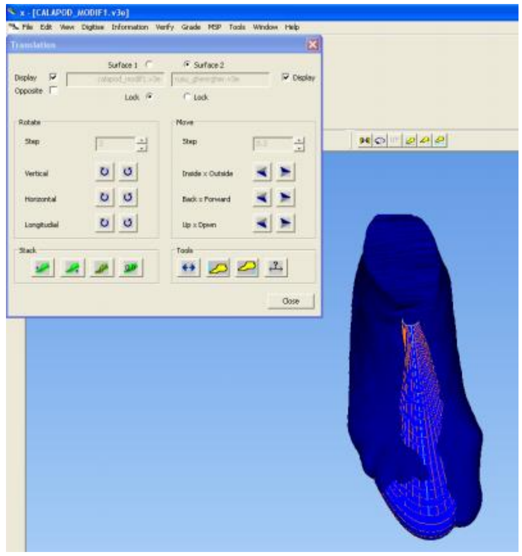


Figure 3. Last's and foot's overlap

Last modifications were made, step by step, on lengths, widths, toe girth, instep girth, heel height, toe spring, and others increments. The result is a last adapted to the conformational particularities of the subject (fig. 4, 5, 6 and 7).

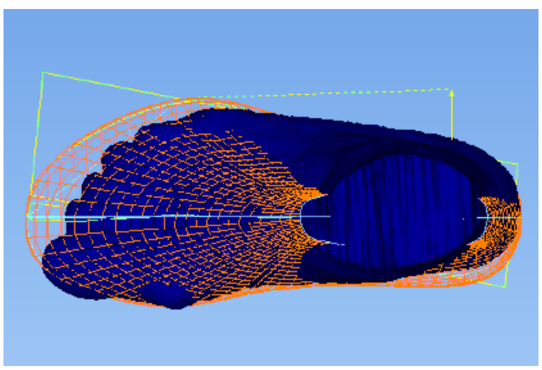


Figure 4. Last's width modification

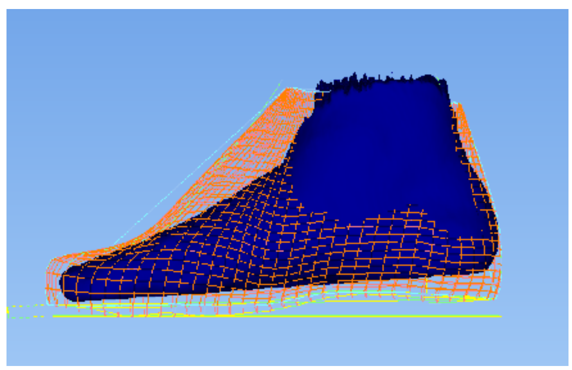


Figure 5. Toe girth modification

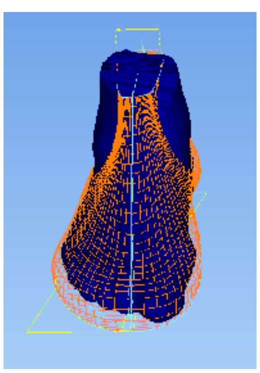


Figure 6. Ankle's girth modification

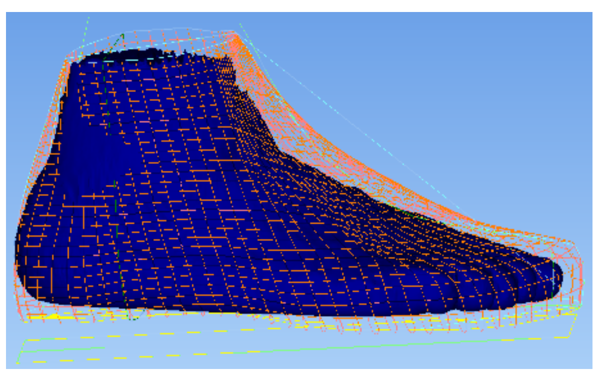


Figure 7. Dorsal modification

There can be seen that between the foot and the last should not be a total identity. When the foot gets inside the footwear, it is constrained to modify its shape and dimensions among certain admissible limits of tightening. These constrains for a diabetic foot have to be as less as possible. Thus, a low level of tightening the foot by footwear is determined, and therefore it reduces the risk of high pressures on specific foot areas.

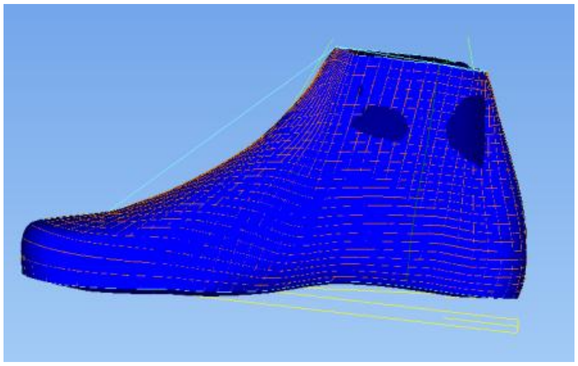


Figure 8. Final shape of the modified last (with the foot inside)

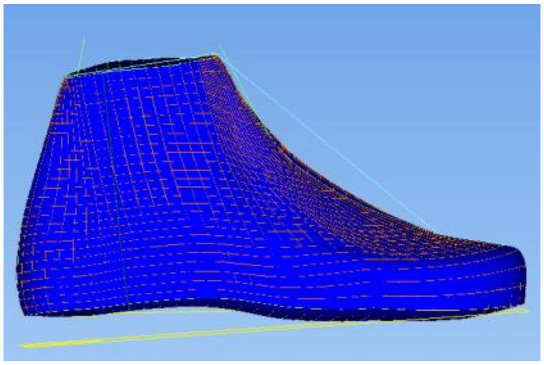


Figure 9. Final shape of the modified last

When the final shape of the last is obtained (figures 8 and 9), the data are exported and transmitted to a CNC machine and a real last could be manufacturing.

3. CONCLUSIONS

- A series of modifications on last is suggested regarding the conformational particularities of the subject. The last's modelling process follows up the foot measurements for the toe girth, the length, width and the toe cap increment, therefore a fitted and adapted last could be obtained.
- A special last, fully adapted to a diabetic foot, was created by using the 3D computer-based technologies. The 3D modelling procedure allows us to interactively visualize and to modify the last accordingly to the patient's scanned foot shape.
- Future research is required in order to analyze the patient's condition while wearing the footwear specially made on the proposed last which has been modified according with the procedure hereby described.

4. REFERENCES

1. Mălureanu G., Mihai A., *Bazele proiectării încălţămintei*, Ed. Performantica, Iasi, 2003.
2. Sikyung Kim; Mazumder, M.M.G.; Se Jin Park, *A Conformal Mapping Approach for Shoe Last Design,* in Frontiers in the Convergence of Bioscience and Information Technologies, pp. 512 – 518, Digital Object Identifier 10.1109/FBIT.2007.158, 2007
3. Zhao J., Xiong S., Bu Y., Goonetilleke R.S., *Computerized girth determination for custom footwear manufacture,* Computers and Industrial Engineering, Vol. 54 , Issue 3, pp. 359-373, ISSN:0360-8352, 2008
4. Armstrong D.G., Lavery L.A., Kimbriel H.R., Nixon B.P., Boulton A.J.M., *Activity Patterns of Patients With Diabetic Foot Ulceration*, Diabetes Care, Vol 26, pp. 2595–2597, 2003
5. Feit E.M, *Key Prescription Pearls For Diabetic Orthotics*, Podiatry Today , Vol. 15 - Issue 3, pp.14 – 18, 2002
6. Praet S.F.E., Louwerens J.W.K., *The Influence of Shoe Design on Plantar Pressures in Neuropathic Feet*, Diabetes Care, Vol. 26, No. 2, 2003
7. Sederberg, T.W., *Free-From Deformation of Solid Geometric Models*, Proceedings of ACM şi GGRAPH'86 in Computers & Graphics, Vol, 20(4), pp. 151-160, 1986
8. Mochimaru, M. et al., *Analysis of 3D human foot forms using the FFD method and its application in grading shoe last*, Ergonomics, Vol. 43(9), pp. 1301-1313, 2000

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

COMPARATIVE STUDY REGARDING FRAMING OF COMPONENT PATTERNS OVER LEATHER AND LEATHER SUBSTITUTES FOR FOOTWEAR MANUFACTURING USING CAD PROCEDURES

Secan Cristina[1], Harnagea Florentina[2], Indrie Liliana[3]

[1]University of Oradea, Faculty of Textile and Leather
[2] "Gh.Asachi" Technical University of Iaşi, Faculty of Textile and Leather
[3]University of Oradea, Faculty of Textile and Leather
email : cris_secan@yahoo.com, harnagea@tex.tuiasi.ro, liliindrie@yahoo.com.

Corresponding author: Secan Cristina, cris_secan@yahoo.com

***Abstract*:**This paper describes the process of patterns positions for footwear manufacturing, taking into consideration particularities for leather and leather substitutes when using CAD procedures. Determinants with influence on volume of waste material must be attentively observed so rational utilization of materials during manufacturing will be implemented.

***Key words*:** leather, leather substitutes, pattern, model positioning, usage ratio

.

1. INTRODUCTION

Both leather and leather substitutes are used during manufacturing of flexible patterns for footwear. Due to different characteristics of each material the manufacturing process is different.
In case of leather the process supposes a one cut layer. The process of leather substitutes implies a multilayer cut. Both cuts are dependent on the width of material used (between 4 -8 layers for leather substitutes and 30-40 layers for textile origin covers) [4].

.

Topographic zones of the surface of material are important to cut out flexible patterns[2]:.

-toe caps, toe cap tips, and edgings – cut out from croups which have approximately same characteristics all over the material in two directions (parallel and perpendicular on the spine line)

-flaps of the footwear and bag flaps of the footwear -cut out at joints and hems

-inside tops, counters- cut out at neck, hem and feet, fig. 1.

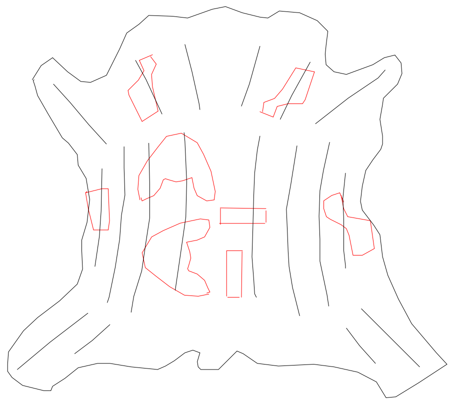


Figure 1. Positioning of patterns at croups hem and neck

In case of the leather substitutes[2], the positioning of patterns which share the same configuration is made respecting the general rule for positioning. This supposes that direction of maximum stretch of the pattern (the longitudinal axis of the pattern) is the same with the direction of minimum stretch of the material (the length of substitute).

2. EXPERIMENTAL

AUTOCAD 2007 software is used to highlight the process of positioning of patterns for footwear using CAD [1,3] procedures. There are presented 3 models of women shoes and placing is done for each of them. The models are taken from the manufacturer SC Tricostar SRL Oradea.
In the next working window it is showed one of the patterns of model number 1(fig 2), framed by a parallelogram. This framing helps to determine placing index which is necessary for the calculation of the amount of waste material. This percentage represents a high percentage of the total waste obtained during the manufacturing of patterns for footwear.

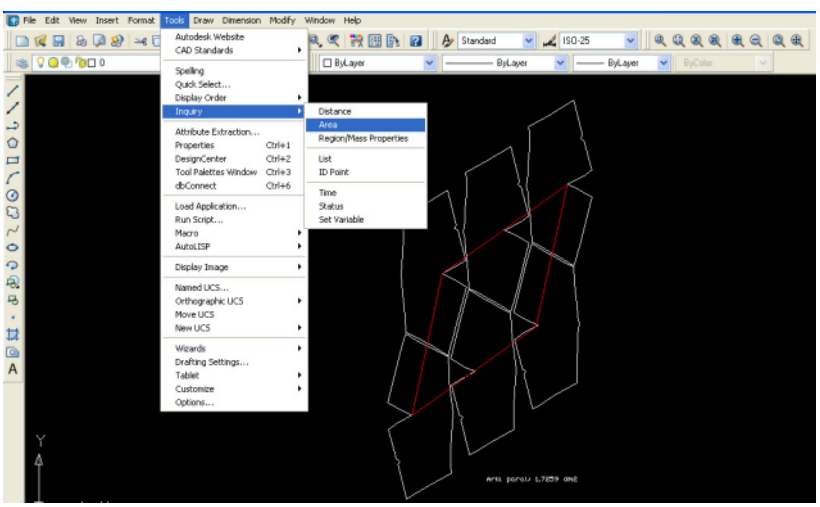


Figure 2 Working window for framed pattern in a parallelogram shape in the case of lather substitutes

AUTOCAD 2007 software is used again for the placing of all patterns, one after another, for leather substitutes. Figure 3 shows the following:

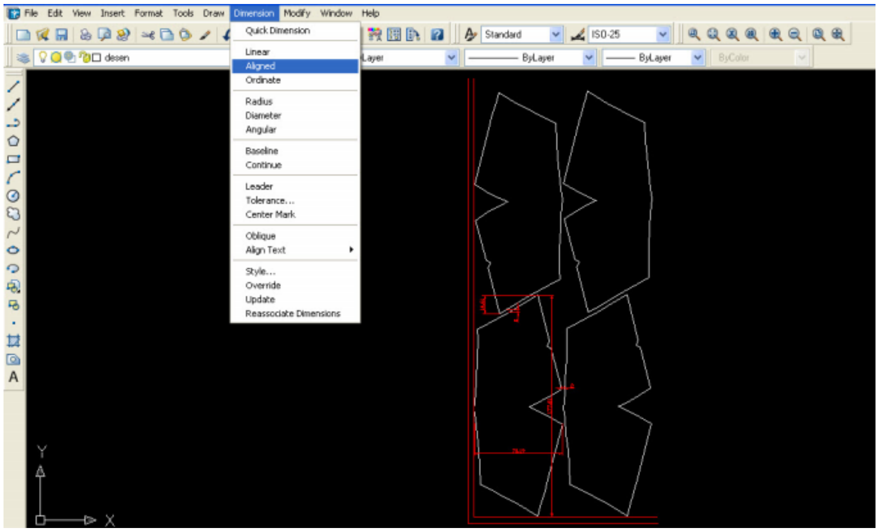


Fig. 3 Working window for already positioned pattern in the case of lather substitutes

Evaluation for usage ratio for leather and leather substitutes[2]:

- ✓ The usage ratio is determined taking into consideration the total amount of waste material during manufacturing:

$$U = F_a - \frac{39}{\sqrt[4]{W}} - \frac{Pset}{2Aset}\, p \text{ X } 100 \text{ , \%} \quad \textbf{(1)}$$

Where:

F_a = placing index

$$W = \frac{A}{m} = 238{,}09 \quad \textbf{(2)}$$

Where:

A – material area, dm^2.
m – it is obtained from: $m = A_{set} / n$
A_{set} – set area (both pears), dm^2
n – number of patterns for a set
P_{set} – pattern perimeter for a set, dm
p - bridge size between patterns, dm

- ✓ Leather substitutes efficiency for a determined placing system:

$$Iu = \frac{n_T \cdot A_r}{B \cdot L} .100, \quad \% \quad \textbf{(3)}$$

Where:

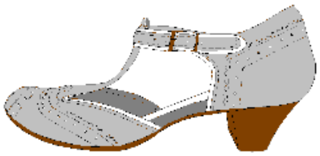
n_T - maximum number of patterns that fit on the surface of material used for manufacturing

A_r – pattern area, dm^2
B, L – linear sizes of the material, dm

3. RESULTS AND DISCUSSIONS

The configuration of patterns has an important influence during the placing of them in the frame of a parallelogram. The number of patterns influences also the placing index and the amount of waste material resulted during the manufacturing process of footwear.
Table no.1 shows values obtained for standard consume rates and values for usage ratio for each model studied.

Tabel no.1 Standard consume rate and usage ratio for 3 types of footwear model

Model	Element	M.U.	Value	Value	Value	Value	Value
M1 	a_{DT}	%	53,88	54	53,3	52,7	52,13
	$N_c(i)$	dm^2	19,52	19,57	19,27	19,03	18,8
	As	dm^2/per	9,0036	9,0036	9,0036	9,0036	9,0036
	U(i)	%	46,12	46	46,7	47,3	47,87
M2 	a_{DT}	%	32,11	31	31,5	30,88	30,28
	As	dm^2	9,0254	9,0254	9,0254	9,0254	9,0254
	N_c (i)	dm^2/per	13,29	13,08	13,17	13,05	12,94
	U(i)	%	67,89	69	68,5	69,12	69,72
M3 	a_{DT}	%	34,59	34	34,02	33,41	32,84
	As	dm^2	6,4092	6,4092	6,4092	6,4092	6,4092
	$N_c(i)$	dm^2/per	9,79	9,71	9,71	9,62	9,54
	U(i)	%	65,41	66	65,98	66,59	67,16

Usage ratio values are growing along with increase of the leather surface [7].
The model number 2 noted V2 encompasses 16 patterns and has the lowest amoun t of waste material, 31,15%. The mean value for the placing index is also noticeable.
The highest value for usage ratio among studied cases is obtained for the model V2. For this model the mean placing index shows a superior value. This is illustrated in f igure number 4:

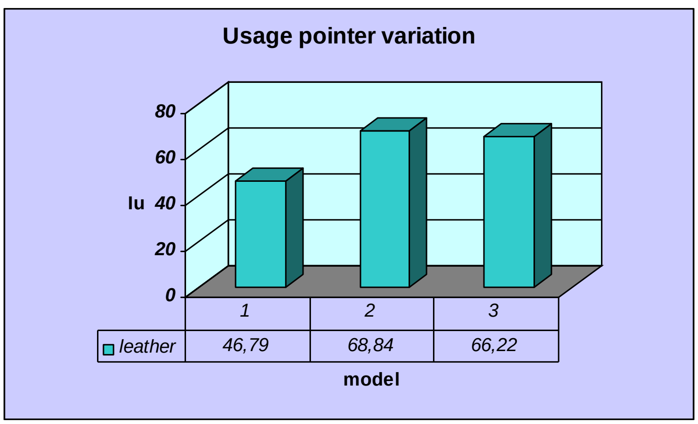


Figure 4 Variation of the usage ratio

The width of the material has a determinant role for optimal usage of the surface of the leather substitute material which also means usage with the least waste material[5]. The optimal length is the one which allows the least waste at the end of material used for manufacturing.
There are parameters[6] like: the placing of the pattern on the surface of the material used, the possibility of interpenetration, and pattern shapes; the size of the pat terns and surface; the working process type chosen: cutting out one pattern at a time or cutting out all patterns from the same surface; the skill of the worker, etc.
Table number 2 shows the values for usage ratios for the models chosen for study and the material used is leather substitutes.

Tabel no 2 Variation of usage ratio

Entry	Name of model	Usage ration [%]
1	Model 1	54,83
2	Model 2	72,55
3	Model 3	66,19

Usage ratio variation for leather substitutes for the three models analyzed in this pap er are illustrated in the next figure (figure number 5):

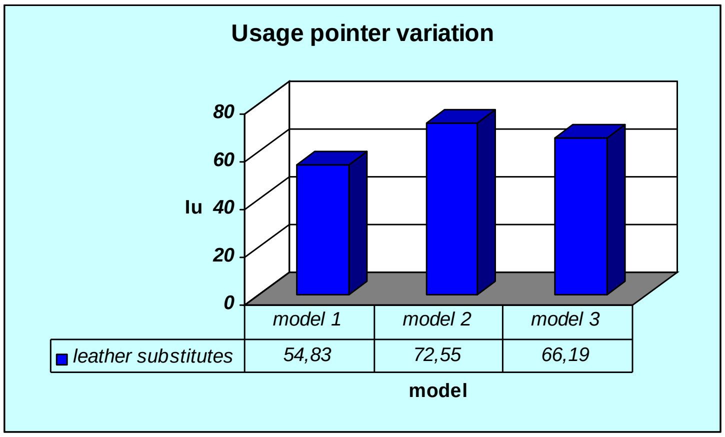


Figure 5 Usage ratio variation for leather substitutes

The highest value for usage ration is obtained for the second model, in the case of leather substitutes. Thus configuration and number of patterns have a significant influence over the value of usage ratio. After comparing usage ratios for both leather made patterns and substitute leather made patterns it is obvious that the highest values are obtained when using leather substitutes for man ufacturing process. These high values are the outcome of the same characteristics of the material in every direction of the surface and lack of flaws for substitute leather. It is also noticeable lack of waste material when cutting out patterns from the su rface of substitute leather. It is stated that waste material practically does not exist because identical patterns are cut out. Figure number 6 shows variation of usage ratios for chosen models of this study, the only differences are in positioning.

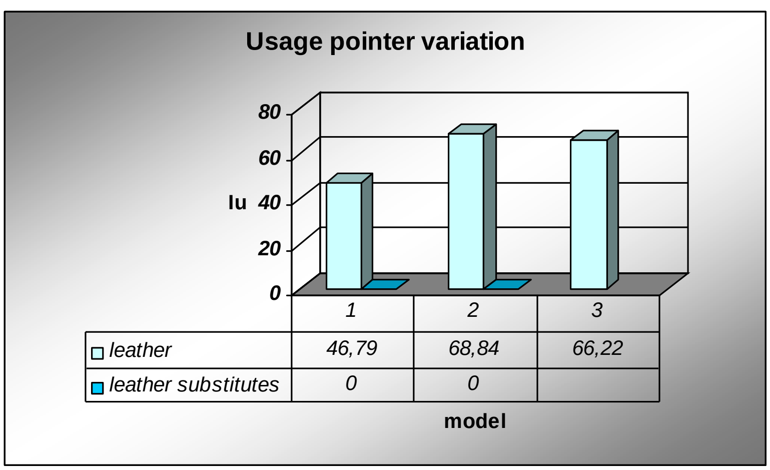


Figure 6 Usage ration variations for leather and substitute leather

4. CONCLUSIONS

The outcome of this paper is represented by the findings regarding placing of patterns on the surface of material used- both leather and leather substitute- for footwear manufacturing using CAD procedures. This study emphasizes also modes for rational usage of materials when cutting up shapes for the upper part of the footwear.

Using the above mentioned software gives the opportunity to work with high precision due to possibilities of pattern groups dimensioning, when leather substitute placing is used for manufacturing. This important characteristic of work process is reinforced by sizing of patterns' perimeters, net surface of patterns and parallelograms in which the las t one are framed into, with the purpose of determination of the mean value of usage ratio, in the case of framing on the surface of leather.

A dependence is observed between standard consume norms variation and the amount of waste material when placing is made over leather for the three models chosen for study. This dependence shows that the least waste material results, the standard consume norms are better, so usage ratios have higher values. The highest percentage for usage ratio is obtained for the seco nd study model, V2, which has a superior value for this indicator.

For the least waste material during manufacturing, it is recommended usage of high size surface materials and patterns combination.

For an optimal placing during footwear manufacturing, it is recommended to establish a standard length and width for leather substitutes. This process must be made in accordance with a low value of marginal waste ratio. Combined placing of all patterns of footwear has a significant importance for the rise of usage ratios. High usage rations bring along rational manufacturing of leather or leather substitutes used in footwear industry.

5. REFERENCES

1.Drişcu M., Mihai A., *Proiectarea încălţămintei cu sistemul Crispin Dynamics Cad Suite -Engineer*, Editura Performantica, Iaşi, 2008

2.Harnagea F**.,** *Tehnologia articolelor de marochinãrie*, Ed.Performantica, Iaşi, 2002

3.Pintilie E., Ciubotaru G., Avădanei M., *Proiectarea confecţiilor textile asistată de calculator*, Editura Performantica, Iaşi, 2006

4.Secan M.C., - *Contribuţii la optimizarea utilizării înlocuitorilor din piele în procesul de fabricare a încălţămintei*,,teză de doctorat

5.Secan C., Harnagea F., Indrie L., -*The influence of building model on usage pointer tu cut parts of the skin substitutes surface*, International Scientific Conference Unitech[09], Technical University of Gabrovo, Proceedings, vol.II, Bulgaria 20-21 Noember 2009, pg. 398-402, ISSN 1313-230X

6.Secan C., Harnagea F., Dorsonszky L., - ,*The influence of model building on materials used when working with leather substitutes*, Annals of the Oradea University, "Fascicle of Textile - Leatherwork", The International scientific conference," Innovative solutions for sustainable development of textiles industry", vol X, Ed.Universităţii din Oradea, 2009, pp 363 -367.

7. Secan M.,C., Harnagea Florentina -,*The influence of the footwear upper shape upon the nesting factor at cutting*, Annals of the University of Oradea, Fascicle of Textiles-Leatherwork, The International Scietific Symposium,,Innovative solutions for sustainable develop ementof textile industry",vol IX,Ed.Universităţii din Oradea, 2008, pp285 -291.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE ACTUAL AND FUTURE STATE OF DEVELOPEMENT IN FORTHOPAEDICAL FOOTWEAR MANUFACTURE IN THE REPUBLIC OF MOLDOVA

N. Talmazan[1], M. Malcoci[1], I. Robu[1], I. Rotari[1], T. Chiochiu[1]

[1] *Tehnical University of Moldova, Chisinau*

Corresponding author: M. Malcoci, E-mail: mmalcoci2005@yahoo.com

Abstract: The first section of orthopedically footwear manufacturing has been opened in Moldova in 1945, even then it was assured with modern utensils. After a while they got old and useless. Nowadays we may meet there such utensils as: PVG – 18 – 2, PVG – 8 – 2, RL, ASG – 13, TA – O, PPG – 4, SPR, OKB – O. All these ustensils belong to the first and the second generation. In what follows we'el see the necessity of replacing the old ustensils.
Key words: technologies, machines, flexibility, quality, mechanisation

1. INTRODUCTION

Footwear manufacturing technologies have seen major changes resulting from the range of materials development, systems downs, experienced technical progress in equipment, being established six development stages:

I. Manual.
II. Mechanic.
III. Semiautomatic.
IV. Automatic.
V. Robotic.
VI. Cybernation.

Need to respond promptly to market requirements requires professionals to act by changing technologies, forms of preparation of production and decreasing execution time, so that productive activity is carried out at full capacity, and fulfilling orders to make the deadlines.
Development tools industry played an important role in the mechanization of manufacture of footwear and related achievements peak of production equipment for these units, the world may indicate t he following:

- automatic machine for cutting parts;
- numerically controlled machine programming thinned types of thin, its width and thickness;
- sewing machines and CNC and based cards;
- machines bent edges of the deposit of adhesive and cutting, notching and hammering reserve;
- rental space for training of two sides or a single operation;
- production units and facilities for all uni ts of (lower-glenc insole, sole-frame, etc.) injection technologies for plastics, polyurethane polymers or rubber vulcanization.

2. ANALYSIS OF EXISTING SITUATION AND PERSPECTIVES FOR DEVELOPMENT IN MOLDOVA MANUFACTURE OF ORTHOPEDIC FOOTWEAR

In Moldova, in 1945, opened the first section of construction of orthopedic shoes. Undertaking date was then equipped with modern machinery, which over the years have been spent technically and morally.

Currently undertaking in may meet such machinery as:

1. Matrix with bridge type PVG - 18-2, Russia (fig. 1).
2. Folding arm matrix type PVG - 8-2, Russia (fig. 2).
3. Machine parts such thin margins type ASG - 13, Russia (fig. 3).
4. Band knife cutting machine with continuous type RL, Russia (fig. 4).
5. Activation facility adhesive film type TA - O, Russia.
6. Sewing machine foot type SPR, Russia (fig. 5).
7. Soldering machine foot type PPG - 4, Russia (fig. 6).
8. Device for removing the shoe from the last type OKB - O, Russia.

Figure 1. Matrix with bridge type PVG - 18-2, Russia

Figure 2. Folding arm matrix type PVG - 8-2, Russia

Figure 3. Machine parts such thin margins type ASG - 13, Russia

Figure 4. Band knife cutting machine with continuous type RL, Russia

Figure 5. Sewing machine foot type SPR, Russia

Figure 6. Soldering machine foot type PPG - 4, Russia

Machines mentioned above are the first and second generation. In the shoe department of a large company in operation is performed manually (fig. 7).

Figure 7. Handmade operations within the enterprise data

Obsolete equipment and lack of basic necessities equipment adversely affect the quality of orthopedic footwear.

Equipping such units, whose orders are dependent on deviations / anomalies each consumer (patient) in hand, require machines with universal and with relatively low capacity to enable implementation of a manufacturing process with greater flexibility. This conditi on can currently he was easily met by modern machinery.
Multitude of specific tools and technologies, resulting in permanent concerns of equipment manufacturers, but also continued diversification of leather substitutes peiele and textiles, require information to date but also a selection of information, so that they meet both requirements for training future specialists and those who want to inform or to supplement their professional training.
In the case involving the manufacture of orthopedic shoes, in m ost cases, individual items for each customer / patient and sometimes for each leg of its specific tools are equipped with efficient mechanisms, adjustable speed range, high quality, minimum -sized, silent.
Analyzing the structure and manufacturing process to manufacture the necessary equipment to that of a normal shoe orthopedic shoes, are found for cutting operations, some processing - equalization, attenuation, assembled by stitching can be used much the same type of equipment. For spatial training, mechanical finishing equipment used for orthopedic shoes more specific considerations of space as it presents a more complex form and large variations from one area to another, and that whole bottom is designed and manufactured for each individual model . Cars pulled up menu for setting boundaries and allow sock tracţionare force and working arrangements of working bodies. Using mechanical finishing units incorporating milling machines, grinding, setting, raising, polishing and deprăfuire. They may be used in processing prosthesis. An important aspect for establishments that produce orthopedic footwear is equipping them with processing systems and obtaining calapoadelor structure elements (orthosis, ortoze, heel cushions, etc.). Such systems allow processing of di fferent materials.

3. CONCLUSIONS

Replacement of old and new machines have several advantages, namely:
- automating the process of cutting flexible and rigid parts ;
- increasing mechanization of shoe production department ;
- reducing the time required to adjust equipment according to the model because the setting is modern or semi-automatically;
- conducting more operations with a single machine ;
- increasing the quality of the finished products.

4. REFERENCES

1. Chiriac V. (1996). *Tehnologii de finisare a confecţiilor textile*. Ed. Tehnică, Bucureşti.
2. Набалов Т. (1990). *Оборудование обувного производства*. Изд. Легпромбытиздат, Москва.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

FUNDAMENTAL AND ADDITIONAL REQUIREMENTS FOR SAFETY, PROTECTIVE AND OCCUPATIONAL FOOTWEAR

Rodica Zaharie Butucel [1], Cornelia Ionescu Luca [2]

[1] *Concern "General Contractor" Oradea, ROMANIA*
[2] *Technical University "Gheorghe Asachi" of Iassy, ROMANIA*

Corresponding author: Ionescu Luca Cornelia, E-mail: cionescu@tex.tuiasi.ro

***Abstract*:** The main technological processes in the industry generate detrimental agents to the human organism. When physical agents such as excessive heat or extremely low temperatures in the working environment, air humidity, noise, vibrations, radiations, sparks, drops of melted metal, burning dross etc., overrun certain limits set by standard, they actuate in a harmful way to the human body. Chemical agents such as gas, toxic aerosols, air standstill dust, acids, bases etc. facilitate occurrence of favorable conditions of producing work accidents and professional decay. The standards regulate the protection equipment specific to each working environment. This paper presents the fundamental quality characteristics and additional quality characteristics of safety, protective, occupational footwear.
Key words: safety equipment, safety shoes, protective shoes, work shoes

1. INTRODUCTION

The safety, protective and occupational footwear is included in the protection equipment category. These footwear designs are manufactured and used according to the specific international standards [1,2, 3, 4].

Safety, protective and occupational footwear includes the following designs [1, 2, 3, 4]: shoes (A), ankle boots (B), half-knee boots (C), knee-height boots (D), thigh boots (E). Type (E) is a boot with the height of the shaft to the knee having as reference the design (D), to which is attached a piece of thin, waterproof fabric that adjusts to the user's size. Depending on the manufacturing fabrics these footwear designs are classified [1, 2, 3, 4] in two categories class I footwear and class II footwear.

Class I footwear is manufactured with leather or other fabrics uppers with the exception of all -rubber or all-polymeric footwear. Class II footwear is all-rubber footwear produced by vulcanization or all-polymeric footwear obtained through injection.

The safety footwear designs are marked with the letter "S", the protective ones with letter "P" and the occupational ones with letter "O". In addition to these symbols several symbols are included with regards to the specific requirements.

Depending on the basic requirements Class 1 footwear is marked with symbols S1, S2, S3 for safety footwear respectively P1, P2, P3 for protective footwear and O1, O2, O3 for occupational footwear. Class 2 footwear is marked with S4, S5 symbols respectively P4, P5 and O4, O5. Corresponding to several additional requirements there are added the following symbols: P – penetration resistance; C- conductive footwear; A – antistatic footwear; I- electrically insulating footwear; HI – insulating bottom assembly against heat; CI- insulating the bottom assembly against cold; E- energy absorbing heel; WR- water resistance; P- metatarsal protection; AN- ankle protection; WRU- water penetration and absorption; CR- chain saw cut resistance; HRO – resistance to hot contact; ORO- hydrocarbon resistance.

The basic and additional requirements are evident in the structural particularities of the footwear and the properties of the fabrics and the marking components.
This paper concentrates on several safety, protective and occupational footwear structures. The emphasis will be on the marking components and the manufacturing fabrics, the types of textile fabrics and their purpose and finally the characteristics and the uses of the final footwear.

2. FUNDAMENTAL REQUIREMENTS FOR SAFETY, PROTECTIVE AND OCCUPATIONAL FOOTWEAR

Basic characteristics of all types of safety, protective and occupational footwear can be determined according to the methods foreseen by EN ISO 2034 4:2004 standard. The mandatory fundamental requirements for all three types of footwear [3, 4, 5, 6, 7, 8, 9] are mentioned in Table 1.

Table 1: Basic requirements for safety, protective and occupational footwear

Requirements regarding the height and the shape of the upper assembly for all footwear designs	
shaft 's height	According to Table 2
The rear	Must be closed for all footwear designs.
Requirements regarding the footwear as a whole for all the designs	
Sole's performance	- The insole must be secured so that its removal may not be possible without damaging the footwear - The adhesion strength between the upper ensemble and the sole, other than the stitched sole, must not be less than 4 N/mm, unless the sole is tearing in which case it should not be less than 3 N/mm.
Metatarsal protection *applicable to safety and protective footwear only*	- The toe-caps must be embedded in the footwear so that their removal may not be possible without damaging the footwear. -The footwear fitted with internal toe-caps except all-rubber and all-polymeric designs must have a vamp fabric supplement or an element in the upper assembly which ensures the same function. -The internal toe-cap must have a distance piece less than 1 mm situated between the toe-cap and the fabric supplement to at least 5 mm from the back edge of the toe-cap and at least 10 mm from the opposite side. - The internal length must have the values in Table 3. - The shock resistance to an energy level equal to 200 J for safety footwear and to 100 J for protective footwear must have a clearance underneath the toe-cap at the time of the shock according to the values mentioned in Table 4. In addition to that, the toe-caps must have no fissures throughout the width of the fabric. - The compression resistance at a force of 15 kN for the safety footwear and of 10 kN for protective footwear the clearance beneath the toe-cap must have the values in Table 4. -The corrosion resistance must not have more than five points of corrosion none of which shall exceed an area of 2,5mm^2. -Nonmetallic toe-caps used in safety footwear must comply with the requirements in EN 12568:1998, item 4.3
Tightness	-The tested footwear must not have air leaks.
Specific ergonomic characteristics	-Safety, protective and occupational footwear is considered conform to the ergonomic requirements if all answers to the questions referred to in EN ISO 20344:2004 standard, item 5.1 are affirmative.
Upper assembly for all footwear designs	
The minimum height underneath which the requirements concerning the upper assembly must be fully satisfied	- For B, C, D, and E designs the minimum height of the surface which must meet the requirements regarding the upper assembly is to be measured from the horizontal surface beneath the insole according to the values in Table 5. - When the fabrics used for collar and inserts exceed the values stated in Table 5 they must show: lining tear resistance to a minimum force of 30 N for leather and of 15 N for textile lining; the abrasion resistance of the lining must show freedom from holes before 25600 cycles in a dry environment and 12800 cycles in a wet environment; for leather lining the pH must not be less than 3.2 and if pH is less than 4 the difference index must be less than 0.7; regarding the leather linings the content of chrome VI must not be detected.

The thickness of the upper assembly	-The minimum thickness of the uppers must be 1.5 mm for vulcanized rubber footwear and 1mm for all types of injected polymers footwear.
Tear resistance of the upper assembly	-The leather footwear must withstand a minimum force of 120 N and the textile fabrics or textile supporting leather substitutes footwear a minimum force of 60 N.
Traction testing properties	-For leather split the traction resistance must be at least 15 N/mm^2. -For vulcanized rubber footwear the breaking force must be at least 180 N. -For injected polymers footwear the modulus of elasticity at 100% elongation can range from 1.3 to 4,6 N/mm^2 and breaking elongation of at least 250 %.
Flexing resistance	-Rubber vulcanized footwear must have no fissures before 125000 cycles and polymeric injected footwear no fissures before 150000 cycles.
Water vapor permeability and coefficient	-Water vapor permeability should not be less than 0.8mg/cm^{2}h. -Water vapor coefficient must not be less than 15mg/cm^2.
pH value for leather upper assembly	-pH value must not be less than 3.2 and when less than 4, the difference index must be less than 0.7.
Hydrolysis resistance	-When the upper assembly is made out of polyurethane fabrics these must show no fissures before 150000 flexing cycles.
Chrome VI content	-In the components of the leather upper assembly the content of chrome VI must not be detected.
Upper assembly (footwear lining) for all footwear designs	
Tearing resistance	-The leather linings must withstand a minimum force of 30N and the textile fabrics or textile supporting leather substitutes footwear a minimum force of 15 N.
Abrasion resistance	-Must show freedom from holes before 25600 cycles in dry environment and 12800 cycles in wet environment.
Water vapors permeability and coefficient	-Water vapors permeability must not be less than 2,0mg/cm^{2}h. -Water vapors coefficient must not be less than 20mg/cm^2.
pH value	-pH value must not be less than 3.2 and when less than 4, the difference index must be less than 0.7.
Chrome VI content	-In leather linings the content of chrome VI must not be detected.
The tongue of the footwear designs – *is submitted to testing only if the fabric is different from the uppers' fabric or the thicknesses are not identical*	
Tearing resistance	-Leather tongue must withstand a minimum force of 36 N and the textile fabrics or textile supporting leather substitutes footwear a minimum force of 18 N.
pH value	-pH value must not be less than 3.2 and when less than 4, the difference index must be less than 0.7.
Chrome VI content	-In leather tongues the content of chrome VI must not be detected.
Insole or sock	
Thickness	-The thickness of the insole must be greater than 2 mm.
pH value	-The pH value must not be less than 3.2 and if less than 4, the difference index must be less than 0,7.
Water absorption and desertion	-Water absorption must not be less than 70 mg/cm^2 and water desertion must not be less than e 80 % of the absorbed water.
Abrasion resistance	- When insoles are not made from leather the attrition must not be more emphasized than that of the reference sample for the same fabric category, before 400 cycles. - When socks are not made from leather the attrition surface must show freedom from holes before 25600 cycles in dry environment or 12800 cycles in wet environment.
Chrome VI content	-In the leather socks the content of chrome VI must not be detected.
The outsole for all footwear designs	
Outsole's thickness without spikes	-The total thickness of a spiked outsole must not be greater than 6mm each point considered.
Tearing resistance	-When the sole is not made from leather the tearing resistance must not be less than 8 kN/m for a fabric density greater than 0.9g/cm^3 and than 5 kN/m for a fabric density less than 0.9 g/cm^3.
Abrasion resistance	-*Non-leather soles or all-vulcanized rubber footwear or all-injection polymeric footwear should not subject to test.* For the remaining soles submitted to abrasion testing the relative volume loss should

	not be greater than 250 mm^3, for a fabric density equal to or less than 0.9 g/cm^3 and it must not exceed 150 mm^3, for a fabric density equal to or greater than 0.9 g/cm^3.
Flexing resistance	-When non-leather soles are submitted to flexion the louver must not extend by more than 4mm before 30000 flexing cycles.
Hydrolysis resistance	-When the outsoles and polyurethane component outsoles are submitted to flexion the louver must not extend by more t han 6mm before 150000 flexing cycles.
Adhesion force between the outsole and the mid sole	-In determining the strength of adhesion between the outsole and the mid sole the force required to separate the two soles must not be less than 4,0 N/mm, with the exception of the sole which tears, in which case the adhesion force must not be less than 3,0 N/mm.
Hydrocarbon resistance *applicable to safety and protective footwear only*	-When the outsole's hydrocarbon resistance is determined the outsole's volumetric expansion must not exceed 12%.

The height of the upper assembly in Table 2 represents the vertical distance between the lowest point of the insole and the highest point of the shaft measured in millimeters. These values are mandatory to all three types of footwear.

Table 2: The height of the upper assembly

The size of the footwear		Design, footwear, shaft [mm]			
French points	English system	A	B	C	D
≤ 36	≤3 ½	< 103	103	162	255
37-38	4 -5	< 105	105	165	260
39-40	5½-6½	< 109	109	172	270
41-42	7-8	< 113	113	178	280
43-44	8½-10	< 117	117	185	290
≥ 45	≥ 10½	< 121	≥ 121	≥ 192	300

Table 3: Minimum internal toe-cap length

The size of the footwear		Minimum internal length, [mm]
French points	English system	
≤ 36	≤3 ½	34
37-38	4 -5	36
39-40	5½-6½	38
41-42	7-8	39
43-44	8½-10	40
≥ 45	≥ 10½	42

Table 4: Clearance beneath the toe-cap at the time of the shock

The size of the footwear		Minimum clearance ,[mm]
French points	English system	
≤ 36	≤3 ½	12,5
37-38	4 -5	13,0
39-40	5½-6½	13,5
41-42	7-8	14,0
43-44	8½-10	14,5
≥ 45	≥ 10½	15,0

Table 5: The minimum height underneath which the requirements concerning the upper assembly must be fully met

The size of the footwear		Design, footwear, shaft (h), [mm]			
French points	English system	B	C	D	E
≤ 36	≤3 ½	64	113	172	265
37-38	4 -5	66	115	175	270
39-40	5½-6½	68	119	182	280
41-42	7-8	70	123	188	290
43-44	8½-10	72	127	195	300
≥ 45	≥ 10½	73	131	202	310

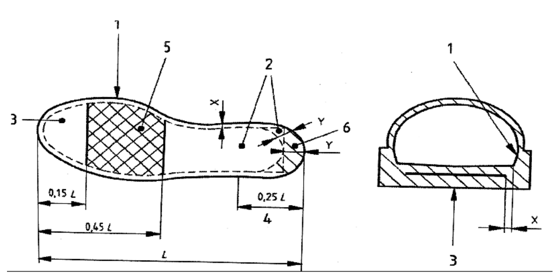
3. ADDITIONAL REQUIREMENTS FOR SAFETY, PROTECTIVE AND OCCUPATIONAL FOOTWEAR

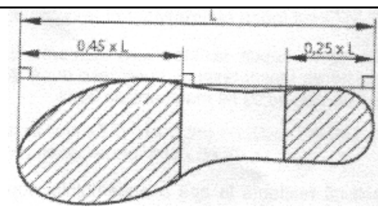
Additional requirements concerning safety, protective and occupational footwear are necessary due to the accidents which are liable to occur in the working environment. With regards to this purpose dependant footwear, it must conform to the additional requirements [2, 3, 4] corresponding to symbols in Table 6. In Table7 there are mentioned the additional requirements for safety, protective and occupational footwear [2, 3, 4, 6, 9, 10].

Table 6: Footwear symbols according to the specific requirements

Requirement, properties		Classification		Symbol
		I	II	
Footwear as a whole	Penetration resistance	x	x	P
	Conductive footwear	x	x	C
	Antistatic footwear	x	x	A
	Electrically insulating footwear	x	x	I
	Insulating lower assembly against heat	x	x	HI
	Insulating lower assembly against cold	x	x	CI
	Energy absorbing heel region	x	x	E
	Water resistance	x	-	WR
	Metatarsal protection	x	x	M
	Ankle protection	x	x	AN
Upper assembly	Water penetration and absorption	x	-	WRU
	Chain saw cut resistance	x	x	CR
Outsole	Resistance to hot contact	x	x	HRO
	Hydrocarbon resistance	x	x	ORO

Table 7: Additional requirements for safety footwear, protective and occupational footwear

Characteristics	Values
Footwear as a whole	
Penetration force	-The force required to pierce the sole should not be less than 1100 N.
Construction	-The penetration-resistant inserts should be embedded in the lower assembly so that their removal may be imp ossible without damaging the shoes. The penetration-resistant insert must not be placed above the spare of the safety or protective toe -cap neither attached to it.
Dimensions	 *Caption:1-contour line of the shoe last; 2- other ways of insertion; 3-insertion; 4- heel region; 5- hachured area 1; 6-hachured area 2.* The penetration-resistant insert must be apportioned so that the maximum distance (X) between its edge and the frame line of the last must be 6.5 mm, with the exception of the heel region. In t he heel region, the maximum distance must have no more than thre e holes maximum 3 mm in diameter. These holes must not be situated in hachured area 1.
Flexing resistance of	-There must be no visible signs of fissure before 10^6 flexing cycles.

penetration-resistant inserts	
Corrosion resistance of a penetration-resistant inserts	-There must be no more than five points of corrosion none of which should exceed 2.5 mm^2.
Nonmetallic penetration-resistant inserts	-The maximum strength is measured according to EN 12598:1998, 7.1.5.
Conductive footwear	-After conditioning in dry environment, the electrical resistance of conductive footwear must not exceed 100 kΩ.
Antistatic footwear	-After conditioning in dry and wet environment the electric resistance of antistatic footwear must be greater than 100 kΩ and less than or equal to 1000 kΩ.
Electrical insulation footwear	-The footwear must comply with 0 or 00 electrical class.
Insulating lower assembly against heat	-The temperature rise on the upper surface of the insole must not exceed 10^0C.
Insulating lower assembly against cold	-The temperature drop on the upper surface of the insole must not exceed 10^0C.
Energy absorbing heel region	-The energy absorption in the heel region must not be less than 20J.
Water resistance	- The total penetration surface after the completion of 100 basin lengths must not exceed 3 cm^2 or the water must not penetrate before 15 minutes have passed.
Metatarsal protection	- Metatarsal protective device must be embedded in the foot wear so that its removal may be impossible without damaging the footwear. - The minimum clearance between the protection device and metatarsals at shock testing must meet the values in Table 8.
Ankle protection	-Establishing the shock absorption capacity of the ankle protection fabrics inserted in the upper assembly, the average testing values must not exceed 20 kN and no values must exceed 30 kN.
Upper assembly	
Water penetration and absorption	-Water penetration evident in the weight increase of the spongiest fabric 60 minutes, must not be greater than 0.2 g and water absorption must not exceed 30%. The footwear must not show perforations decorative purposes only.
Chain saw cut resistance, *mandatory for safety and protective footwear only*	-Should be made for B,C,D and E designs only. - The footwear protective area must be at least 30 mm above the contour line and must cover the entire space from the toe-cap to the heel's end. This must overlap the contour line with at least 10 mm. -There must be no space between the toe-cap and the protective fabric. The protective fabric must be permanently embedded in the footwear. - When the upper assembly is cut tested the factor must not be less than 2.5. - The chain saw must not pierce the footwear. - The footwear must show perforation resistance to a minimum force of 1100N.
Outsole	
Spiked surface	 - Hachured surface must be fitted with spikes opened on the edges. - The thickness of outsoles without spikes must be at least 4 mm with the exception of all-vulcanized rubber or all-injected polymers footwear in which case it must not be less than 3 mm. - The spike's height must not be less than 2,5 mm with the exception of all-vulcanized rubber or all-injected polymers footwear in which case it must not be less than 4 mm.
Resistance to hot contact	- Rubber or polymer outsoles must not melt nor show signs of fissures when submitted to testing in sand bath at 250 ^{0}C for 30 minutes. - Submitted to the same test the leather outsole must show no fissures nor carbonize down to the dermis layer..
Hydrocarbon resistance *applicable to safety and*	- When immersed in the immersing liquid at a temperature of (23±2) ^{0}C for (22±0.25)h the outsole's volumetric expansion must not exceed 12%.

protective footwear only	

Table 8: Minimum clearance at the time of the shock

The size of the footwear		Minimum clearance after shock [mm]
French points	English system	
≤ 36	≤3 ½	37,0
37-38	4 -5	38,0
39-40	5½-6½	39,0
41-42	7-8	40,0
43-44	8½-10	40,5
≥ 45	≥ 10½	41,0

4. CONCLUSIONS

- Safety, protective and occupational footwear is a professional foot wear produced according to the specific European and international s tandards.
- Due to the diverse working conditions in which this footwear is used, there is a wide range of structures. To manufacture to footwear leather is used but textile fabrics, steel components, composite fabrics components, rubber and ethylene vinyl a cetate markers as well. There are used many manufacturing systems such as: glued sole, injected sole or stitched and injected sole.
- European and international standards specific to safety, protective and occupational footwear require two groups of quality characteristics, fundamental and additional characteristics.
- Fundamental and additional quality characteristics for these types of footwear are determined according to the methods stated in EN ISO 20344:2004 standard.
- Occupational footwear should meet the same requirements as safety and protective footwear except the requirements regarding metatarsal protection, compression resistance, corrosion resistance of the metallic toe-cap, chainsaw cut resistance of the upper assembly and the outsole hydrocarbon resistance.
- Due to the diverse working conditions in which this footwear is used, there is a wide range of structures.

Acknowledgements.
This paper presents the results obtaining within SIMSANO project (no.41064/2007) which has been funded by Romanian Ministry of Education and Research within the framework of the 2nd National Research and Development Plan.

5. REFERENCES

1. SR EN ISO 20344:2004. Echipament individual de prot ecţie. Metode de încercare pentru încãlţãminte.
2. ISO 5725:2004. Aplication de la statistique - Exactitude des résultats et methods de mesure –Partie 2.: Méthode de base pour la determination de la répétabilité et de la reproductibilité d'une méthode de mesure normalisée.
3.ENV 13005:2004 Guide pour l'expression de mesure.
4.EN ISO 20345:2004.Echipament individual de protecţie. Inc ãlţãminte de securitate.
5.EN 50321:1999. Chaussures électriquement isolantes pour travaux sur installations à basse tension.
6.EN ISO 20 346:2004. Echipament individual de protecţie. Inc ãlţãminte de protecţie.
7. EN ISO 20 347:2004. Echipament individual de protecţie. Inc ãlţãminte de lucru
8.Luca, C., Dragomir, A., (2005) Safety, protective and occupation footwear characteristics used in metalurgical industry, Buletin I.P.Iaşi, tomul LI (LV) fasc. 4, ISSN 1453 -1690, p 109
9.Ionescu Luca, C., Iuhas, M.,(2005) Studiu privind factorii nocivi care acţionează asupra muncitorilor din industria metalurgică şi cerinţele impuse încălţămint ei de siguranţă şi de protecţie, , volum Analele Universităţii din Oradea, mai 2005,p242, ISSN 1582 -5590
10.Ionescu Luca, C., Secan C., (2005).Studiu privind cartacteristicile încălţămintei de securitate, de protecţie şi de lucru din industria metalurgică, volum Analele Universităţii din Oradea, fascicola Textile-Pielărie, mai 2005,p72 , ISSN 1582-5590

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

QUALITY MANUAL, A GUIDE IN IMPLEMENTING QUALITY STANDARDS

Nicoleta Alina Andreescu[1], **Darius Gheorghe Andreescu**[1]

University of Oradea, Romania

***Abstract*:** Adoption, maintenance and continuous improvement of quality management system must be a strategic decision to conduct the highest level of a company. Designing and implementing a quality management system are influenced by needs - taking into account their variability over time, goals, products / services that provide, the employed processes, as well the size and organizational structure.

Key words: quality manual, quality standards

1. APPLICATION OF QUALITY MANAGEMENT

Applying quality management principles produce not only direct benefits, but also contribute to a significant extent of the cost and risk management. Considering the benefits of costs and risks, plays an important role for the organization, for its customers and other stakeh olders.

Process approach

In a business process, a model adopted by the organization management is encouraged by early identifying opportunities for management and its continuous improvement.
Applying a system of processes within an organization, together with the identification and interactions of these processes and their control can be considered an “process approach ".

2. GENERAL ASPECTS OF QUALITY MANAGEMENT SYSTEM

The company must define its processes and ensure compliance needed to harmonize its pr oducts and services to customer requirements. Quality management is included in the general principles of company management. At its base are eight general principles to facilitate the achievement of quality targets:

1) Customer focus: conscious of its dependence on customers, a company is open to all proposals made by the client, due to its current and future needs. Meet customer requirements and propose the best options to solve its needs, preoccupied with exceed customer expectations ;

2) Leadership : management establishes unity of purpose and direction of the company, creates and maintains the internal environment in which staff can become fully involved in achieving organizational objectives;

3) Involvement of people: tends to be a total involvement of peoples, considered a determinant factor of the firm, enabling the organization to achieve maximum profit valuing the peoples skills and competences;

4) Process approach: Procedural thinking about corresponding resources and activities shall be conducted in "process" module; **desired result is achieved more efficiently;**

5) System approach to management: Systemic thinks, identify, understand and manage the processes related to a system for achieving a given objective, which contributes to the organization effectiveness and efficiency;

6) Continuous Improvement: Continuously improve the quality / overall performance of the organization, action that constitutes a permanent objective of the organization;

7) Facts-based approach in taking decisions: Decisions are factual addressing, decision process is effective, and intuitive decisions are based on analysis and logical data and information;

8) Mutually beneficial relationships with the supplier: Mutually beneficial relationships are established with suppliers, the organization and its suppliers are interdependent in a relationship, which must be mutually beneficial conformable to efficiency principle - cost - quality - timeliness - availability.

3. DOCUMENTATION REQUIREMENTS

QMS documentation from a company includes:

- **Quality Manual**, providing consistent information on the QMS, both for internal and external purposes. Also includes:
- documented statements of policy and quality objectives;
- documented procedures (system) required by **SR EN ISO 9001:2008** standard describing the necessary actions for operation of QMS, at the system level;
- work instructions documenting sequences and interactive nature of the processes, activities to ensure both effective planning / operation / control processes and compliance product / service.
- quality records required by **SR EN ISO 9001:2008** standard to provide evidence of compliance with the requirements of standard QMS and its effective functioning.

4. QUALITY MANUAL

A company sets and maintains its **Quality Manual,** including:

- application domain of QMS;
- references to documented established procedures for QMS;
- describe the interactions between QMS processes.

Quality manual was developed and is used to describe an implemented QMS and effectively applied in business and associated procedures, is in making up:

- reference and guide for all employee of the company;
- QMS presentation material for clients, suppliers, certification bodies;
- documented basis for audits and demonstrate QMS compliance with the requirements of **SR EN ISO 9001:2008** standard and quality requirements in contractual situations;
- Quality Manual provisions applied to all activities which **SR EN ISO 9001:2008** standards refers and which are applied to all involved employees, for all delivered products and rendered services in *activity domain.*

Quality requirements are primarily aimed at customer satisfaction by responding to their requests by implementing a QMS, respectively QMS continuous improvement and nonconformities prevention.

Reference and related documents

Reference Documents

- **SR EN ISO 9001:2008 -** Quality management systems. REQUIREMENTS;
- **SR EN ISO 9000:2006 -** QUALITY MANAGEMENT SYSTEMS. Fundamental principles and vocabulary;

Related Documents

➢ **SR EN ISO 19011:2003**	- Guidelines for auditing quality and / or environmental management systems.
➢ **SR ISO/ TR 10013:2003**	- QMS documentation guidelines
➢ **SR EN ISO 9004 :2001**	- Quality management systems. Guidelines for improving performance.

Managing Quality Manual

Develop quality manual is under instruction for **Format and Numbering Documents** and work instructions for symbols and diagrams. Methods and responsibilities for quality control manual are established in procedures **"**Control **of documents and Control counting".** Responsible development is coordinated by QM, and approval by the Director General, controlling and represents responsibility QM Responsible.

When is necessary to identify the quality manual in force when is referred, after code is added "edition n / revision n"

QUALITY MANUAL ORGANIZATION

Quality Manual is organized into chapters and subchapters as of its "content".

Dissemination, archiving

Quality Manual is provided in-house by computer or on paper for all employees involved in his knowledge / application. All copies of broadcast quality book are identified and cont rolled by internal or external recipients registered under the form **"**Application **Document "** administered by the QM Responsible" .

Disseminating quality book by outside individuals and organizations is only with the approval of the General Director, usually in informative copy, except the certification bodies, to which transmit controlled copies.

Character of copy is specified on the first page and can be:

- "**controlled**", distributed under the approval of the General Director from the document file, with confirmation of receipt (signature) indicating the address of the holder or transmission. They are numbered and any changes in the quality manual content are transmitted to their respective owners.

- "**informative**", diffused on verbal approval by the General D irector, these copies are not numbered, but is highlighted in the document file without requesting signature of receipt. These informative copies ("unchecked" samples) are not updated to new versions.

Quality Manual is archived by QM Officer to maintain d ocument history for a minimum period of 3 years. This is a controlled document and is subjected to the requirements and **"**Control **of documents and Counting control"** procedures.

Revision

Each change will be recorded in the Application document. A (single o r multiple) change increase the edition number and revision of the document. Changes - new version - will be sent to all holders of controlled copies of the textbook quality.

Continuous improvement of QMS in the firm determine the revision quality manual a t least every three years or whenever circumstances arise causing revision (e.g. changes in organizational structure of the company, change of reference documents, company policy to adapt reformulate the new conditions of market, and other more).

Changes from earlier versions are reviewed and approved by the General Director. Traceability of changes is maintained in Application Document of the Quality Manual and to identify changes in the broadcasting document state, the last change is wrote on a yellow bac kground with red font.

Documents control

QMS documents are controlled by **"Control of documents and Counting control"** procedures which states that:

- documents are audited / reviewed and approved before use;
- documents are reviewed, updated if necessary and re-approved;
- current revision of documents is identified;
- existing versions of available documents in all areas of use of the organization to QMS function effectively;
- obsolete documents are promptly removed from all points of distribution and use;
- any obsolete document for well-defined purposes are identified in properly mode ;
- documents remain legible and easily identifiable ;
- documents of external origin are identified and their distribution is controlled ;
- is prevented from unintended use of obsolete documents and is applied to them a proper identification when is stored for any purpose.

List of documents and forms in force is maintained by the QM Officer **“QMS documentation structure ”**, informative attached to the Quality Manual.

Control of records

Relating records to quality are established, identified and maintained to demonstrate compliance with legible **SR EN ISO 9001:2008** standard and efficient operation of the QMS in the company. The **Control of documents and** the **Counting control** cover the identification, storage, protection, easy retrieval, storage life and quality records disposal.

Proof for requiring achieving final product quality and effectiveness of QMS management is contained in quality records.

Quality records include results of inspections and checks, customer complaints, complaints from vendors, the results of internal audits.

Some records are kept on computer; their security is assured by restrictions of access and regular backups of data.

5. REFERENCES:

M.Cucu, Stagiu de pregatire Auditor in domeniul calitatii, Bucuresti 2005
S.Cuc, Managementul calitatii,note de curs, Oradea 2005
STANDARD ISO 9001:2OO8
STANDARD ISO 9000:2006

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE IMPACT OF CRISIS ON THE LABOR MARKET FROM THE COUNTY OF BIHOR

Delia BEKESI, Viorica BANCIU

University of Oradea, Romania

georgianabekesi@yahoo.com

Abstract: This paper presents in its first part general issues of labor market and in the second part the evolution of labor market indicators during the crisis. The crisis manifested itself in Bihor county since October 2008, its effects on the labor market being evidenced by: the decreasing number of employees, the monthly average earnings decline, the increase of unemployment and unemployment rate due to the action of several factors such as the increased number of collective and current dismissals of staff and the restructurings caused by the definitive cessation of work because of the falling demand of orders for their goods and services, etc.
Key words: crisis, unemployment, Bihor, employees, labor market

1. INTRODUCTION

The labor market provides (together with the market of consumer goods and services, money market, capital) the functioning of modern economies as market economies and in this process takes a particularly important place because the direct stakeholders are the people themselves, with specific training and their potential skills, and the offer and the demand refers to a special "good", - work. (Neamtu, G. (coord.), 2003, p.607).

Thus the transactions on that market have two objects work or labor. If we understand the workforce as a totality of the physical and intellectual abilities that exists in the living personality humans and which they put into service when they create economic goods, means that work represents the conscious spending of labor force. They form a coherent whole, so that the use of the two synonymous expressions in the economic theory and practice is beneficial to human resources management, which decides on planning, organization, use and evaluation of work results in a specific economic circuit.

There are in literature several definitions of the labor market.

In a generalizing formula the labor market can be defined as a socio-economic space in which capital owners or their representatives, as buyers, and holders of the labor force or their representatives meet and trade, freely, as sellers. The capital owners are the exponents of the labor force and labor holders are the exponents of labor offer. (Paraianu, M., 2003, p.90)

Michel Didier defines the labor market as "a set of means of communication through which sellers and buyers inform each other about what they have, the needs they have and the prices they ask or they propose in order to enter into such transactions" (Didier, M., Economy: game rules, 1989, p.72).

Finally in a more technical approach, but perhaps more operational in respect of terms of investigation techniques, the labor market is defined as all the operations which are conducted at different levels of socio-economic organization of the different economic agents and / or social actors in relation with the adjustment of the offer and demand for labor force, of professional relationships, generally.

As for socioeconomic and educational, the labor market main functions are:

a) the efficient allocation of labor resources by sectors, industry branches, professions, areas, according to the volume and structure of the demand for labor force;

b) increasing and combining the volume of labor force with the me ans of production;
c) the influence on the formation and distribution of income;
d) training and orientation of the working climate and social protection;
e) offering information for the process of vocational guidance, retraining and reintegration of lab or force and action through its mechanisms on this process (Cre ţoiu G., Cornescu, V., 1992, p.320)
Phenomena and processes occurring in Bihor county labor market were largely influenced by the economic crisis we cross. This can be defined as „an accentuated deterioration both of the present economical situation and of the economy in perspective”. By its manifestation diversity and its phases, with longer or shorter period, it also is an economic disease whose causes have been identified by economists in different zones, thus the anticrisis measures proposed were diffe rent. (Romanian Economic and Business Review, Fall 2009, volume 4, number 3, p. 206).

2. THE EVOLUTION OF LABOR MARKET INDICATORS DURING THE CRISIS

The impact on labor market may be highlighted Bihor abide by the following indicators:

The number of employees

In the county, in late December 2009 number of employees was 157.104 persons to 171,054 persons registered at the end of December 2008. In 2009, the number of employees decreased by 13,950 persons (-8.2%) from 171 054 people in late December 2008 to 157,104 people at the end of late December 2009. The evolution of the number of employees' during the period December 2008 - December 2009, is presented in the table 1.

Table 1 Number of employees at the end of the perio d

-persons-

	2008	2009											
	dec.	jan.	feb.	mar.	apr.	may	jun.	jul.	aug.	sep.	oct.	nov.	dec.
Total county	171054	171228	169799	168560	167552	166422	165146	163865	162566	161518	160172	158759	157104

The Source of the data: Bihor County Statistical Direction

In Bihor county, the employment rate of labor resources (expressed as a ratio of civilian employment and labor resources) from January 1, 2009 was 76.7% and the one at the country level at 63.6%.

Salary Gains

Average gross monthly earnings in December 2009 on the total economy in Bihor county was 1485 lei, three lei lower (0.2%) compared to December 2008 (table 2). *Average net monthly earnings* in December 2009 was 1094 lei, 7 lei lower in July (0.6%) compared to December 2008. Significant increases in monthly net average earning w ere registered in the industry and constructions.

Table 2 The Evolution of Salary Earning

	Dec 2008 (lei)	**Dec 2009 (lei)**	**Dec 2009 / Dec 2008 (%)**
The average gross monthly earnings – total which in:	**1.488**	**1.485**	**99,8**
- Agriculture, hunting and related services, Forestry and fishing	**1.549**	**1.434**	**92,6**
- Industry and constructions	**1.302**	**1.413**	**108,5**
- Services	**1.617**	**1.536**	**95,0**
The average net monthly earnings – total which in:	**1.101**	**1.094**	**99,4**
- Agriculture, hunting and related services forestry and fishing	**1.141**	**1.054**	**92,4**
- Industry and constructions	**981**	**1055**	**107,5**

- Services	**1.183**	**1.122**	**94,8**

The Source of the data: Bihor County Statistical Direction

In December 2009, average gross monthly earnings of Bihor represent 73.4% of the average g ross monthly earnings achieved at the country level.

Table 3. The Unemployment and the Number of the Unemployed

INDICATORS	*DECEMBER 2008*		*DECEMBER 2009*	
	TOTAL	WOMEN	TOTAL	WOMEN
Total unemployees registered from which:	8.596	3.868	16.679	7.027
1.unemployees compensated	3.255	1.881	10.100	4.630
-unemployment compensation (75 %)	2.718	1.551	8.980	3.996
- unemployment compensation(50 %)	537	330	1.120	634
2.unemployees unpaid	5.341	1.987	6.579	2.397
Unemployment rate (%)	3,0%	2,8%	5,9%	5,3%

The Source of the data -County Agency for Employment

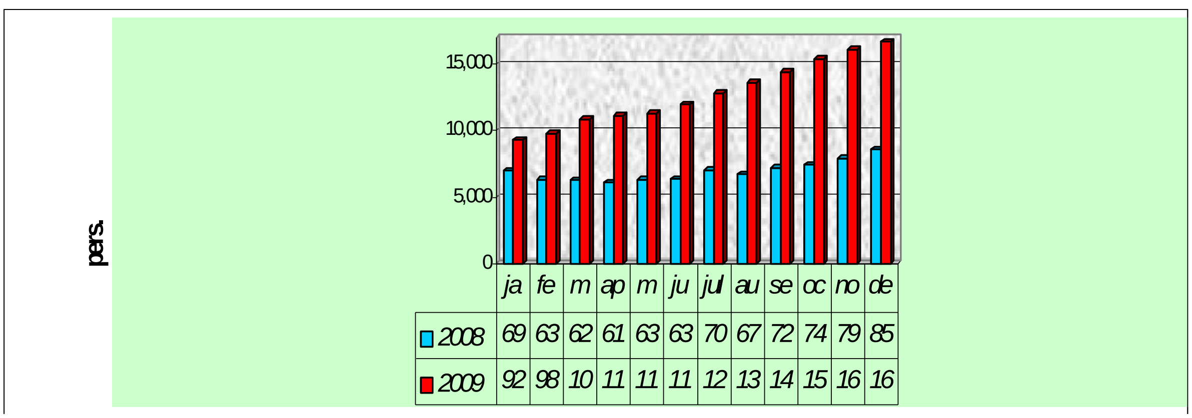
Bihor county level in late December 2009, unemployment rate was 5.9%, the registered unemployment rate is 2.9 % higher than in December, 2008 and by 0.2% than in November 2009 (table 3).

The total number of unemployed at the end of December, 16,679 people rose to 8083 people in late December 2008 and 547 people to end in November 2009 (figure 1).

Of the total registered unemployed, 10,100 people were paid unemployed people and there were 6579 unemployed unpaid. The unemployed allowance increased to 842 the previous month and the unpaid unemployed persons decreased by 295 persons.

The unpaid unemployed from the total unemployed was at the end of December 2009 of 39.4%, decreasing from the end of Janua ry 2009 with 21.4%

Regarding the sex registered unemployment at the end of December 2009 compared to December 2008, the male unemployment rate increased from 3.2% to 6.4% and the female unemployment rate increased from 2.9% in May from 3% to 5%.



The Source of the data: Bihor County Statistical Direction

Figure 1 Developments in the number of registered unemployed in 2008 and 2009

From the data analysis a sharp increase in the number of registered unemployed in 2009 to 2008 i s revealed. The main factors for this increase were:

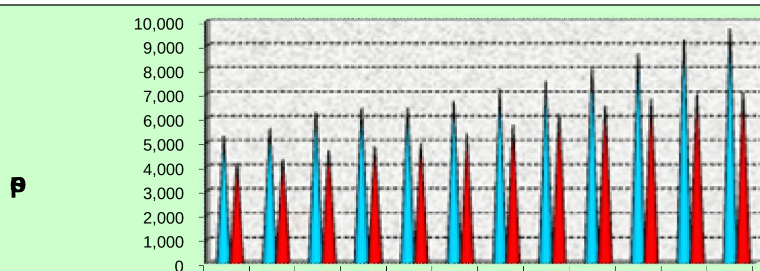
- ❖ Increasing the number of collective redundancies/dismissals and current of staff (employees not covered by collective redundancies), and the unpaid unemployed, in the period October 2008 - January 2010 a number of 83 employers have filed to AJOFM BIHOR projects for a number of redundancies for a total of 4456 people.

- Increasing the number of students recorded in the agency, following the information and advice, made in educational institutions for their final years, reduce the number of vacancies registered with the agency.
- increasing the number of employers with a number of employees less than 10, chose this time to liquidate the companies or to suspend the work, they exempted from the collective redundancies.

Redundancies that have occurred in most cases were the effect of:
- Restructuring caused by the termination of work - 13 employers have completely ceased work, intending dismissal of a number of 1070 persons, which were actually made available until 30.11.2009 a total of 1048 people.
- Restructuring due to lack of orders, which led to the intention of dismissal of a total of 2377 people from 48 employers, from which were actually made available by the date of 30.11.2009 a total of 1690 people.
- Restructuring caused by the season due to cold weather, which prevented the normal course of business (construction and agriculture), led to the intention of dismissal a total of 1009 people from 22 employers were actually made available until 30.11.2009 of a total of 539 people.

For the period October 2009 - January 2010 there were 29 projects at county level of redundancies for a number of 1161 people but there are 25 collective redundancy notifications made by other agencies for regional employers based in another county but their employees who are subject to layoffs, are in Bihor county (339 people). (Source: AJOFM Bihor).

One effect of the economic crisis was also the decreasing of vacancy communicated by the employers thus the monthly average of registered job vacancies is 680 jobs, compared to 1300 jobs in 2008. A job loss is recorded in the domain of construction, trade, metal machining. Vacancies in the light industry (clothing confectioner, shoes confectioner), were maintained or even increased, 80 % of the agency tender is in the following occupations: sewing, clothing confectioner, tailor footwear confectioner, leather and artificial sewer, unqualified worker in light industry. Also it was maintained the job offer in the field of electronics components.



	jan.	feb.	mar.	apr.	may	jun.	jul.	aug.	sep.	oct.	nov.	dec.
M registered unemployed	5197	5546	6187	6365	6377	6641	7169	7472	7964	8622	9176	9652
F registered unemployed	4101	4254	4637	4785	4926	5327	5672	6132	6479	6751	6956	7027

The Source of the data: Bihor County Statistical Direction

Figure 2 Evolution of the number of registered unemployed by sex, during January -December 2009

The analysis of 2009 data shows that the male population is currently more affected by unemployment, unemployed male in that period, being higher for unemployed women (figure 2). The dynamic in 2009, the growth rate of female unemployment was 71.4% and unemployed male 85.7%. The evolution of paid unemployed, by age group (table 4), from January to December 2009, differs significantly from one age group to another. The tendency to increase paid unemployed are found in all age groups but increases, the most important redundancies from segments of the population aged 30-39 years and 40-49 years intervals.

Table 4 Situation of unemployed by age groups in 2009

Age groups (years)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Difference Dec-Ian
under 25 years	600	638	539	596	559	696	681	671	1428	1576	1596	1655	1055
25 – 29	388	481	548	640	714	783	898	925	1010	1057	1143	1249	861
30 - 39	1207	1488	1729	1897	2107	2266	2555	2697	2819	2834	2952	3217	2010
40 - 49	964	1190	1365	1516	1658	1792	1969	2085	2228	2281	2463	2772	1808
50 - 55	382	433	519	565	624	668	743	762	800	825	865	943	561
over 55 years	101	129	150	170	165	173	212	186	204	209	239	264	163
TOTAL	3642	4359	4850	5384	5827	6378	7058	7326	8489	8782	9258	10100	6458

The Source of the data: Bihor County Statistical Direction

The distribution of the number of registered unemployed by level of training
In late December 2009, from the total number of unemployed of 16,679 people, 11,254 were workers (67.5%), 3694 people had completed secondary education (% 22.1) and 1731 people were educ ated (10.4%).
At the level of the towns of Bihor at 31.12.2009, out of 16,679 registered unemployed in 6585 come from the urban environment and 10.094from the rural. The share of the number of unemployed in the population of 18-62 years (calculated conf Article 1, paragraph 5, OUG 75 / 2000) was 3.2% in urban environment and 5.8% from the rural environment.

3. CONCLUSIONS

The effects of the crisis on the Bihor county labor market may be evidenced by: the decreasing number of employees, the decline of the average monthly earnings, increasing number of unemployment and unemployment rate due to the action of factors such as increasing the current collective redundancies due to the restructuring plan caused by permanent cessation of activity, lack of jobs due to decreasing demand for goods and services, etc.
During this period it decreased the number of vacancies notified by employers, except for jobs in the light industry, which were maintained or even increased employment, in the field of electronic components which were also maintained.

4. REFERENCES

1.Creţoiu G., Cornescu, V.,(1992), Political Economy, Tempus Publishing House, p. 320, Bucharest
2.Didier, M.,(1989) Economy: the rules of the Game, Humanitas, p.72, Bucharest
3.Neamtu, G. (coord.),(2003) Social Assistance Treaty Polirom, p.607, Iasi
4.Paraianu, M.,(2003) Parallel Labor Market, Expert Publishing House, p.90, Bucharest
5.Romanian Economic and Business Review, Fall 2009, Volume 4, Number 3, p. 206
6. Dates offered by the Bihor County Statistical Direction

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

CONFLICT OF INTERESTS AND RIGHTS CONFLICT, DIFFERENT CATEGORIES OF WORK RELATED CONFLICTS

Lavinia ONICA-CHIPEA

University of Oradea, Romania

laviniachipea@yahoo.com

Abstract: This paper wants to present two types of work related issues, conceptualized through Law nr 168/1999 and later on through the dispositions of the new Work Code. Their comparative analysis is to identify the specific of each category and to highlight the practical utility, concrete to each of them.
Key words: labor conflicts , rights conflicts, conflicts of interest, jurisdiction, Labor Code

1. CONFLICT OF INTERESTS AND RIGHTS CONFLICT. GENERAL ASPECTS

Both the Work Code and Law no. 168/1999 on solving work related conflicts that operate with *suma divisio* (12), of a special importance, therefore two categories of work conflict: *rights conflict and conflict of interests*.
We think it's desirable before defining and characterizing the two types of work conflicts to realize the distinction that is between the terminology work conflict, used by the new Work (Labor) Code and Law no. 168/1999 regarding the solving of work conflicts and the concept of labor litigation, used in the old Work (Labor) Code (art.172 paragraph 3).
Therefore, the term litigation comes from the Latin word *litigium* which means disagreement, quarrel. Article 172 paragraph 3 from the previous Work Code defined labor litigations: „litigations between people who are employed and companies, about the completion, executi on and completion of the labor contract…". Using the terminology of Law no 168/1999 the definition was referring to the labor conflicts with an individual character. Between the terms of rights conflict, which are actually labor conflicts, individual or co llective, and labor litigations are synonymous words, the difference is that the litigation is a conflict inferential to the judgment, for which the jurisdiction was approached to solve. (15)
Law no 188/1999 about the Status of the Public Servants, uses th e phrase "labor litigation" which marks the litigious causes between the public servants and the authorities and public institutions where they work. Labor conflicts are controlled by the legislator inferring from the labor contracts, either individual, either collective, these contracts regard the employees and not the public servants, in this case the terminology being labor litigations. (Article 92 from Law no 188/1999) .
Therefore, the labor conflict, starting from the legal dispositions that are invo ked, not any labor litigation is a labor conflict, but only those that derive from a labor contract. Labor litigation is the genre, and the labor conflict is the form. (14).
Labor conflicts are defined as those labor conflicts that have as an object that e xerts certain rights or the fulfilling of obligations that issue from laws or other normative acts, also from collective or individual labor contracts. (Article 248 paragraph 3 of the Labor Code and art.5 from the Law no 168/1999 regarding the solving of l abor conflicts.).
From the definition it can be extract a few *characteristic features* of labor conflicts (12, pp.578-579):

- They interfere only in the assumption of infringement of legally established or contractual rights, not of simple expectations;

- They can refer only to rights or obligations that issue from individual or collective labor contracts, but not from other contracts;
- They can interfere in any moment of the exertions, completing of the collective contract and the ascertainment or completion of the nullity, the exertion or completing of the individual labor contract (including the one of probation at the work place) and even after the expiring of them, if they regard rights that come from their basis;
- They can have an individual or a collective character, as they have as an object rights that issue from the individual or collective labor contract.

All of this character of labor conflicts, individual or collective, belong to the ones that come from the abusive exertion of some of the rights that issue from the individual or collective labor contracts.
As an example, individual conflicts can be triggered regarding (13): the rejection by the employer of an application of a person at a competition for job offer, although that person fulfills al the conditions; the refuse of the company to receive a person at work after the completion of the individual labor contract; the disciplinary sanctions applied by the employer; the dismissals of employees; the breach of obligations about the additional acts of the individual labor contract; the pay of compensation for material prejudices caused by parts through not carrying out or carrying out correctly the obligations set in the individual labor contract; not paying the salaries and other financial rights by the employer; the abusive exertion of certain rights by the employer and by the employee; ascertainment of the nullity of individual labor contract; actions of contravention of equality in rights, of discrimination.
The High Court of Justice said that because of the compensations that were asked for issuing late or not issuing at all the labor book, even though they were formed after the completion of the labor contract, they are based on the report, and their analysis under the aspect of material and procedural right are generated by the existence of this report (9).
But they don't constitute individual conflicts, therefore they are not an object of labor jurisdiction (6) the litigations between the companies and the person that work based on other contracts, than the individual labor contract – civil contracts for services, completed based on the Civil Code, commercial contracts, management, of commission and so on; litigations that are about students about their professional practice/internship; conflicts between Unions, that are representative or not and one of it's members(such as one that was started by an employee against the union for the wrong way they took care of a labor litigation) (10).
Referring the civil conventions for services, until the new Labor Code was valid, they belonged to the individual labor contracts, according to Law no 130/1999. Further on through Law no 597/2003 of approving of GEO no 9/2003 the government regime was expressly abolished, so that they don't belong to labor contracts anymore. In these conditions, the litigations that come from civil conventions can't be considered labor conflicts, especially of rights so they don't belong to special resorts. (7).
Also, it was said that even though they are based on an association convention, the legal relationship between co-operative and the member of that co-operative are considered forms of labor legal relationship. In this circumstance, the discrepancy between the partners of the legal relationship that were analyzed, form labor conflicts and undergoes the regulations of labor jurisdiction, which excludes the possibility of solving the litigation by the rightful institution (11).
Conflict of interests are those labor conflicts that have as an object the establishment of the labor conditions when the collective labor contracts are negotiated and they refer to interests of a professional, social or economical matter of employees (art. 248 paragraph 2 of Labor Code and art.4 of Law no 168/1999 regarding the solving of labor conflicts).(16)
Therefore, conflict of interests has the following *features*:

- They can't interfere in another moment of the retrace of labor report but exclusively in the moment of the negotiation of the collective labor contract, in the before the contract is signed (5); therefore the conflict of interests, on one side can't apply to negotiating of an individual labor contract, and on the other side, usually, it can't trip during the validity of a collective labor contract;
- They can have as an object the aspects according to Law no 130/1996 about the collective labor contract, they can be readjusted through the collective labor contract;
- They can't have as an object of the employees claims for which to be solved it is needed a certain law to pass or any other normative act;
- They always have a collective composition, they can interfere, according to Article 9 of Law no 168/1999, at local level or at a national level and only in special cases for subunits of companies or group of employees;
- They can't regard interests of people that work based on an other contract that the individual labor contract (8).

2. CONFLICT OF INTERESTS AND RIGHTS CONFLICT. COMPARATIVE ANALYSIS

The comparative analysis of legal dispositions that set the judicial régime of the two types of labor conflicts show aspects of each category, that singularizes them and shows reference to their object, at the moment they can interfere between the people that have a conflict. Therefore, while the right conflicts can appear at any moment of the ex ecution, completion of a collective labor contract and the validation of the nullity of this contract or the completion, the execution or completion of the individual labor contract (including the one for the probation at the work place) and even after the expiration of them, if they regard rights based on them, conflict of interests come only when there is a collective negotiation, so before the contract is signed. Conflict of interests can be determined only by misunderstanding when collective negotiating, by the signing of the collective labor contracts, especially for the case in which the employers don't accept the opinions of the employees. (15, p.924).
Both types of conflicts that were analyzed can refer only to rights or obligations that come from individual or collective labor contracts, but not from other contracts, they can refer only to the interests of the people that work based on an individual labor contract and on other type of contract. If the right conflicts can be individual or collective, as they have rights that issue from the individual or the collective labor contract, the conflict of interests always have a collective feature and can take place only at the levels of which, according to the dispositions of art.10 of Law no 130/1996, th ey can sign collective labor contracts (1), a natural correlation because the conflict of interests comes from the misunderstanding between the social partners regarding the collective negotiation of the labor conditions.
Also, the legal dispositions that outline the object of the labor jurisdiction and the ones that define the two great categories of labor conflicts, outline the idea that only the subjective rights conflicts can form causes for solving by the law court, the conflict of interests are solve d after a specific procedure, extra – jurisdictional. Actually, conciliating and mediating don't replace, nor prevent a jurisdictional action, because such an action is impossible. What can be prevented through conciliating (mandatory) or mediation (optional), is the surmount the conflict and degenerate this in extreme forms like a strike. When it comes to the conflict of interests, the doctrine sustains the idea that only the breach of the requests of the laws regarding the specific procedure of certain st eps of conflict of interests can give the right to those who are interested to come before a court.
Also, if the court is approached with a collective conflict (about the execution, completion of the collective labor contract or the ascertainment of thei r nullity) and see that truly the collective labor contract has stopped or is null, but the company refuses to negotiate a new one, that conflict becomes a conflict of interests, that is solved through conciliation, mediation, arbitration. But if, the cour t sees that the collective labor contract is valid, the disagreement between parts are to be solved by justice, it's about a collective conflict of rights, that comes from the execution of a collective labor contract that is valid.
Different of the conflict of interests, the right conflicts can't be solved arbitrary. The conclusion is in harmony with the civil procedure code (art.340) that sets expressly that any patrimonial litigations can be solved through arbitration, except those which the law "doesn't allow deals". The labor code prescribes imperatively that employees can't renounce their rights that are recognized by law, any transaction through which they follow the renouncing or limitation of these rights to be strike by nullity.
About the dispositions of art.38 from the Labor Code there was an exception that was invoked by unconstitutionality. Through the decisions no 494/2004 (2) no 322/2005 (3) and no 356/2005(4), the Constitutional Court has decided for rejecting the unconstitutionality of this legal text sustaining the interdiction to renounce in part or totally for the rights recognized by law, also with the annulling the acts of acceptance of some diminished rights, measures of protection for the employees meant to assure the unguarded exercise of the rights and legitimate interests that belong to them in their labor relationships, to guard them from the abusive consequences from the employer.

3. CONCLUSIONS

The knowledge and the analysis of the two types of work conflict present a special importance mainly because of their practical implications.Therefore, conflict of interests can be set off at the moment of negotiating the union labor contract, at any level that they would be signed (company level, group of companies, branch and at a nati onal level) and is solved through an extra jurisdictional procedure, that means going through different steps: conciliation, as a mandatory step, mediations, arbitrary and strike

as optional steps. Only in the situation in which the legal dispositions are broke referring to the specifically procedures of some of the steps of the conflict of interests, the ones that are interested have the possibility to go to the judicial court.
In the same time, the right conflicts come only when some rights that are legal or contractual, are being broken and they are solved no matter if they are individual or collective, by the judicial courts. Therefore we have the labor jurisdiction and the premises of its organization as a special jurisdiction is in the singularities of the labor judicial relationship and taking into account these singularities, the labor jurisdiction is called to defend the protection function that the directions of labor law.
The labor judicial relationship (individual or collective), are defined as being those socially controlled by law relationships that are between a natural person and a legal person, following a service by the first person for the second one, the second one is obliged to pay the first person and to give them the conditions they need to bring this service. The judicial labor relationship has a personal character (intuitu personae), and making this happen is characterized by a subordination of the one that gives the service and putting them in an organized normative and hierarchic functional system. As a consequence of not respecting the subordination and the reglementation of labor, the law comes in.

4. REFERENCES

1.Athanasiu, Al., Dima, L. *Dreptul muncii (Labor Law)*, Editura All Beck, Bucuresti, 2005, p.317;
2.Decizia Curtii Constitutionale(The Decision of the Constitutional Court) nr. 494/2004 publicată în Monitorul Oficial nr. 59 din 18 ianuarie 2005;
3.Decizia Curtii Constitutionale (The Decision of the Constitutional Court) nr.322/2005, publicată în Monitorul Oficial nr. 702 din 3 august 2005;
4.Decizia Curtii Constitutionale (The Decision of the Constitutional Court) nr. 356/2005, publicată în Monitorul Oficial nr. 825 din 13 septembrie 2005.
5.Dimitriu, R., *Conflictele de muncă şi soluţionarea lor(Labor conflicts and their solving)*, Editor Tribuna Economică, Bucureşti, 2006, pp. 86-92;
6.Dimitriu, R., *Legea privind soluţionarea conflictelor de muncă. Comentarii şi explicaţii (The Law about the solving of labor conflicts. Commentaries and explanations),* Editura C.H.Beck, Bucureşti, 2007, pp.203-204;
7.Gâlcă, C., *Codul muncii (Labor Code)*, Editura C.H. Beck, Bucuresti, 2008, p.652;
8.Ghimpu, S., Ţiclea, Al., *Dreptul muncii(Labor Law)*, Ediţia a II-a, Editura All Beck, Bucureşti, 2001, p.788;
9.Înalta Curte de Casaţie şi Justiţie, Secţia civilă şi de proprietate intelectuală, Decizia nr. 3083 din 18 aprilie 2005;
10.Inalta Curte de Casaţie şi Justiţie, Secţia civilă şi de proprietate intelectuală, Decizia nr. 7 din 2005, p.252;
11.Inalta Curtea de Casaţie şi Justiţie, Secţia civilă şi de proprietate intelectuală, Decizia nr. 585 din 19 ianuarie 2006;
12.Ştefănescu, I., T., *Tratat de dreptul muncii(Treaty of Labor Law)*, vol.I, Editura Lumina Lex, Bucureşti, 2003, p.578;
13.Ştefănescu, I.,T., *Tratat de dreptul muncii (Treaty of Labor Law),* Editura Wolters Kluwer, Bucuresti, 2007, p.719;
14.Ţiclea, Al., *Competenţa soluţionării litigiilor de muncă în cazul funcţionarilor publici*, în Revista română de dreptul muncii nr. 1/2006, p.14;
15.Ţiclea, Al., *Tratat de dreptul muncii (Treaty of Labor Law)*, Editura Universul Juridic, Bucuresti, 2007, p.954;
16.Ţinca, O., *Dreptul muncii. Relaţiile colective (Labor Law. Collective Relationships)*, Editura Lumina Lex, Bucureşti, 2004, pp.188-189;

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

SYNERGETIC –A NEW PARADIGM IN TRAINING OF ENGINEERING DESIGNERS IN CLOTHING INDUSTRY

Victoria Danila[1], Stela Balan [2]

[1] *Technical University of Moldova, Chişinău, Republic of Moldova, e-mail:* victoriavasilecojocari@yahoo.com
[2] *Technical University of Moldova, Chişinău, Republic of Moldova, e-mail:* stela.balan@yahoo.com

Abstract: The paradigm shift in science, Newtonian paradigm shift from the evolutionary paradigm (paradigm synergetic) generally reflects the needs of hu man culture. In this context the important task of the new paradigm is changing ideology to provide a shift in thinking of society in an appropriate manner.

Synergetic paradigm of education chooses to open, direct feedback. Training process, methods of communication and student learning - these are processes of knowledge transfer from one head to another is not broadcasting, education and presentation of truths existing situation is actually searching for information, and seeking their own paths of developm ent and accumulation of knowledge. Synergetic education is education that stimulates the person's own way of development; it can still hidden, but made a direct involvement of the human search for truth.

Key words: Synergy, education, engineering designe rs, clothing industry, system.

1. INTRODUCTION

Synergetic is a metascience was established in 1971; the german physicist H. Haken bring a new scientific guidelines, which is the landmark science momentum towards the new synthesis, a new vision of existence.

Synergetic is defined as combination of several elements to achieve a common purpose or function unit. This concept has its origins in Greek by associating words *syn* (inside or together with) and *ergos* (action).

H. Haken (1977) defines synergetic as "science self organization systems, regardless of their nature based on collaboration, cooperation structural organic components [1].

Haken, first introduced the term synergy to his lectures at the University of Stuttgart in 1969, and so this year can be considered the founding year of synergetic. He chose this term because many scientific names have names of Greek origin. He sought a word that would express such an activity in common, a common power to do anything because the system is self organization and tends to create new structures.

He sought to trigger a new science that would deal with the problems mentioned. Since then, he noticed that there is great similarity between the phenomena that occur in nature and those that occur in society [2].

2. GENERAL INFORMATION ABOUT SYNERGETIC IN EDUCATION

Synergetic can be called also "Complexity theory", promoted by the school in Santa Fe, USA. This term is widespread in synergy as open nonlinear systems mostly consist of several subsystems which self organizing constantly. In literature we can find a clear explanation of the difference between *complexity* and *complicity* system. *Complicity* expresses the degree of structuring system, the variety of items and their numbers. While the *complexity* involve the degree of change over time, the variety

of elements correlations and changing the elements correlations. Prigogine defined complex systems representing the system's ability to change shape and characteristics of the system. While complex systems are those which consist of different components and various subsystems [3].
When Haken formulated the term *"synergy"* he added an explanation - "the science about of interdependence." Haken says that there are several names of this science - *complexity theory, theory self organization*, *imbalance theory,* etc. Haken calls following concepts shown in Figure 1, which represents the synergetic essence [4]:

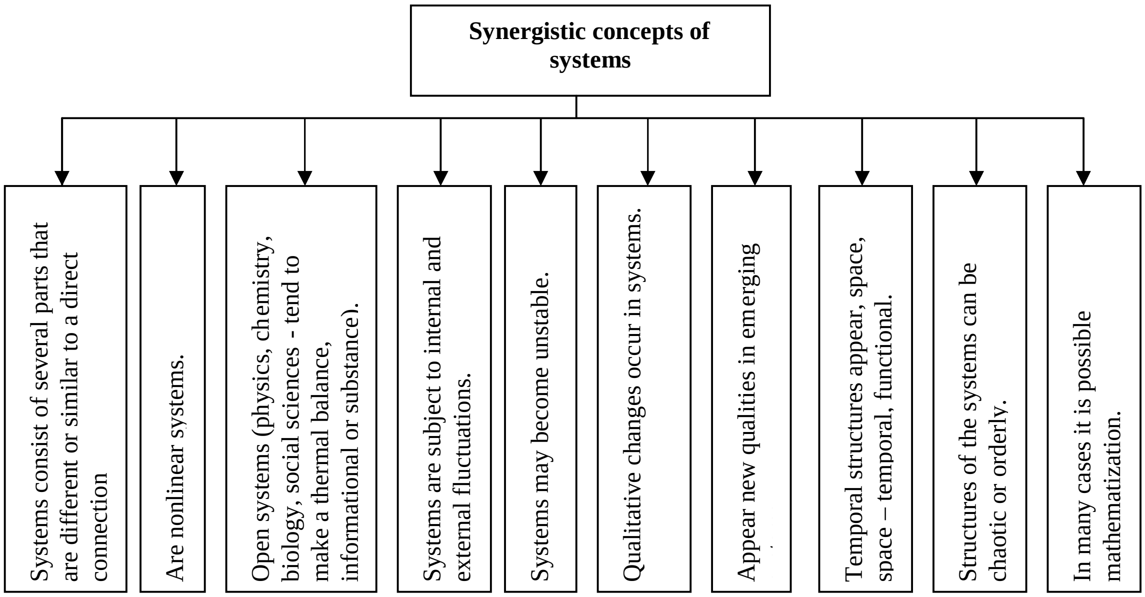


Figure 1. General synergetic concepts after H. Haken

Synergy cooperation of elements is not a mere interaction, but more, it is an interaction toward the target.
To better understand the effect of synergy is necessary to know that it refers to components of working "together at the same time and not one after another but some by others." By synergy whole is more than the sum of [5].
Synergistic, multidisciplinary science captures the interest of both its content and the specific method of approach and analysis. It concerns phenomena occurring in complex systems, open, living world and the specific social systems, which manifest themselves at microscale, the effect of synchronous cooperation, macroscale and the individual components. Dramatic affects on structures resulting efficiency gains these systems.
Inflow of energy or information, due to earlier accumulation causes the shift from an equilibrium characterized microscale a chaotic motion, through a new dynamic equilibrium, with a net efficiency higher.
Therefore, the chaos is order. This effect is specific to self-organization processes of open systems and is highlighted by synergy. A synergy teaching should be the new field ungraded likely to develop a new way of learning based on authentic scientific.
Novelty is determined by the quantity and quality of relations established between components. Not every relationship is organizing, as not every relationship is synergistic. If the system consists of *n* elements which can relate to *m*, then the number of possible relations is equal to how many combinations from *n* taken *m*, i.e. [5]:

$$C_n^m = \frac{n!}{n!(n-m)!} \quad \textbf{(1)}$$

The rapid pace of development of the field is facing a period of "storm and stress", which leaves no time for unifying concepts and implementation of an orderly system for the entire amount of accumulated evidence. Logical development of modern scientific methodology can be presented as follows (Figure 2):

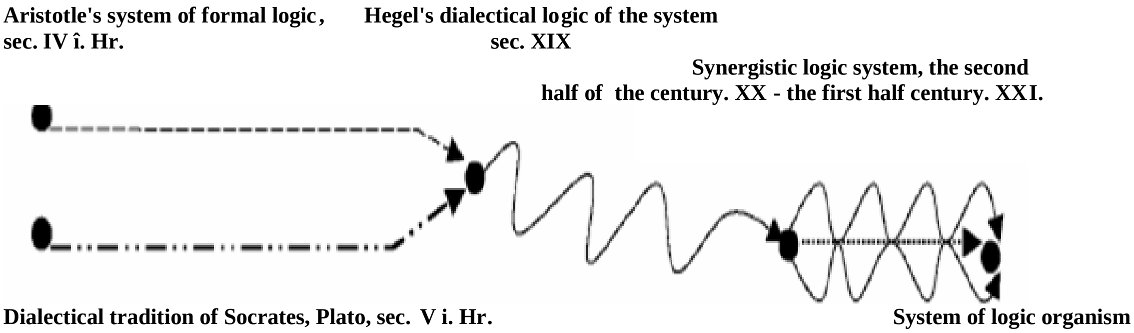


Figure 2. Logical synergy of modern scientific methodology [6]

Synergetic approach and development of information technologies in education of the last decade have covered various fields of science, but at the same time entered in the sphere of human activity, which has a purely applicative.

Synergetic provide general guidance for scientific research, forecasting and modeling complex social systems. A striking representative of such types of systems is education, and training of young professionals in the domain of clothing.

The aims of the integrate system of information technology in education is to improve the system through synergetic, engineers offering a professional skills development through their active involvement in the educational process.

Synergetic is a scientific discipline that examines patterns of system integration processes and self-organization in different systems. The new educational paradigm that provides new concepts and methods can be applied to solving various problems in nontraditional ways.

In all processes under the traditional approach to a model of balance. The synergetic focus areas of instability around the unstable points around the transition phase. This is one of its specific characteristics.

Synergetic has an interdisciplinary language, it highlights common legitimate for any nonlinear system is open in nature or in society. In nature and in society there are lots of systems and phenomena that are virtually impossible to control and organize as in fact they themselves organize themselves as a result of the interdependence of its elements. This was the reason that prompted the German physicist *Hermann Haken* to develop a new science designed to investigate such systems, called *open nonlinear systems*, which have a linear evolution and self organize when there is transition to a new stage of development. "Open systems are irreversible systems, in themselves an important factor is the time" (Figure 3) [7].

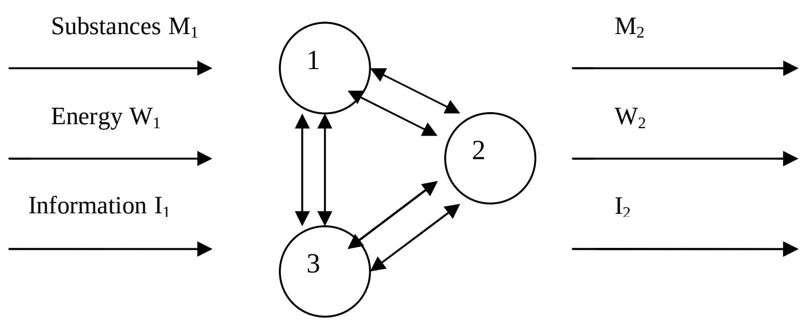


Figure 3. An open system model

The synergy can distinguish two directions - theoretic synergetic and applied synergetic, although this division is conventional enough. Scientists studying a particular practical task from its very synergistic communities frequently propose some new ideas and hypotheses in general, when solving these problems arose. Proposed ideas and assumptions often give an unexpected boost for research in another completely different area, which in fact result in the scientific community there is an exchange of constructive ideas.

Synergetic advocates for attitudes high in knowledge synthesis, exceeding the limits *more* or *less narrow* sciences in each hand, rather it is interested in methodology, the principles of exchangeable in several areas than private investigative methods or techniques. Synergetic as science includes the following contents [8] which are presented in Figure 4:

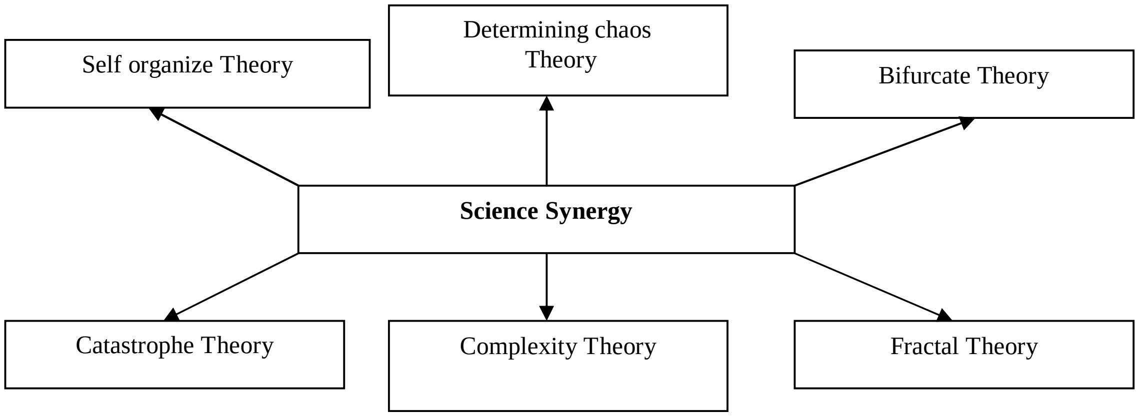


Figure 4. Component elements of synergetic science

Today graduates from higher education institutions are required not only the ability to use the knowledge gained during the study process to resolve certain issues, but re quiring the ability to detect problems and determine their solution methods to acquire new knowledge and skills for life.

3. CONCLUSIONS

Synergetic theory can be used as a new methodological basis for future research, modeling and global development. There is another point of contact between synergy and future. Education, built on principles synergetic is more effective and meet the training requirements and how personal skills training, self education.
To investigate the synergetic approach to knowledge dev elopment methodology lets design and build a training system and methodology, a self-organization, capable of self-development. In terms of the concept of self-organization, teachers need to master different training methods and techniques - a real learning process - are therefore, it must be a situation of choice alternatives. But the complexity, diversity, openness to new information on the perception arsenal methodological knowledge is prerequisites for the emergence and development of training of young specialists.
Synergetic model involves changing role of teachers: the transition to joint action in new situations in a straightforward manner. It involves the study process of irreversible change in the world, is the basis for implementation of education for an open future is a new type of social relationships, which requires mutual assistance, cooperative and creative.
Situation creation jointly developing world, where participants in the educational process are combined into a single structure, which ha s created functional properties oriented learning environment, allow for optimal educational model for each individual.

4. REFERENCES

¶
1. Хакен Г. Тайны природы. Синергетика: учение о взаимодействии. — Москва-Ижевск: Институт компьютерных исследований, 2003. – 320 стр., с. 14.
2. Хакен Г. Синергетика. М.: Мир, 1980.
3. В.И. Аршинов. Синергетика как феномен постнеклассической науки. Москва, 1999. – г. 4.
4. *Синергетическая парадигма: многообразие поисков и подходов*. Прогресс-Традиция. 2000; Концепции современного естествознания. Под ред. В.Н. Лавриненко, В.П. Ратникова. М ., 1997.
5. Ion Mînzat. Psihologia sinergetica (În cautarea umanului pierdut), Bucuresti, Ed. Pro-Humanitate, 1999.
6. Svetlana Zorina–Şişcan. Fundamentarea de noi abordări ale managmentului strategic şi cros-cultural, Autoreferat al tezei de doctorat, Chisinau, 2006.
7. Курдюмов С.П., Синергетика – начало нелинейного мышления. Москва, 1993. – с. 145.
8. Цикин В.А., Брижатый А.В. Синергетика и образование: новые подходы. – Сумы: СумГПУ, 2006. – 276 с.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

ASPECTS REGARDING THE STRUCTURAL AND QUANTITATIVE ANALYSIS OF COMMERCIAL HUMAN RESOURCES INSIDE THE ROMANIAN TEXTILE COMPANIES – A CASE STUDY

Raluca Petronela Lăzărescu

„Gh. Asachi" Technical University of Iasi , ROMANIA

Corresponding author: Lăzărescu Raluca Petronela, rdragoi@tex.tuiasi.ro

Abstract: The paper presents a short analysis regarding the structure and the quantity of the commercial employees working inside the textile companies. Based on this, the author had followed to develop the structure of a small size Romanian textile company, according wit h its particularities on different stages.
Key words: structural and quantitative analysis of commercial human resources, textile company.

1. INTRODUCTION

The number and quality (the level of education and training used properly by the management in ord er to obtain a good company performance) of commercial human resources show the measure of importance regarding the trade activity inside Textile Company.
On such an understanding was established the thematic work, aiming to develop a research in order to emphasize and explain the role of human resources in commercial strategy of the textile company.
The efficiency of organizational structure of the commercial personnel depends by the way the manager think to use and integrate this resource into the globa l objectives of the company at a certain moment.
And more important: in order to accomplish the commercial objectives, the employees must receive tasks and responsibilities according to their competencies and professional preparation.
Inside the Romanian textile companies, the manager is rarely interested by the development of commercial human resources. Most of cases, the manager is oriented to employees working in the production area, because of the internal and external factors in the last decade. Many times, the textile company renounced to the commercial activities, trying to integrate the specialized human resource to other activities. In the last years, the managers of textile companies are struggling to survey, especially those working in the small size firm, because of an inefficient general strategy regarding the trade activity.
Therefore, the professionals in the commercial area of the textile companies are discouraged by the lack of an efficient plan regarding their carrier and future developme nt, and they prefer to work in other industries.
The managers of the Romanian textile companies, facing the realities of the business environment, must rethink the importance of commercial employees and to re -structure the commercial activities in order to be successful in the future.

2. THE STRUCTURAL AND QUANTITATIVE ANALYSIS OF COMMERCIAL HUMAN RESOURCES

The structural process of the commercial employees working in Textile Company involves the following stages:

- To define clearly the business objectives;
- To specify the role of commercial employees in the global activity of the company;
- To identify the tasks that have to be accomplished by the commercial employees;
- To realize the staff allocation for each group of commercial activities;
- To implement an efficient control system regarding the work of commercial human resources.

Usually, the commercial managers allocate staff according to some criteria, such as sales volume, customer groups, and geographical regions, the characteristics of products or pro duct groups. An optimal organizational structure of a company should begin with six criteria: geography; product; market; geography and product; geography and market; geography, product and market.

Analyzing these requirements in terms of a textile busines s, draw the following conclusions:

- the organization of the commercial activity according to the geographical criteri on consists in having an employee for each territorial area who has to reach the responsibilities required by the commercial activity of the company**;**
- the organization according to the product criterion: the textile company markets different products. Such a case of a textile company that manufactures and sales both specific clothing (protective clothing for fire fighters) and other types of c lothing. In this case, it is important for the commercial employees to be specialized in different categories of textile products, in order to satisfy the clients` requirements. In fact, this type of organizational structure is less adopted by the textile company, because it increases the costs with commercial the employees, but it is recommended if the manager desires to improve the relations with clients;
- the organization according to the market criteri on means training the employees according to the clients' needs and the market division. This allows the employees to identify and satisfy better the needs of clients.

Each criterion has both advantages and disadvantages. Therefore, the management of textile companies often uses mixed structures leading to methods such as specialization according to the product – market criteria or specialization according to market criteria (when key accounts can be achieved under different distribution channels or by type of industry the company operates).

The choice of the textile company regarding the organizational structure and the number of commercial employees depends on the factors that can influence it. In a case of a change in the commercial human resources structure must be carefully analyzed, as an important elem ent in the decision process, the measure in which the change can assure an increasing of employees` s productivity.

Regarding the factors influencing the organization of commercial personnel, on the first place is the market. The diversity of customers` needs and motivations, the demands` characteristics and the offer of the textile company require a certain structure of the commercial human resources. For textile companies, the offer have to be appropriate in terms of needs, desire and preferences of the client, therefore it has to divide the market according to the customers.

On the second place**,** equally important, are the development plans of the textile company. Figure 1 presents is a development model for commercial departament of a textile company.

In case of a newly founded company, with fewer employees, the organizational structure will not include commercial manager. In the first stage, the small size textile company will have an owner as manager and few employees working in a production system. The communication is a short and direct one, without any problem of organization. Mostly, small Romanian textile companies prefer to work in a lohn system**.** Companies that make products themselves it sells through its own stores (figure 1) or through other companies stores. In the first case, the company has its own sellers; in the second case, the owner of the other company employs the seller.

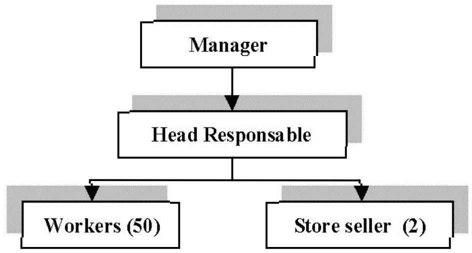


Figure 1: The organizational structure of the textile company – stage 1

On the growth process of the textile company, once the number of the employees working in the production activities increasing, the manager must vision in a strategic manner the development of commercial employees system (figure 2).

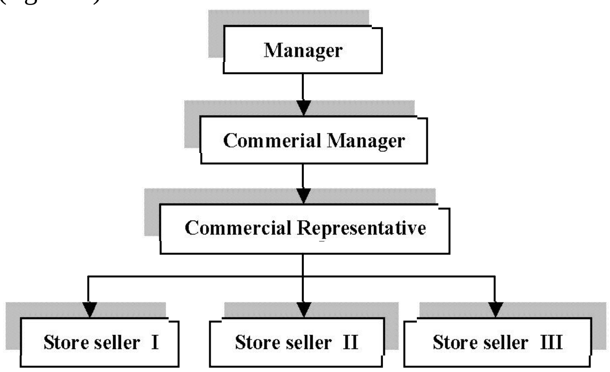


Figure 2: The organizational structure of the textile company – stage 2

The development of the textile company increases, due to an internal expansion and connections with other companies, going to an organizational structure able to handle the new dimension of commercial activity. The number of employees continues to grow, but the rate of growth is to a moderate level. If the commercial strategy of the textile company is to develop trade in other areas of the country, establishment will show as in figure 3:

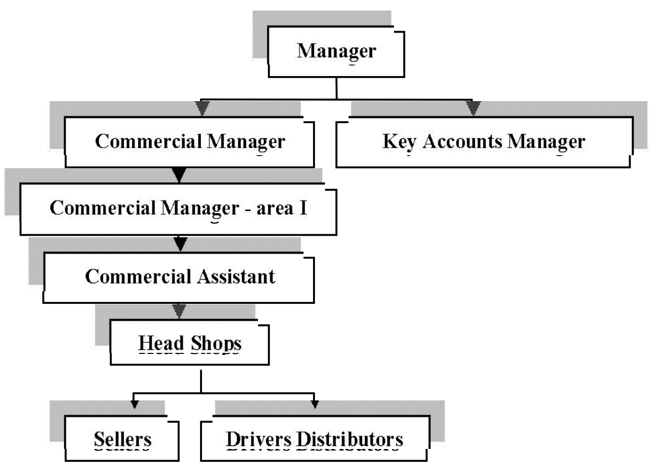


Figure 3: The organizational structure of the textile company – stage 3

Key accounts are the customers that have strategic importance for the textile company and have certain characteristics, such as:

- Represents a substantial part of existing or potential business activities;
- Both companies benefit from maintaining a permanent relationship.

Relations with this category of clients evolve over time, sometimes becoming so complex that requires an adaptation of organizational structure to the needs imposed by this category of customer.

Meantime, the textile company reaches a well-consolidated market position. The growth becomes slow and the costs of sales increase. The textile company can have problems regarding the control process of the commercial activities.
Because of the complexities of commercial activities and attempts to adopt new forms of sales (e.g. e-commerce) and increasing requirements for employee's skills, the managers of textile companies need to initiate training and development plans for the personnel involved in trade.

3. CONCLUSIONS

The correlation between the commercial objectives, employees and the organization of trade activities are essential for the managers of the Romanian textile companies. Therefore, the managers must have efficient strategies to develop the company together with increasing the number of employees, investing in their professional skills. Many times, the managers of the companies decide to extend the commercial activity, neglecting the human resources: they prefer to give more responsibilities and tasks to people, than to hire others. Unfortunately, the consequence is the dissatisfaction of the clients, and later their migration to the competitors.

4. REFERENCES

1. Nicolescu, O., (1999), *Management*, Editura Economică, ISBN 973-590-164-1, Bucureşti.
2. Pânişoară, G., (2004), *Managementul resurselor umane : Ghid practice*, Editura Polirom, ISBN 973-681-779-2, Iasi.
3. Sachelarie, O. M., (1998), *Resursele umane : O provocare pentru managementul contemporan*, Paralela 45, ISBN 973-9291-92-9, Pitesti.
4. Dumitrescu, L., (1998), *Management comercial*, Editura Universităţii "Lucian Blaga"din Sibiu, ISBN 973-9410-54-5, Sibiu.
5. Purcarea, Th., (1994), *Management comercial*, Editura Expert, ISBN 973-96322-5-4, Craiova.
6. Mercioiu, V., Dragusin, M., (1998), *Management comercial*, Editura Economicã, ISBN 9735900602, Bucuresti.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

ASPECTS OF THE URBAN CONCENTRATION OF POPULATION AND ECONOMY

Florica ŞTEFĂNESCU

University of Oradea, Romania

florica_stefanescu@yahoo.com

Abstract: We are currently witnessing a growing concentration of world population in urban areas, simultaneously with the phenomenon of industrialization and development of the tertiary sector. But urbanization, industrialization and modernization are not necessarily synonymous, many specific negative aspects of the urban environment emphasizing in a parallel way with urban congestion. These shortcomings are beginning to be felt by the "city man" who directs the gaze to the periphery of cities or to rural areas, attracted by the green space, less pollution, the restful silence, the possibility of carrying out physical activity, the prospect of better health conditions.
Key words: urbanization, industrialization, modernization, shortcomings.

1. INTRODUCTION

We can wonder if the numerous population in the cities attracted the big economic objectives into cities or these generated urban agglomerations. The city creates expansion as much as expansion creates him, "said Fernand Braudel (1984, p. 264). The phenomenon is analyzed and reviewed by historians and sociologists. K.Marx suggests the concomitance and the interdependence of the economic and demographic aspect in the urbanization process. "The base of any developed division of labor ... is the separation of villages from towns..... The city is the concentration of population, of production tools ... while the village illustrates just the opposite, isolation and fragmentation "(K.Marx, 1972, p. 419).
A similar idea is encountered at Arnold Toynbee, who added the concomitance of the technical progress: "The urban explosion as well as the population explosion, with which it is linked, is a startling and colossal phenomenon ... If the increase of the size of cities, in history, were presented visually as a curve, this curve would have the same configuration as a curve showing the increase of technological potential (A. Toynbee, 1979, p. 15 and 233).
During the pre-modern period, cities have served as fair cities, whose role was primarily commercial and serving a large rural area around them, or as port cities stimulated by international trade. If at that time the cities were just a few and at long distances from each other, after the industrial revolution, cities are becoming more numerous and, in addition, begin to move, filling the fields and pastures in a "march of bricks and mortar "(idem, p. 61).
However, the traditional and the modern cities have much in common. One of these is the high density, in the traditional town (even higher than in the modern one) because of its narrow limits, in the modern one because of the growing number of urban population, generated also by the migration from village to city. Another common aspect is the discomfort caused by the congestion of the static population in the traditional city and the congestion of the commonly used means of transport in the modern one.
The most important consequences of these situations are: physically and mentally tiredness, loss of work hours, loss of rest hours. “Cities are like a power transformer: they make the tensions high, make the exchanges faster, and make the people’s life agitated”(F.Braudel, 1984, p 264).

2. URBAN POPULATION AND ECONOMY

The evolution of the urban and rural population (millions of inhabitants) all around the world, from the beginning of the 19th century and until 2025 is very interesting :

Table 1: The evolution of the urban and rural population (millions of inhabitants)

	Total underdeveloped countries			Total developed countries		
Year	Total	Urban	Rural	Total	Urban	Rural
1800	720	61	659	180	22	158
1900	1100	99	1001	495	148	347
1950	1684	285	1399	832	448	384
1994	4534	1867	2667	1236	910	326
2025	7100	4000	3100	1400	1140	260

Source*:* B. Negoescu and Gh. Vlasceanu, *"Terra, economic geography"*, page. 63

Contemporary urban overcrowding has more than one cause:

- the increase of Earth population; beginning with the 16th century the demographic flare is the main cause of the growth of cities, of the urbanization level "London and Paris lead the movement, but also Naples, privileged for a long time, having 300.000 inhabitants at the end of the 16th century. Paris, being, maybe, reduced to 180.000 inhabitants in 1594 because of the internal French conflicts, doubles its population during Richelieu. Then there are other cities closely following these ones: Madrid, Amsterdam, recently Vienna, Munich, Copenhagen and over all, Sank Petersburg" (F. Braudel, 1984, p. 320). This phenomenon was not even closely known in America where the number of population was still low.

- the emigration of the rural population; in traditional societies, every city, big or small had its own rural area, the villages that were around it, providing the food and also the workforce; many of the village inhabitants know that agriculture does not offer them big perspectives especially in comparison with the industry that assures clearly higher incomes; on the other hand, in the developed countries the high productivity of the agricultural work releases the workforce for nonagricultural activities

- the economic development and the continuous growth of the request for workforce ; One of the city features is "the provision with people, just as indispensable as water for mill wheel" (F. Braudel, 1984, p. 266).

- the mirage of the city as a symbol of civilization; the city takes all the industrial activity, the financial and the banking one, the stocks, the commercial activity and it is also the area where the road, water, drainage and telecommunication infrastructure is developed.

The urbanization process didn't happen at the same rate everywhere in the world, there are areas where the urban population was larger and others with a lower share. Some details in this regard are offered by Braudel for the 16th-17th centuries: England and Germany each had in 1500 10% of the population with residence in cities, while in the Netherlands the proportion of this population reached 51%; in Russia, in 1680, an urban population of only 2,5% was registered. (F.Braudel, 1984, pp. 270 - 271).

And nowadays there are strongly urbanized areas, with a population that exceeds two thirds of the total population (Europe, Latin America and Oceania) but also areas with a lower share, less than one third of the population (Africa, South Asia, East Asia). In the second half of the 20th century, a real urban explosion was registered as well as the proliferation of big cities and of urban agglomerations, large human concentrations with some big attraction spots and many urban centers, larger or smaller, which gravitate around them. The number of cities with over one million inhabitants currently exceeds 300, half of which have at least two million inhabitants.

Table 2: Important metropolitan areas

No. crt.	Metropolitan area	Country	Population (million inhabitants)1995	Population (million inhabitants) 2000
1.	Ciudad de Mexico	Mexico	24,0	27,9
2.	Sao Paulo	Brazil	21,5	25,4
3.	Seoul	South Korea	19,1	22,0
4.	New York	S.U.A.	14,6	14,6
5.	Osaka-Kobe-Kyoto	Japan	14,1	14,3

Source: U.S. Bureau of the Census International Data Base.

The main problems raised by the massive urbanization are:
- the precarious habitation conditions
- the difficult administration of the huge residual quantities
- the deterioration of inter-human relationships
- the loss of cultural feeling, of the traditions, the loss of the cultural diversity
- the increased criminality
- the fast spread of contagious diseases
- the stress on a daily bases
- intense pollution etc.

All these problems affect the 'city man', reason for which he is more and more interested in the periphery or in the rural areas, looking for the open, green and unpolluted spaces, for the peaceful silence, for the opportunity of outdoor activities, seeing in all these a better state of health.
Currently, almost a half of the world's population lives in cities, while in 1900 only 10% represented it. For 2015 it is estimated say that there will be 60 cities with over 5 million inhabitants out of which 4 will be inhabited by over 20 million people.

Table 3: The urban percent of the population in 2005

Places in the world	The urban amount of the population
At a world wide level	49.2
Africa	39.7
Asia	39,9
Europe	73.3
Latin America and the Caribbean	77.6
North America	80.8
Oceania	73.3

Source : 25ème Congrès international de la population, Tours, 18 au 23 juillet 2005, p.24

In a study developed by The General and The Regional Policies Direction of The European Commission and the Eurostat in 258 cities situated in the 27 states of The European Union, materialized in a synthesis report, published in 2007, one could find the state of the European cities, that is some demographical, social, economical, educational, environmental aspects, and others of transports and civic attitude in the European urban area.
Concerning the demographic development, the cities were grouped in three categories (according to the increase of the population between 1996 and 2001): almost 33% of these cities registered an increase of over 0.2% (cities from Spain, Ireland, Finland, Greece, due to the high level of immigration): 33% of the cities registered an increase between -0.2 and 0.2 (a semi stable population from a numerical point of view). The remaining percentage registered a decrease of the population (Central and East European cities). The increase we are talking about happened mostly in the outskirts, and less in central areas. the most interesting case was the one of the cities of Finland, where the population increase outran the national average, the main reason being the powerful development of the economy, mostly in the public utilities.
It didn't happen in the same way with the East and Central European cities, where, even though the economy was developing, the population decreased, because of the birth rate which decreased. Another conclusion of this study relates the demographic problem with the evolution of the cities, saying that the areas that are more dynamic help the increase of the population. Also, there was made a link between the age pyramid and the increase of the population, based on the fact that this increase is bigger in the cities with a young population and with a negative impact in the cities inhabited by elders. Anyway, this has nothing to do with the Central and East European cities and, moreover, in the

Mediterranean cities, the two go hand in hand, that is because the elders retire in these cities with a warm climate.
Economically speaking, the study mentions that the cities are real eng ines when it comes to economic development, saying that big cities (with a population of over 1 million people) reach to a bigger GDP and in the same time having an income with 25% bigger for each person at an European level, an with 40% at a national level. All these occur because of the increase of the population in the urban area, because of the creativity and of the entrepreneurial skills. In what regards the working places in the urban area, it is quite diverse, due to the fact that there are areas wh ere one could find all the public institutions there are to be in a city, and so there is work to do, but there are neighborhoods where one can find the poor, areas that are mostly affected by unemployment.

A big problem is represented by the quality of h uman capital, the level of professional training, considering the demands of economy based on knowledge. On top of all these, we need to add the participation rate of women in the labor market, which is high in the North, East and West of Europe and lower in the South. The most important economic urban district in what concerns the employment of the labor force is the tertiary district in cities like London, Paris, Madrid and Rome, where 80 -90% of the job offers are in the service field.

The study identifies as most important characteristics of urban life:

1. „Work... but not for everyone nor anywhere" (a smaller occupation rate among women, especially in the Southern Europe).
2. „The unemployment rate has the tendency of being higher in towns", being higher than the national mean in 2 out of 3 towns of the urban audit. A high rate of the urban unemployment is recorded in Poland, Belgium and the south of Italy, and a lower one in Holland, Germany and in the north of Italy. „ The unemployment rate varies depending on the district. The study shows the different distribution of unemployment in the same city, a higher incidence of the phenomenon being recorded in the central areas, in comparison with the periferic ones.
3. There are major differences concerning the livin g space on the number of inhabitants, between 40 m^2 in the West of Europe and 15-20m^2 in a number of Eastern countries (p.13).
4. Approximately 77% of the residents of European towns live in apartments, and 50% are the owners of their dwellings., this situa tion being more frequent in the Eastern Europe (due to the privatisations measures, according to the study, but also due to a certain mentality and cultural values, I would say), in Spain and Portugal, respectively at the perifery of the town, rather than in the center.
5. One can notice a tendency of grouping unipersonal families in the center of the towns where most of the services are converged, a fact that suits better the persons who live alone, and of migration of the families with children to the peri fery, where they dispose of more spatious accomodations, and of more green space; also, the elders group in the proximity of boutiques, the transportation means, the health institutions, which facilitate the access to destinations that can satisfy needs, a nd the youngsters are attracted to the loisir infrastructure.
6. The townsmen have a superior education level comparing to the other citizens, this being an important factor of social and economical development, of the sustaining of a society based on knowledge.
7. The health of townsmen is not one of the best, the life expectancy in the audid cities being in average 3 years lower than the European mean, both for men and women , lowering as we move from the West to the East. The main causes of this situations l ie in the lifestyle, the economic concourse and the health services.
8. The townman 's life means more and more time spent in the transportation means; the study emphasizes a major difference between the urban transportation means among the old and the new countries of EU, so between the West and the East of the Europe, concerning the transportation means that are used: in the West one uses mostly cars, in the East, the underground, the train or the bus. (Commission européenne, Direction générale politique régionale, 2007, pp. 13-16).

3. CONCLUSIONS

1. Nowadays we can notice that defining aspects of modernisation, such as the urbanisation and the industrialisation, are disputed and devalued while the village is reconsidered and cherished, under the pressure of environmental problems, the ones concerning sustainable development, ideas that make room in the speciality studies, but also in the political speech and in the media.

2. Moreover, due to the deterioration of the life quality in the urban areas, the rural and its values are rediscovered, giving the right to the nostalgic ones to hope that the rural needs and has to be recovered, in spite of the obvious decline recorded under demographic and economical aspects.

4. REFERENCES

1. Braudel, Fernand, (1984). *Structurile cotidianului*. vol.I-II, Bucuresti: Ed. Meridiane
2. Marx, K., (1972). *Bazele criticii economiei politice*. Bucureşti: Editura politică
3. Negoescu, B., Vlăsceanu, Gh., (1998). *Terra, geografie economică.* Bucuresti: Ed. Teora. Educational
4. Toynbee, A., (1979). *Oraşele în mişcare*. Bucuresti: Ed. Politică
5. ***25ème Congrès international de la population, Tours, 18 au 23 juillet 2005
6. ***Commission européenne, Direction générale politique régionale, 2007

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

THE EVOLUTION OF CONSUMPTION EXPENDITURES FOR THE PURCHASE OF CLOTHING IN THE EUROPEAN UNION COUNTRIES

Simona TRIPA, Viorica BANCIU, Cristiana MARC

University of Oradea, Romania

tripasimona@yahoo.com

Abstract: This paper presents an analysis of the evolution of consumption expenditures for the purchase of clothing in the European Union countries, highlighting the importance of the functions of these products in making purchasing decision.
Key words: clothing, consumption, fashion, price, quality, brand

1. INTRODUCTION

If clothing is not useful and / or did not contribute in any way to our social identity and to the improving of our external appearance, certainly our customers would not invest so much money to purchase these products. Thus expenditures for the purchase of clothing are made because the functions that it fulfills. Therefore, before approaching issues about the evolution of expenditures for the purchase of clothing consumption, we briefly summarized these functions.

Through clothing functions, those roles that play in human life are understood. As a measure of functional perfection of clothing is also its correlation with the consumer's exigencies. Clothing functions are conditioned by the material from which is made by color, shape, design, size, and the destination of clothing.

Clothing functions are divided into two groups: utility and social - aesthetic [4].

- Utility functions depend on the practical use of clothing for the usual clothing they are subdivided into the usual protection functions and practical utility functions. Protective functions are exercised by the fact that clothes protect the person from the negative influences of physical environment (static electricity, dust, hot water etc.) the biological environment (insect bites, rodents, the action of bacteria, fungi, plants, etc.) the physiological-psychological environment (static dynamic, hypo-dynamic, emotional overstressing), natural environment (sunlight, air and soil humidity, wind, etc..) and mechanical injuries (bruises, incisions, etc.). The practical utility f unctions, include specific destination and practical use functions. The destination related function is to ensure, through clothing, the processes for which it is designed, i.e.: work, rest, etc. The i nappropriate clothing for these processes can become the cause of the occurrence of fatigue, worsening health, low labor productivity, etc. The practical function is characteristic for groups of clothing (corsets, bras, etc.) and it is designed to fix certain parts of the body in a well-defined state or to assign a particular form.

- the social - aesthetic functions consist of the spiritual side of clothing, or the quality of clothing to reflect the acquisition of natural and social usefulness, of beauty and perfection, to contain certain information. In this respect, clothing indicates civil/public function (uniforms) or even the rank of a person and not a few human spontaneous gestures and reactions urge us to remember another justification of clothing, the psychological one. A well-dressed person always gives more evidence of safety in movement, feels stronger, more entitled to take collective or individual action. Usually, in addition to all other 'features' which is attributable, clothing amplifies, highlights or creates the illusion of different, harmonic physical properties, can hide some potential, "physical defects" of the individual, while suggesting absent qualities, with its help the human silhouette can recompose indefinitely. All these things bring into debate the aesthetic function of clothi ng [2].

Fashion is one of the social functions of clothing. The consumers use fashionable clothing to identify and distinguish from others, and their public image can be used as sign of affiliation to a group or as a sign of autonomy [1]. This is defined by Solomon and Rabolt as "a form of collective behavior or a social trend" [7] and refers to a "style that is accepted by a large group of people at a time" [7]. Another definition is given by Sproles who considers to be a temporary behavior adopted by most members of a social group under certain circumstances and during certain periods of time [8] To characterize fashion, some authors call for conformity and individuality of human nature (which is reflected perhaps most visible in clothing) [3] and believe they are fundamental in shaping fashion and that without one of them, fashion would not exist [6]. Studies concerning conformity and individuality of fashion dates back more than 100 years and show that fashion history tends to repeat itself, this is reflected in fashion trends, fashion cycles and the effects of social norms on clothing [5].

An example in this respect is the influence of the `20s to current fashion. This year, designers were left influenced by "fashion iconii". The `20s were the years [9]

- Alberta Ferretti, who was closest to the classic Charleston dress, full of fringes made of fluid materials.
- Jil Sander who made the Charleston dress futuristic. He took the classic model and led it to extreme basics. Thus the fringe patterns came to the bare earth and with cutting ups that uncovered the body very much.
- Elie Saab not only used the fringes but also the oversized flounces that make one think about the fashion the `20s.
- Gaspard Yurkievich made a mix of the fashion of the `20s and the one of the current year. He took only a few representative elements for that time and combined them with current fashion pieces such as the jacket or sports shirts with a V low-necked. However, he was the only one who has kept an extremely common accessory in the `20s fashion, which is the bandana.

2. THE EVOLUTION OF CONSUMPTION EXPENDITURE FOR THE PURCHASE OF CLOTHING

Whatever the definition given to fashion, through the trends imposed by it, it directly influences the purchasing decision of products, especially those in the clothing category. Obviously the decision to purchase compete with other factors such as income levels, product prices, their quality, buyer’s type oh household, buyer age, residence, etc.

The analysis of annual expenditure regarding clothing and footwear revealed that they were on average 800 per person in EU-27 in 2006, with values ranging from 100 EUR per person in Romania 1200 EUR per person in Italy. For most EU member states, the average expenditure in 2006 has not changed much compared to 2000. The most significant change is registered in Lithuania, where the growth is from 100 per person, to 400 per person. Other increases, but lower (i.e. 200 euros) were registered in Estonia, Greece and Finland.

Table 1. – The Evolution of a household's annual expenditure, on clothing and footwear – in current prices

	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
UE-27 Countries	**600**	**600**	**700**	**700**	**700**	**700**	**700**	**700**	**700**	**800**	**:**	**:**
Belgium	700	700	700	700	700	700	700	800	800	800	900	:
Bulgaria	0	0	100	0	100	100	100	100	100	:	:	:
Czech Republic	100	100	200	200	200	200	200	200	200	300	300	:
Denmark	700	800	800	800	800	800	800	800	900	900	1000	900
Germany	800	800	800	800	900	800	800	800	800	800	800	:
Estonia	100	200	200	200	200	200	300	300	300	400	500	:
Ireland	700	700	800	900	900	900	800	800	900	900	900	:
Greece	:	:	:	600	600	700	800	800	900	900	1000	:

Spain	500	500	600	600	600	600	600	700	700	700	800	:
France	700	700	700	700	700	700	700	700	700	700	800	700
Italy	1000	1100	1100	1100	1200	1200	1200	1200	1200	1200	1200	:
Cyprus	700	700	800	800	900	900	800	800	900	900	900	1000
Latvia	100	100	100	200	200	200	200	200	200	300	500	:
Lithuania	100	100	100	100	200	200	200	200	300	400	400	:
Luxemburg	1000	1000	1000	1100	1100	1100	1100	1100	1100	1100	1100	:
Hungary	100	100	100	100	100	200	200	200	200	200	200	200
Malta	400	400	500	500	500	500	500	500	500	400	400	400
Netherlands	700	700	800	800	800	800	800	800	800	800	900	:
Austria	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1100	:
Poland	100	100	100	200	200	200	200	200	200	200	:	:
Portugal	500	600	600	600	600	700	600	600	700	700	:	:
Romania	**:**	**:**	**0**	**0**	**100**	**100**	**100**	**100**	**100**	**100**	**:**	**:**
Slovenia	300	300	400	400	400	400	500	500	500	500	500	:
Slovakia	100	100	100	100	100	100	100	100	200	200	:	:
Finland	500	500	600	600	600	600	700	700	700	800	800	800
Sweden	500	500	600	700	600	700	700	700	700	800	800	:
Great Britain	800	800	900	1000	1000	1000	1000	1000	1100	1100	1100	900

Source:
http://epp.eurostat.ec.europa.eu/portal/page/portal/living_conditions_and_social_protection/data/database ,
accesed in 23.08.2009

A breakdown of household consumption expenditure for the purchase of clothing and footwear reveals some significant changes in terms regarding the amounts spent and the volume of components purchased in the period 2000 - 2006 (see Figure 1). The volume of clothing and footwear bought increased mostly in the member states. There is a growth in Estonia, with 106.4%, followed by Britain and the Czech Republic, countries where the volume increased by approximately 50%. There are states where there have been decreases in the volume of clothing and footwear bought, they are in decreasing line: Italy, Turkey and Germany.

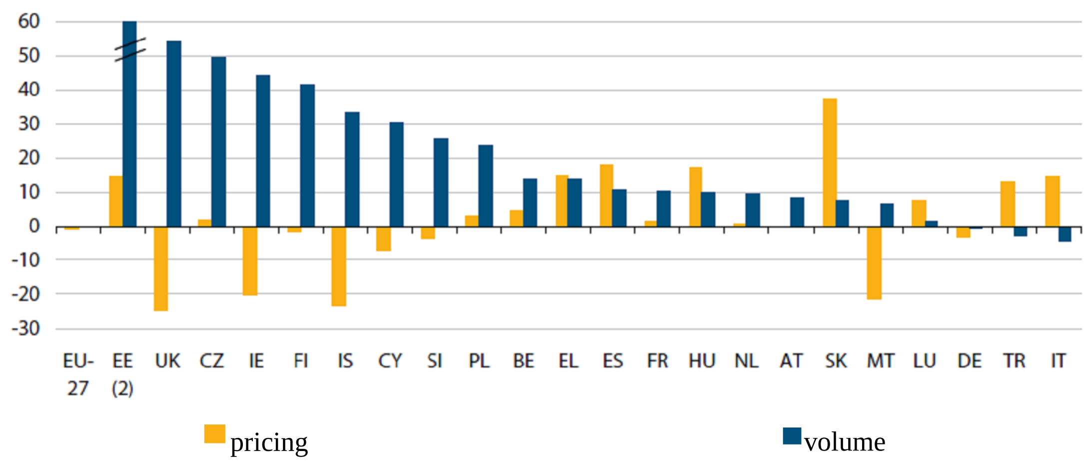


Figure 1. – The household consumption expenditure for the purchase of clothing and footwear: changes in prices and volumes purchased from 2006 to 2000

Source: ****Consumers in Europe*, Office for Official Publications of the European Communities, 2009, p. 182

In terms of money spent, the biggest decrease was registered in the UK and Malta (20% and 25%). In contrast, growth, between 2000 and 2006 were registered in Estonia, Greec e, Italy, Hungary and Spain (between 14% and 18%), the largest increase was in Slovakia (37%). This development is due to lower prices of clothing, so with less money, there have been purchased larger volumes of products and because the fact that in recent years there have been important changes in consumer demand, respectively that they are more interested in cheaper products in detrimental to the expensive ones.

3. CONCLUSIONS

In 2006 compared to 2000, the expenditure allocated to the purchase of cloth ing products as a percentage of the total annual expenditure of households, remained generally at the same level.
In most EU member states there were acquired during the period analyzed, larger volumes of products in some countries with more money, in othe rs with less. One country which makes an exception to this trend is Italy, where the volume acquired fell over 5%, while expenditure increased by about 15%, which shows that in this country clothing product price rose during the analyzed period. In contrast, in countries which have bought large volumes with less money shows that the low price of these products decreased, an example being the United Kingdom where, in 2006, a product volume was purchased by 50% higher than in 2000, and their cost was 25% lowe r.
The examples presented highlight and consumer preferences, respectively that the Italians are still willing to pay significant sums for items of clothing, lead us to think of products in fashion, with brand, personalized, etc. while in UK consumers pref er cheaper products.

4. REFERENCES:

1. Banister, E.N., Hogg, M.K., (2004) *Negative symbolic consumption and consumers' drive for self-esteem: the case of the fashion ind ustry*, European Journal of Marketing, Vol. 38, No. 7, pp. 850-868
2. Durbacă, Nuţa and colab., (2008) *Elemente de estetică şi psihofiziologie a vestimentaţiei* , Buletinul AGIR nr. 4/2008, octombrie-decembrie, pp. 99-105
3. Hawkes, J., (1994) *Second Skin, New Directions*, New York, NY
4. Mitu, S., Mitu, M., (1998) *Bazele tehnologiei confecţiilor textile*, vol.I, Ed. "Gh. Asachi", Iaşi, p. 9
5. Piamphongsant, T., Mandhachitara, R., (2008) *Psychological antecedents of career women's fashion clothing conformity*, Journal of Fashion Marketing and Management, Vol. 12, No. 4, pp. 438-55
6. Simmel, G., *Fashion*, (1957) American Journal of Sociology, Vol. 62 , p. 546
7. Solomon, M.R., Rabolt, N.J., (2004) *Consumer Behavior in Fashion*, Prentice-Hall, Englewood Cliffs, NJ., p. 6, 19
8. Sproles, G.B., (1979) *Fashion: Consumer Behavior Toward Dre ss*, Burgess, Minneapolis, MN
9. Zidaru, Oana, *Lasă-te inspirată de moda anilor 20!*, 04/05/2009, http://www.divahair.ro/moda/moda/lasa-te_inspirata_de_moda_anilor_20!, accesed in 2.11.2009
10. ****Consumers in Europe*, (2009) Office for Official Publications of the European Communities , p. 182
11. http://epp.eurostat.ec.europa.eu/portal/page/portal/living_conditions_and_social_protection/data/database, accesed in 23.08.2009

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

YELLOWING OF TEXTILES

Abu Sayeed Md. ATIQUZZAMAN[1], Dr. Engr. Md. Nazirul ISLAM[2]

[1] *DTT, Ahsanullah University of Science & Technology, Dhaka, Ban gladesh*
[2] *JRK Colour & Chemicals Ind. (BD) Ltd. (Nanochem), Dhaka, Bangladesh*

Corresponding author: Abu Sayeed Atiquizzman

Abstract: The yellowing of white and pastel colored textiles and garments has been a problem for many years in the textile industry. There are numerous causes that can attribute to yellowing of textiles; the major causes have been clarified in this work. Most common causes are aging, over heating, interaction between dyes/chemicals/residues and atmospheric pollutant like nitrogen o xide, ozone, sulfur dioxide, hydrogen sulfide etc., use of phenolic antioxidant in associated products used in textile and garments industries, presence of chlorine in process water or in domestic washing, contamination by the end -users, ionic interaction of different chemicals etc. The present study conspicuously reveals that the yellowness of textiles could be avoided in lesser to higher extent by taking a series of special measures starting from fiber production up to the level of end -uses. Nonetheless, the complete prevention or removal of yellowness of textiles can't be assured.
Key words: yellowing, white and pastel colored textiles, garments .

1 INTRODUCTION

Yellowing behavior of textiles is one of the oldest and common quality problems usually found in white and pastel shades as the yellowness, which appears on fabric is of very low intensity (see illustration 1). As the name implies, Yellowing of textiles is the yellow discoloration of textiles that can develop during processing, usage or storage. Ap art from the frequent attack on white or pastel shades, dark shades are also affected, which becomes duller in appearance.

Figure 1. Yellowing of Textiles

As the literature goes, yellowness has been found to be encountered in all most all types of text ile materials including those made from natural fibers such as cotton, wool or silk, as well as those composed of synthetic fibers such as polyester, nylon, or spandex. It should also be noted that in the cases of blended fabrics, at times only one fiber i n the blend may be affected and at other times several or all fibers in the blend are affected by the yellowing. Fabric yellowing can occur in either of the following ways:

- by color break down
- by chemical destruction

- by topographical change
- by fiber degradation

Additionally, some fabric fibers as well as dyes are susceptible to aging discoloration when exposed to light and/or oxygen. Such discoloration is irreversible. Some fabrics discolor because they stained with a material that can be bleached out and /or washed away by detergents. Some such stains (like those produced as a result of the iron content in water) are not removable. The textile finishing chemicals presently available are more numerous and chemically complex than ever before. They often show yellowing tendencies as they are aged or are subjected to improper storage and cleaning techniques. Besides, it has been reported that the high concentration of various atmospheric pollutants present today in many parts of the world resulting from a variety of industrial and natural effluents are the major reason for the substantial increase of fabric yellowing.

2 CAUSES OF YELLOWING

In recent years even today, the various causes of these yellowing issues have been studied extensively with the subsequent publication of numerous technical papers and reports. As a general statement, yellowing of textile materials is an indication of unanticipated chemical degradation. Very often, as colorless chemicals decompose, they form light to moderate yellowish colors. Of course, if this chemical is a textile finish or additive or has been absorbed by a textile product, this color formation is noted as fabric or garment yellowing. It should also be noted that continued chemical decomposition could form moderate to dark brown colors or, in some extreme cases, even black colors. However, the causes can be grouped into the following broad categories with the understanding that there can be crossover or combinations of causes that yield observed fabric yellowing. These are certainly not a totally complete listing of all the potential causes of textile yellowing but it does cover the major sources indicated in the technical and trade literatures.

2.1 Fiber Degradation

Destruction, decomposition, internal change of the fiber structure due to chemical or biological degradation, exposure to excessive heat, intensive or long term exposure to light radiation and/or fiber aging are all primary causes of fabric yellowing.

2.2 Chemical Additives or Auxiliaries

It is well known that the overuse or misuse of chemical finishes such as softeners, lubricating agents, resins, optical brightening agents, or metallic salts can lead to unwanted fabric color change including fabric yellowing.

2.2.1 Fabric softener

Among all other fabric softeners, mainly cationic softener and amino modifies silicones are responsible for fabric yellowing.

i. Cationic softener- cationic softeners have poor resistance to yellowing [1,2], which is chiefly associated with the amines (primary, secondary and tertiary) with free hydrogen attached to nitrogen atom [3].
ii. Amino silicones- the higher the amine content, the better is the softness. But higher the amine content also means more yellowing. The amine content of a silicone is expressed by the amine value and can be calculated from the given nitrogen content of the polymer.

$$\textit{Amine content} = N_2\ \textit{content}\ x\ (56.1\ /1.4)$$

Both these softeners generally contain primary, secondary or tertiary amines and sometimes amides also. These groups are characterized with the presence of ‘H’ atoms attached to ‘N’ atom. The former is susceptible to substitution and can be replaced by chlorine and form chloramines (illustration 2). Chloramines being yellow in color impart yellowness to the fabric. Nowadays the domestic detergents contain chlorine bleaches; chlorine is also used as a disinfectant in household and industrial process water, in swimming pools and in some medical. So, with each domestic wash increase the tendency of yellowing.

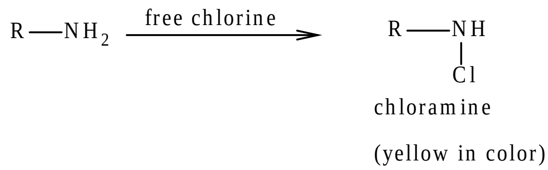


Figure 2: Formation of chloramines

Also all these nitrogen-based groups (amines or amides) can very well be oxidized to nitrogen oxides if the finished fabric is over heated (temperature over 140 to 150°C) [4]. Even during normal drying of the fabric/garment these groups can be oxidized and produce different oxides of nitrogen. Nitrogen oxides are brownish in color and at very low concentration they look like yellow (see illustration 3).

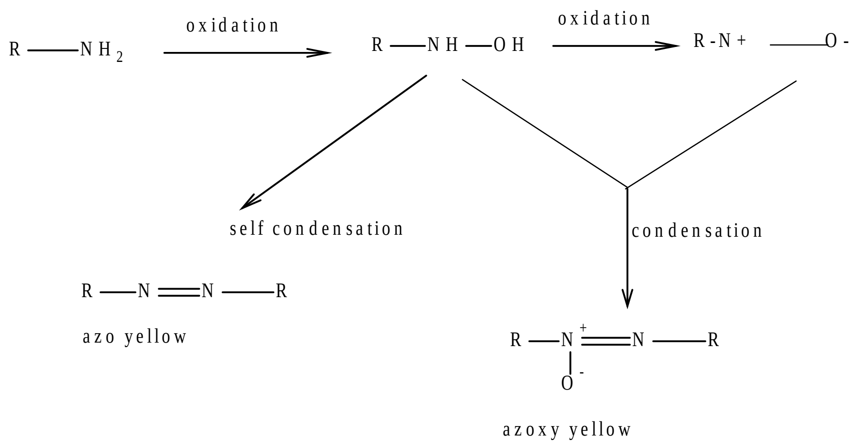


Figure 3. Mechanism of thermo yellowing

2.2.2. Lubricating agents

Any type of lubricating ager nents which is not applied correctly or that is sensitive to storage conditions, environmental conditions, heat, biological attack or chemical environment has the potential to yellow the textile fabric [5]. Industrially applied chemicals such as fiber finishes, yarn lubricants, knitting oils, warp sizes, and many other lubricating agents used combined with other finishing chemicals fall into this category.

2.2.3 Resins

Chlorine in textile process waters has been called the "unseen assailant" and is a common source for fabric yellowing. Chlorine is retained from process or wash water by many textile resin finishes used for cotton, rayon, or lyocell, slowly building over time to finally yellow and weaken the fabric s

2.2.4 Optical brighteners

Different brighteners are used for different types of fabrics. Some of these agents are sensitive in alkaline pH and some are in acidic pH, aging, atmospheric pollutant or excessive heat and may break down and lose their whitening power, so that the fabric reverts to a yellowish or grayish appearance [6]. Some fabric may take on a pinkish or greenish blue depending on the nature and type of brightener used.

2.2.5 Ferric ions

Ferric ions present either in treatment bath or in the cotton fabric itself may cause yellowing effect.

2.3 Atmospheric Pollutants

Studies have shown that one of the most potent agents for causing yellowing comes from atmospheric pollution (from both natural and man-made sources). The single biggest source of yellowing has been identified as oxides of nitrogen. For example, these oxides are formed by the action of lightning in the atmosphere. Man-made sources include the burning of gasoline and diesel fuel in tow motors, automobiles, trucks and trains, gas- and oil-fired heating systems, and various types of industrial and commercial processes. The most prevalent pollutant, nitrogen dioxide, may react with small amounts of chemical residues, oils or greases on the fabric surface. High concentration of nitrogen dioxide has been shown to yellow nylon fiber directly.

Other gaseous pollutants shown to induce fabric yellowing include sulfur dioxide, hydrogen sulfide, and ozone. It must be emphasized that fabric yellowing in the presence of these atmospheric contaminants is usually the result of a chemical interaction between the specific pollutant and some chemical components on or near the fabric surface.
The polluting gases present in the air can destroy indigo. The air, especially of large cities, is polluted with ozone, (O_3), which is a very powerful oxidizing agent. Ozone, in presence of sunlight, when comes in contact with indigo generates free radicals. The free radicals decompose indigo into an oxidized product called as Isatin (see illustration 4)[7]. It is yellowish in color and hence imparts yellowness to the textiles.

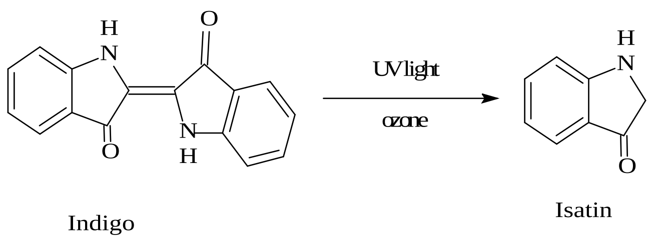


Figure 4. Mechanism of denim yellowing

2.4 Warehouse Yellowing (Phenolic Yellowing)

A commonly occurring problem encountered in the garment retail shops is yellowing that typically takes the form of bright yellow patches or bands on the folded edges of garments stored for long periods in cardboard boxes.; It can also occur on other substrates and in other modes of storage not associated with cardboard. It is caused by the interaction of atmospheric n itrogen oxides with certain phenolic substances present in, for example, storage materials. The resulting compounds, which are nitrated phenols, which are colourless in acid media but yellow in alkaline (see illustration 5)[4]; can sublime in the acid form and migrate at room temperature through protective plastic films, to be fixed in the yellow, alkaline form on fabric., or on other substrates contaminated by alkaline residues. Yellowing of textiles is very often a result of the presence of phenol -based antioxidants (BHT - butylated hydroxy toluene derivatives)[8].

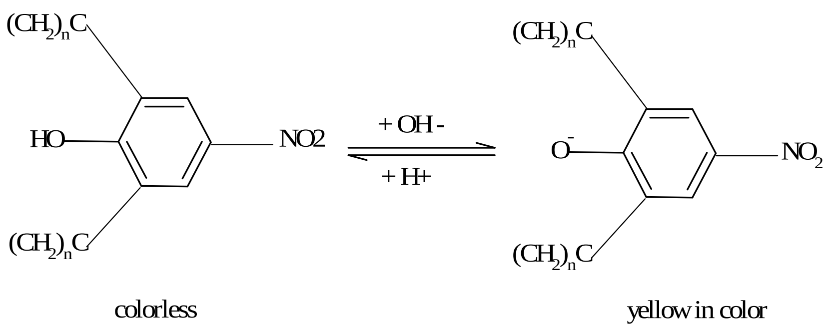


Figure 5. Mechanism of warehouse yellowing

The effect is often observed in areas of the garment directly under parts of the packaging material that have been sealed with adhesive tape or adhesive strips. The solvent in the adhesive can leach the BHT out of the packaging film and set onto the garment that leads to yellowing.
For instance, these phenolic antioxidants have been found to be in polyethylene wrap and bags , cardboard, brown paper, and other wrapping and packaging materials. In textile processing, these antioxidants have been used as additives in the fiber extrusion process, as fiber finish additives, as preservatives in textile softeners, coning oils, knitt ing lubricants, and various other textile finishes. In the cut and sew industry, these phenolic antioxidants have been found in foam paddings, interlinings, fabric adhesives, and stitch lubricants. Obviously, to prevent this type of fabric yellowing, mater ials should be chosen which do not contain these phenolic antioxidants. However, because of the widespread use of these compounds in many necessary textile auxiliaries and supplies, it becomes difficult to completely eliminate these antioxidants from all p otential exposure scenarios. Therefore, to

minimize yellowing in storage, warehouse areas should be well ventilated to remove nitrogen dioxide and temperature controlled.

2.5 Consumer contaminants

In many times, fabric yellowing can be directly attributed to the actions of the consumer. For instance, fabric yellowing can occur by the improper cleaning and removal of body lotions, perfume and cologne, hair spray, make-up, perspiration, and other oily dirt absorbed into the fabric or garments through normal use. In many cases, such as around collars or underarms of blouses or shirts, the contaminants which lead to fabric yellowing slowly build-up over time until they reach a point where the garment appearance and performance is negatively affected.

The textile consumer can contribute to fabric yellowing in other ways. The particular choice and use of detergents and fabric softeners can be a factor. Over-drying of laundered garments can lead to yellowing. Exposure of textile fabrics to smoke and soot from fi replaces, pipes, cigars, cigarettes, and improperly maintained gas- and oil-fired furnaces within the household can all contribute to fabric yellowing. In commercial laundering, overuse of starch or hot pressing garments containing too much alkali can lead directly to yellowing.

3 SUGGESTED REMEDIES

The following is a general but not complete list of measures to take on to minimize yellowing of textile fabrics:

- Use of nonionic or anti ozone softeners instead of cationic softener, as they impart less yellowing to textiles.
- In case of amino silicone, one should limit the amine value between 10 -20 for non-yellowing behavior.
- Use of chemical finishing agents which do not contain phenolic-based antioxidants and preservatives and also have minimal affinity for volatile phenol compounds.
- Minimum amounts of softeners, particularly cationics, should be used since they may intensify yellowing by attracting dirt and oils and by storing phenolic compounds.
- Maintain a slightly acidic pH of around pH 6 or below for the finished fabric with a non-volatile acid.
- If possible use of packaging and wrapping materials and boxes free from phenolic antioxidants. Use of gas impermeable wrapping films.
- Avoiding textiles to exposure to oxides of nitrogen pollution.
- Avoiding the use of vehicles powered with internal-combustion engines in warehouses, storage areas, and processing facilities.
- Safely removal of harmful gases, maintain good ventilation in storage areas, and processing houses.
- Ensuring that garment components such as shoulder pads or interlinings do not contain phenolic compounds, which have a tendency to yellow.

4 CONCLUDING REMARKS

As it is revealed from this study, there are a wide variety of causes for yellowing of textiles and garments. The following four kinds of yellowing are, however, the common phenomena and of substantial importance:

- Yellowing by oxides of nitrogen. It may react with dyes, chemicals residue, oils, grease and impart yellowness to textiles.
- Presence of phenolic antioxidant especially BHT in packaging.
- Yellowing of the softener used (depending on the amino content). This can happen during processing or at consumer end, while they are hot ironing or laundering.
- Fading of optical brightening agents. Ionic Interaction of anionic brightener with cationic softener or sensitivity towards acid/alkali can deteriorate the brightener.

5. REFERENCES

1. Tomasino, C. (1992). *Chemistry & Technology of Fabric Preparation & Finishing* , pp.143
2. Thangavelu, R.K.(2003). *Effect of Non-Visual Stimulus on Color Perception*, Thesis work, North Carolina State University, pp. 21
3. Shenai, V.A., *Technology of Textile Processing* , Vol. VIII, 129
4. Zyschka, R.(2001). *Textile softeners and their tricky application* , Melliand Int, Vol.7, pp 249-251
5. Y. Chi, S., Obendorf, S. K.(1998). *Aging of oily soils on textile materials*, Journal of Surfactants and Detergents, Vol.1, No.3, July 1998.
6. Hall, A.J.(1966). *Textile Finishing*, 3rd edition, pp 58-60
7. Zytex News, Vol.1, Issue 2, Sept-Nov' 2001, 2
8. Bangee, O. D., Wilson, V. H., East, Holmei, G. C. (1995). *Antioxidant-induced yellowing of textiles*, Polymer Degradation and Stability, Vol.50, pp.313-317.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

PVC NANOFIBER MEMBRANES WITH ANTIMICROBIAL ACTIVITY

T. Bălău Mîndru[1], I. Bălău Mindru[1], V. Tura[2], I. Bucişcanu[1]

[1]*Technical University "Gh. Asachi", Jassy, ROUMANIA*

[2] *"Al. I. Cuza"University, Jassy, ROUMANIA*

Corresponding author: Tudorel Bălău Mîndru, tbalau@yahoo.co.uk

Abstract: In this paper we investigated the use of poly(vinylchloride) as a material for nanofibers preparation, considering its advantages: PVC nanofibrils have a small fiber diameter, are extremely porous, and have a high specific surface area, exhibiting a better reactivity. In this study we obtained PVC nanofibers with silver ion nanoparticles with antimicrobial activity for filtering and purification. The mats structure and morphology were characterized by Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM); bactericidal activity was also analyzed.

Key words: PVC nanofiber, antimicrobial activity; silver nanoparticles.

1. INTRODUCTION

Fibers in the submicron range, in comparison with larger ones, are well known to provide better efficiency for a wide variety of applications, including filtration, membranes, reinforcing fibers in composite materials, biomedical devices, and scaffolds for tissue engineering. Electrospun nanofibers, with fiber diameters of 0.25 microns (5-10 times smaller than the smallest meltblown fibers available) have been used in industrial, consumer and air streams and liquid streams filtration applications for more than twenty years. By choosing suitable polymers and solvent systems, nanofibers with diameters in the range of 40-2000 nm can be made. Nonwoven mats composed of electrospun fibers have a large surface area per unit mass and a small pore size [4, 5].

Polymeric nanofibers can be made using the electrospinning process, which has been described in the literature [1] and in patents [2]. Electrospinning uses an electric field to draw a polymer solution from the tip of a capillary to a collector. A voltage is applied to the polymer solution, which causes a jet of the solution to be drawn toward a grounded collector. The fine jets dry to form polymeric fibers, which can be collected on a web (sometimes called a nanoweb). The electrospinning process has been documented using a variety of polymers [3].

Nanofibers provide dramatic increase in filtration efficiency at relatively small decrease in permeability. In many laboratory tests and actual operating environments, nanofiber filter media also demonstrate improved filter life and more contaminant holding capacity. Nanofiber filter media have enabled new levels of filtration performance in several diverse applications with a broad range of environments and contaminants.

The benefit of achieving better filter efficiency accelerates when fiber sizes are less than 0.5 microns (small fiber sizes such as those of 0.2 to 0.3 micron diameter are highly desired for filtration applications).

Due to small diameters, PVC nanofibers are extremely porous, and have a high surface area [3].

In this study we have obtained PVC nanofibers with silver ion nanoparticles with antimicrobial activity for filtering and purification. Silver, a non-toxic metal with antimicrobial properties, was extensively studied in various fields like antimicrobial filters, air filtration, water disinfection, sensors, chemical and gas filtration, wound dressing material, protective cloth, etc.

The electrostatic interaction between the negatively charged bacterial cells and positively charged nanoparticles is very important for antimicrobial activity of the bactericidal material [4]. If the bacterial effect on microorganisms is well known, the action mechanism is not completely understood [5]. The silver cation, Ag^+ is a potent antimicrobial agent, as it binds to and damages the bacterial cells at multiple sites. For example, when Ag^+ binds to proteins in the cell wall, the wall ruptures and the internal cell content leaks out, resulting in the death of the bacterial cell. The antibacterial efficacy increases with the decrease of silver particle size.

To evaluate antibacterial efficiency and stability, the specimens were obtained by physical blending of a polymer with metal nanoparticles .The silver ions are reduced into silver nanoparticles by N,N-dimethylformamide (DMF) at room temperature; [6,7] After electrospinning, UV-irradiation stimulates the formation of silver nanoparticles that are homogenously dispersed. Silver nanoparticles are good antimicrobial agents against E. coli [8]. Further we have tested the antimicrobial activity against gram-negative bacteria-E.coli. Preliminary results are given which provide a platform to promote the nanofibers as an antimicrobial filter.

2. MATERIALS AND METHODS

2.1 Materials

Poly (vinyl chloride) polymer (bulk density 1.385, Mw 99,000); Metallic Ag; Solvents: DMF, acetone; Agar and LB Broth Lennox, E. coli ATCC 25922.

2.2. Methods

Preparation of functionalized nanofibers. For the obtaining of the homogeneous dispersion of silver nanoparticles, metallic Ag (3 %) was dissolved by ultrasonication in the DMF bath, for 30 min at 600W. For the PVC precursor preparation 7 %, respectively 8 % of PVC was dissolved in the metallic Ag-DMF solution, by magnetic stirring for 2 h at room temperature. The solutions were kept at room temperature for 48 h at dark, observing their color change in time (from colorless to yellow–brown signifying the slow formation of silver nanoparticles).

Electrospinning was conducted on a plate onto which the aluminium sheet was wrapped around. The silver containing the polymer solution was loaded in a syringe. A positive voltage of 19 kV was applied at the needle tip with respect to a grounded metal collector, which was placed at 15 cm from the spinning nozzle. Subsequently, these nanofibers were irradiated in UV light (600 W) in order to increase the number of silver nanoparticles on the surface [15]. The irradiation time (15 min) for UV-irradiation used in the present work for PVC was enough to induce good antimicrobial activity.

The presence of silver nanoparticles was determined using a Vega Tescan scanning electron microscope.

The experiment was completed using gram-negative bacteria (E. coli ATCC 25922) for testing the antimicrobial activity. The nanofibers (without Ag^+) were used as etalon and nanofibers with Ag before and after UV-irradiation were used as a test sample.

Inhibition Zone. For inhibition zone test, nutrient agar was poured onto sterilized Petri dishes and was allowed to solidify; then 100 mL of E. coli was streaked over the plate and spread uniformly. The control and the test samples were placed over the solidified agar gel in the Petri dishes. Plates were incubated at 37^{o}C for 12 h for the bacterial strains.

Antibacterial Test. 5 mL of sterilized LB broth was measured into sterile tubes. The nanofibers (with 3% of Ag) before and after UV-irradiation and the nanofibers without Ag as control were introduced into the LB broth solution, which contains $1x10^5$ colony forming units (CFU) of E. coli. The mixtures were cultured at 37^{o}C in a shaking incubator (at 250 rpm) for overnight. Then the numbers of bacterial colonies (CFU) were counted to estimate the antimicrobial effect.

3. RESULTS AND DISCUSSION

The FTIR spectra obtained for PVC nanofibers are shown in the Figure 1. The SEM images in Figure 3(b) show clearly the formation of silver nanoparticles after UV irradiation proving that DMF successfully reduced the Ag^+ ions to silver nanoparticles. In the process, DMF was used as a solvent and powerful reducing agent for silver ions. As the reaction proceeds, the solution color shifts from light yellow to dark brown, demonstrating the reducing action of DMF. In the present work we observed that UV irradiation for 10 min. determined an almost uniform size of silver nanoparticles .

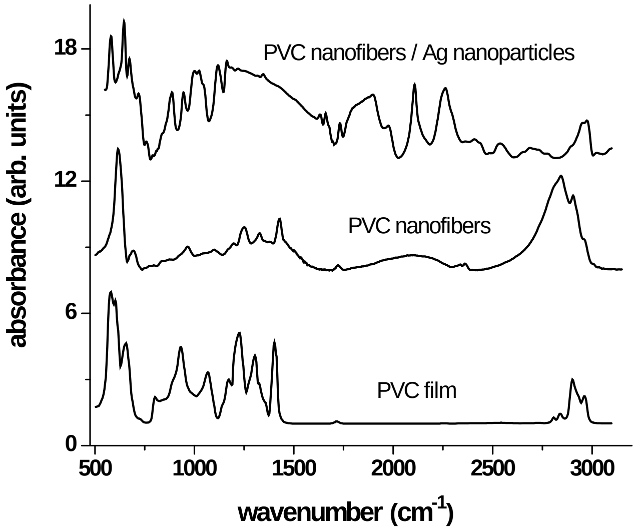
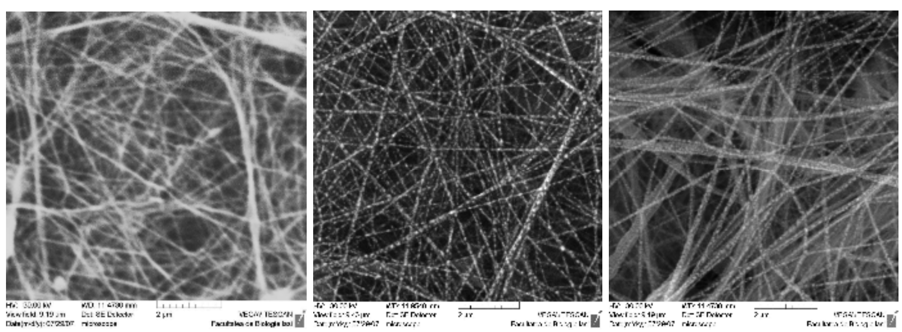


Figure 1. FTIR spectra of PVC: film, nanofibers and Ag nanoparticles doped nanofiber membrane. Silver-doped nanofiber membranes were prepared from a 3% wt Ag-DMF solution.

The PVC/Ag nanofibers prepared using PVC/DMF solutions doped with Ag nanoparticles exhibit important absorption bands around 1800 cm^{-1} (νC=O stretching), 2200 cm^{-1} and 2400 cm^{-1}, which are not present in pure PVC film or nanofiber membranes, suggesting an interaction of Ag nanoparticles with N–H bonds of NH_2 groups. The appearance of absorbance bands at new frequencies, band broadening and shifting of absorbance peaks may be due to the change in tacticity and geometry of polymer structures of the composite material.

Table 1: Dimensional characteristics of PVC/Ag nanofibers before and after UV irradiation

PVC nanofiber	Average diameter [nm]	Thickness [μm]
Control specimen	65	91
Without UV- irradiation	52	105
With UV-irradiation	46	97



(a) (b) (c)

Figure 2. SEM images of PVC nanofibers with 3 wt% of Ag:
(a) as prepared, (b) without UV and (c) with UV-irradiation

Antibacterial Test. In order to test the antibacterial efficiency of the PVC/Ag as a filter material, Escherichia coli ATCC 25922 was selected because it is a common contaminant of water sources. Strains of ATCC 25922 were grown in Luria-Bertani broth for 12 hours at 37°C. Subsequently, the culture was centrifuged and the bacteria were washed and suspended in distilled water. The resulting suspension was used to prepare a solution of 10^6 CFU/mL (Colony Forming Units) E. coli in distilled water.

The filter was prepared by introducing a PVC/Ag nanofibers membrane between two stainless steel meshes (disks of 20 cm diameter). We used the membrane with finer Ag nanoparticles, prepared using UV irradiation (Fig. 2c).

The filter allowed a 0.3 L/min water flow rate. The tests performed on the water passed through the filter showed no trace of microbial activity, demonstrating the filter capacity to completely annihilate all the bacteria in the filtered water.

Zone of Inhibition. The Ag ions and particles have biocide activity against gram-negative and gram-positive bacteria; the silver cation, Ag^+ binds to and damages the bacterial cells at multiple sites, causing structural changes, degradation, and finally cell death.
In the present work, PVC nanofibers (with 3 % wt Ag) exhibited positive results (inhibition observed), and the control nanofiber showed no change (no inhibition observed). The nanoparticles prepared using UV irradiation showed a slightly increased radius of the inhibition zone, demonstrating a more efficient antimicrobial action due probably to a higher releasing rate or Ag^+ ions. (Figure 3).

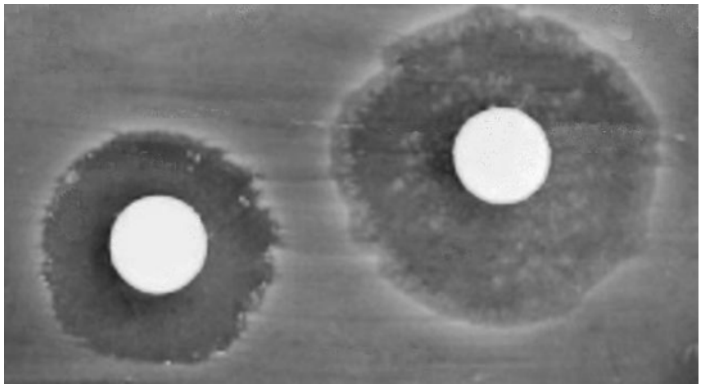


Figure 3. Inhibition zone test on Escherichia coli culture, for PVC nanofiber membranes with Ag nanoparticles: without (left) and with (right) UV irradiation.

4. CONCLUSIONS

- PVC nanofibers containing silver nanoparticles were obtained and tested against bacteria E. coli and the antimicrobial activity of these functionalized nanofibers was evaluated.
- The combination of PVC - DMF containing 3 % wt of Ag and UV-irradiated for 10 min was found to be most effective.
- UV irradiation narrows the size dustribution of the Ag nanoparticles.
- The antibacterial activity od the PVC/Ag composite material was found to be dependent on the nanoparticles size, the finer nanoparticles bein g more efficient.
- The tested materials show good antimicrobial properties for gram-negative bacteria therefore, the functionalized nanofibers can be used as filter materials against bacterial contaminants.

5. REFERENCES

1.Keun Hyung Lee, Hak Yong Kim, Yo ung Min La,Douk Rae Lee,2 Nak Hyun Sung, (2002). *Journal of Polymer Science:* Part B: Polymer Physics, Vol. 40, 2002, 2259–2268.
2. Lee, S.-W.; Belcher, A. M.(2004). *Nano Letters*, 4, 2004, 387-390.
3. Jin, H.J.; Fridrikh, S. V.; Rutledge, G. C.; Kaplan, D. L.(2002). *Biomacromolecules*, 3, 2002,1233-1239.
4. Golubovich VN, Rabotnava IL (1974). *Microbiol.*, 43, 1974, 948–950.
5 .Gottenbos B, van der Mei HC, Klatter F, Nieuwenhusi P, Busscher HJ.(2002). *Biomaterials*, 23, 2002, 1417–1423.
6. Efrima S, Bronk BV. (1998). Silver colloids impregnating or coating bacteria. *J Phys Chem* B 102(31), 1998, 5947–5950.
7. Pastoriza-Santos I, Liz-Marzan LM. (2000). Reduction of silver nanoparticles in DMF. Formation of monolayers and stable colloids, *Pure Appl Chem* 72(1–2), 2000, 83–90.
8. Sondi I, Salopek-Sondi B. (2004). Silver nanoparticles as antimicrobial agent:a case study on E. coli as a model for gram-negative bacterial, *J Colloid Interface Sci*, 275, 2004, 177–182.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

MONITORING WATER CONSUMPTION RECORDED BY METERS INSTALLED ON STAIRCASES

Botiş Aurel Cristian[1], Şuteu Marius[2], Mihăilă Ioan[3]

[1] *SC Compania de apă Oradea S.A,ROMANIA*
[2] *University of Oradea, Faculty of Textiles and Leather,*
[3] *University of Oradea, Faculty of Management and Technological Engeneering*

Corresponding author: Botiş Aurel Cristian, botisrodica@yahoo.com

Abstract: This paper presents a system of monitoring the consumption of cold water on the staircase for a group of blocks in the Oradea city. Water meters, specially equipped for this action generate electric impulses (signals) to electronic readers SUPERCAL type or electronic integrators connected to a M -BUS type. The bus drives the signal to a Data-logger and then to the central dispatcher than can supervise all the parameters of the network and water meters through a dispatching system.

Key words: monitoring, water network, M-Bus meters, processing data.

1. GENERAL INFORMATION

For elaborating this paper was carried out a study on a group of blocks of flats supplied with cold water from a pumping station. These blocks present water meters installed on each staircase. Water meters are equipped with REED relays for signal transmission at distance – electric impulse type - very low intensity, approximately 5mA. Depending on the meter type REED relay transmits an electrical impulse to the integrator every 10 L or 100 L of consumed water. Depending on the number of impulses received, the integrator processes information and displays the volume of water that passes through the meter.

This information is transmitted by bus M-BUS type, which is connected to a Data-logger. The transmission of information from their memory to the dispatching unit is done using a modem via television cable bus. The television cable network is fiber type network . The purpose of this monitoring activity is to store the water consumptions recorded by meters and use them in a billing program.

Monitoring measurements points by inquiring successively electronic systems can be done at command or automatically at programmable periods of time between 1min and 24 hours.

.

At the operator's command or automated monitoring system at prescribed intervals, the central dispatching unit inspects the physical measurements acquired by surveillance equipment. The inspected values are displayed on the operator's screen controller and stored by central computer, server type. Such data can then be used for generating functional reports. The program allows graphical representation of the development parameters for a certain period of time, from a measurement point and allows printing them.

2. FIGURES ACHIEVEMENT

¶

Figure 1 is outlines the way in which data is provided on water consumption read by REED relay at a certain period of time.

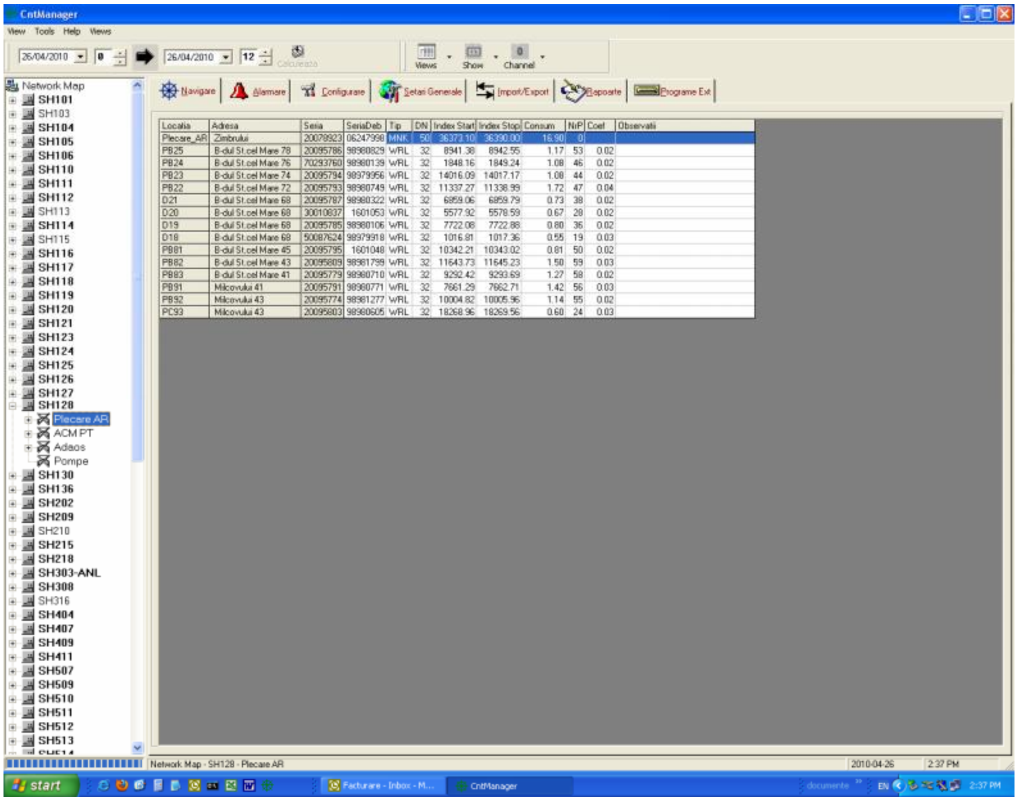


Figure 1: Tabel flow

Figure 2 presents the table with ID data and addresses of consumption points used in the billing program

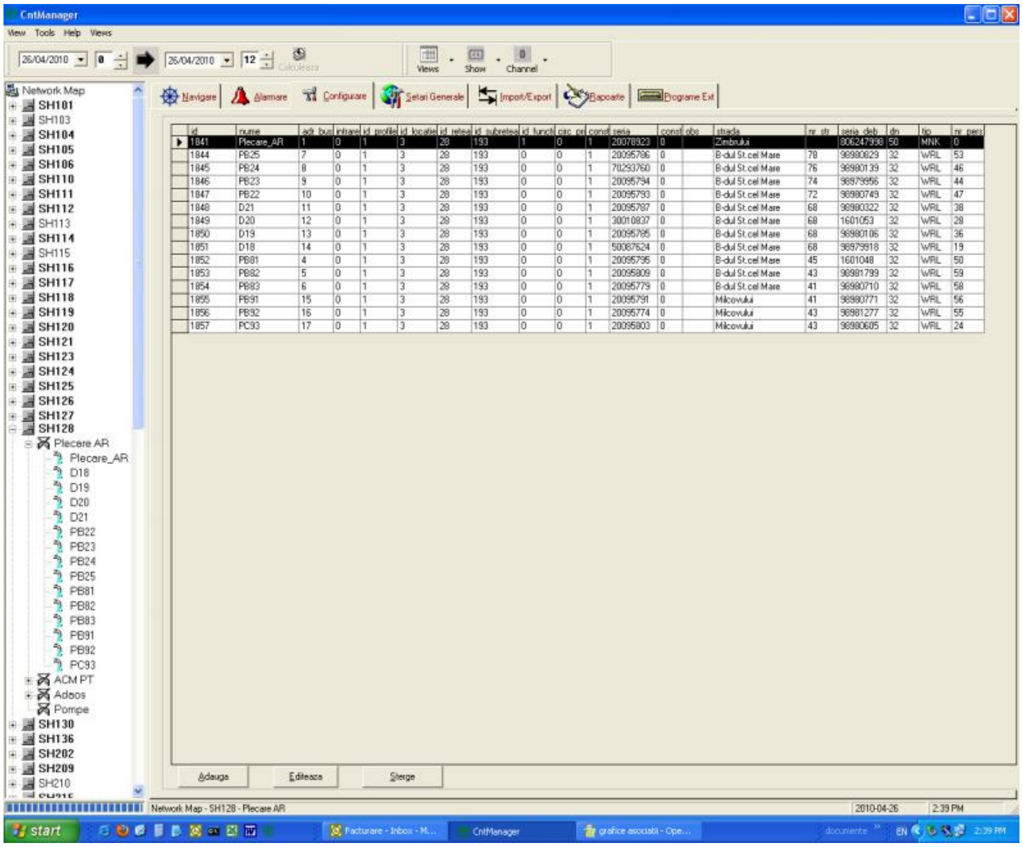


Figure 2: Tabel billing address ID

In Figure 3 is shown the evolution of water consumption in a period of 12 hours measured every hour at full hydrophore station.

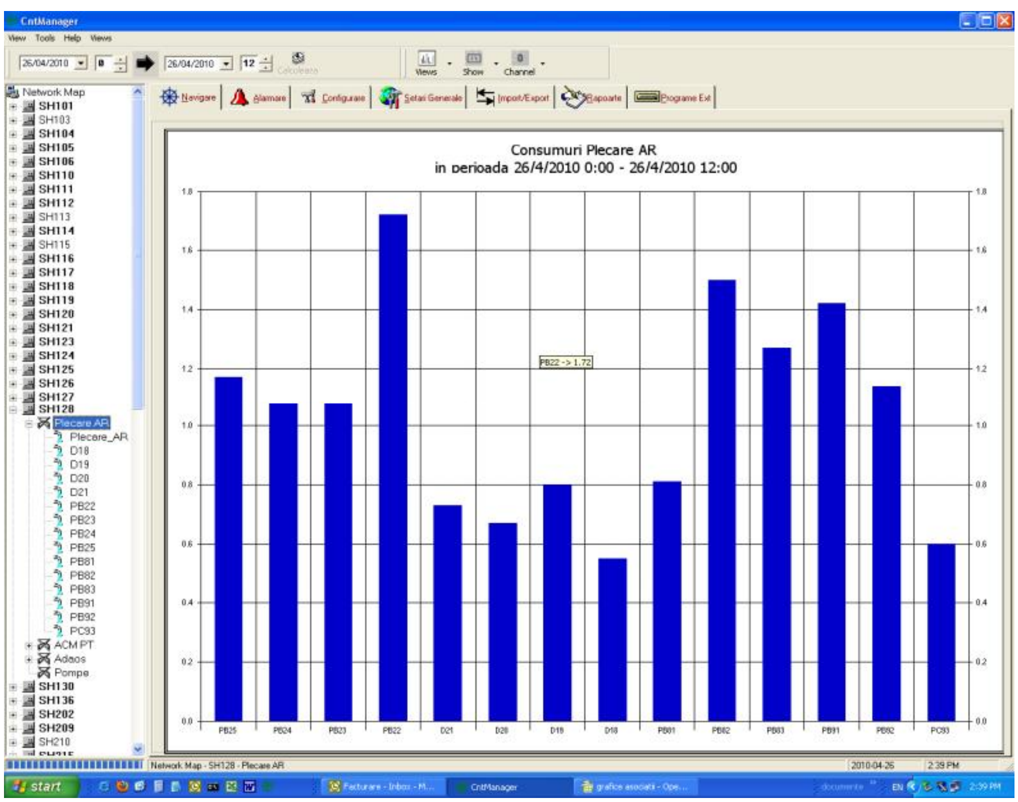


Figure 3: Grafic 12 h water consumption

Is shown in Figure 4 evolutian water consumption in real time for a water meter that measures consumption on a single block.

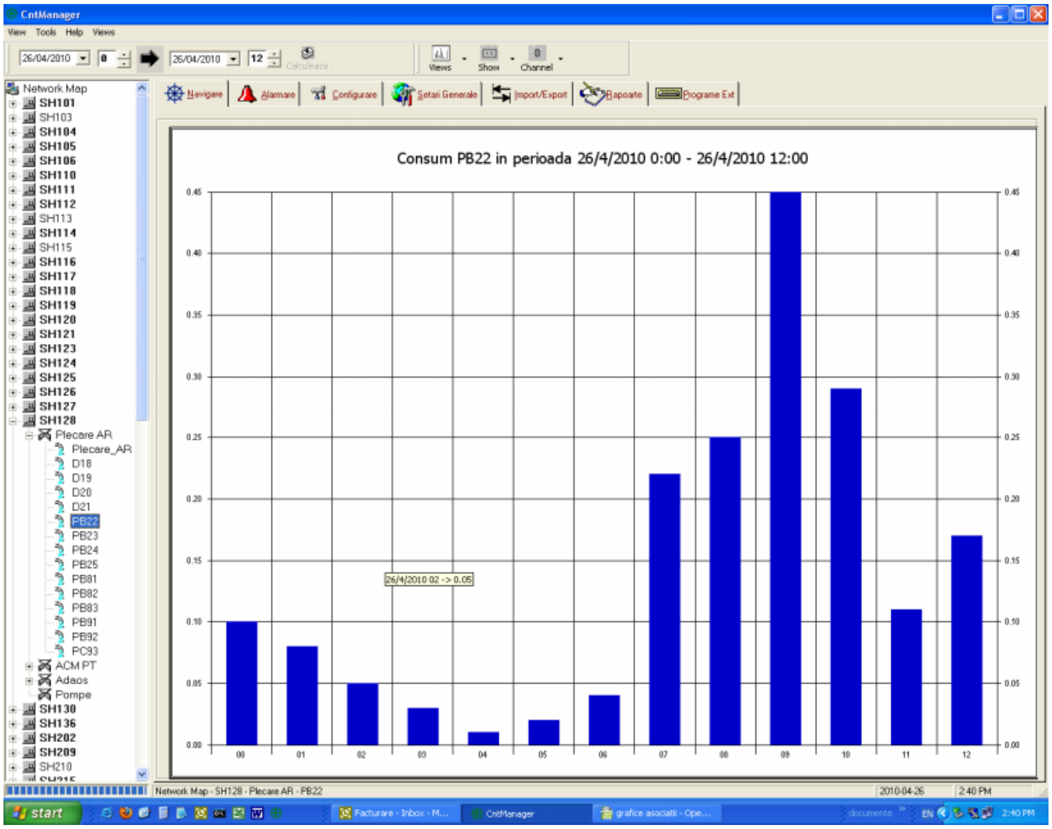


Figure 4: Graphics on a single meter water consumption

4. CONCLUSIONS

1.Monitoring system enables automated reading of water consumption recorded by branching meters;
2.Enable automatic display of the information acquired at predetermined period of time;
3.All equipment used can be controlled by the dispatcher;
4.This system can updated automatically the database and can generate periodic reports;
5.An important function fulfilled by the monitoring system is to notify dispatchers in case there take place variations of the allowed parameters;

5. REFERENCES

¶

1. Communication systems for meters and remote reading of meters – Part 1 : Data exchange; English version EN13757-1:2002
2. Communication systems for meters and remote reading of meters - Part 2: Physical and link lear;English version EN13757-2:2004
3. Communication systems for meters and remote reading of meters- Part 3: Dedicated application layer; English version EN13757-3:2004

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

NATURAL DYES A VIABLE ALTERNATIVE FOR TEXTILES PAINTING

M. Chindriş,
"Gh. Asachi" University, Textile and Leather Faculty, Iaşi, ROMÂNIA

Abstract: At present role in the synthesis of chemical pollutants that destroy the environment is very critical, dyestuffs industry represents one of the most polluting secto rs of chemical industry. Therefore, at present the idea to return to natural dyes becomes more accentuate facets.
Obtain natural dyes can be achieved in a number of plants of which is very high, but there are viable alternatives to the plants producing dye s can be used in other areas such as feed or manure.
The price of painting with natural dyes should be considered, taking into account the plant cost, quality and cost of dyeing auxiliaries needed.
Natural colors can be a viable alternative to dye textiles but in parallel and use of synthetic dyes not be entirely removed from current use.

1. PAINTING TYPES THAT CAN BE MADE WITH NATURAL DYES

Painting with natural dyes suggests that those refined colors they use are many plants contain synthesis colorants. Many plants contain coloring juice: some in the leaves and flowers, in stems and roots in other, others in flowers buds and fruits. From these, few juices that are dyeing wool single set in cotton, hemp or silk, so that their resistance to light and wash painting is good.
Natural colors are included in "Colour Index" as a classification of natural dyes and pigments but it is important to note that this classification has been reported in a single cationic dye.
In terms of chemical structure, natural dyes a re the following families: carotenoids, anthocyanins, flavones, benzochinonici or anthracene compounds. Under "color index";... "these are colors that are derived from animal or plant products, no or little chemical processes. They are mainly mordant dyes "and in the many cases they are mixtures of 2-3 unitary dyes [7]. For this painting to have good resistance to washing and light is necessary for the paint to be used fixing agents appointed for dyeing with vegetable dyes, mordant agents, hence the name of mordant dyes. In general, used mordents agencies are salts of iron, copper, tin and aluminum with natural dyes forming complex salts. Ensuring continuity of dyeing plant resources is organized and compulsory primary condition for their industrial usage. But this consition just does it provide partial. Moreover, many potential tinctorial plants are used in pharmaceuticals, perfumes, food, etc., the recovery is clearly superior in some research undertaken shows that the red purple colored fruits are up to 20 compounds hidroanthrachinonic plus many other factors. From these, most are of the alizarin, purpurine, xantopurpurine, pseudopurpurine type and the presence of mordant painted wool in colors of brown range. [6] In other studies show that colors are natural vegetation identified in our country are found anthocyanidine and anthocyanine .
Mordents may be natural substances such as eg. urine, tannin, lemon juice, Borsa or pure chemical compounds with metal ions.
When wool fiber, the most common mordents are ch romium and aluminum salts, and a lesser degree of iron salts, copper and stanium. The two types of metal salts, namely Cr, and Al, forming wool fiber chelated very strong, making the resistances to be very good. The formed dyeing complexity with metal salt can lead to changes in dyeing shade and improve light resistance.
Mordant dye may be natural or synthetic, with neighboring groups containing free electron pair of electrons USA, OH groups, carboxyl COO, azo and amino situated in ortho position.

ALUM is the most common aluminum salt $KAl(SO_4)_2 \times 12 H_2O$ and form different complex types of hydrates in water. Absorption of aluminum or hydrate of the compound by wool fiber involves a replacement of water around the cation nucleophiles by the group of ligands in wool, along premordents. Painting a bath containing a dye coating made from fresh flowers, also involves a coordinative binding of dye molecules with metal cations replacing molecules of wate r. [5.6]
The only painting of this sensitive issue with vegetal dyes, remains ultimately elimination or reduce all metals that pollute the water after the process of mordant. Mordents causing the most problems is chromium and as such he was taken first to suggest recipes in discussion. The old recipes issuing of dyeing without mordant as color itself has remained in the mordant bath chrome objectionable content. An improvement of recipes that use chromium mordant can be the use of formic acid (reduced chromium mordant). As a result, chromium can be used in small quantities, as indicated by the old recipes, the metal is set in a larger quantity of wool and the amount of metal left in the mordant bath is much less resistance and light fastness and is generally enhanced by the presence of Cr (III) and not Cr (IV). Old recipes suggest using 3% potassium dichromate at wool mordant, but by using additions of formic acid (HCOOH) in the mordant bath, only 1% potassium dichromate will be consumed. Those who realizes this painting, they immediately found an improvement in its resistance. So, instead of wool with chrome mordant bath remained strong yellow color, appears as gray -green wool, when adding formic acid and mordant bath is very little color, so you can say it i s exhausted. And introducing early process, in the mordant bath can be added 1% lactic acid with 20 minutes before the end of the process of mordant.Recipes that use COPPER in mordant can also be improved in the same way, but only by the addition of 2% ace tic acid, so that it can be obtained a reduction in the amount of copper sulphate. The addition of acetic acid in mordant bath also leads to determining copper wool fiber. Obviously, if you want to attach a larger quantity of metal wool fiber, then it is l eft remaining in mordant bath, causing it to be saved and stabilized fiber. Mordant traditional recipes suggest the use of aluminum in a proportion of 25% with or without the addition of 7% cream of tartar, but the reaction after mordant and dye testing sa mples show that reducing the amount of aluminum to improve the resistance of most painting with light natural dyes. The use of 8% and 7% cream of tartar, appears to be beneficial from an environmental perspective, the other metal is taken up by fiber, so t hat interpretation of mordant bath remainder is less decisive.
STANIUM (STANNOUS CHLORIDE) is a common but less mordant and is used mainly by households for dyeing fabrics dyed colors shine through substances additions of chemicals, making the paint bath to finally be exhausted.In general, using tin as a mordant is to produce scarlet, carmine, color is achieved through a mordant dyeing. Oxalic acid is frequently recommended for use with paint tin in recipes, particularly for obtaining these particular color s. Both chemicals are potentially harmful environmental and the mordant / bathroom paint remaining, can not be made to be clean. Therefore, they are not recommended for use.
Over recent years, cellulose fiber has become much sought after and paintings were regarded as suitable natural dyes to color these fibers. Very few dyes gave intense colors cellulose fibers without a mordant or fixing agent such as for example tannin or tannic acid. For a real painting with natural dyes, tannin sources can be found eas ily. It is well known as a good investment for the production of organic yarns, and all are beneficial for many countries whose economy can rely on local textile dyeing with natural resources.
Oak bark and bark resins can be used as natural dye cellulosic binding. The fiber quantity can be extracted tannin from these natural products varies from source to source, but generally speaking there is enough tannin, so that we make these paintings to be valid in terms of environmental protection. The use of natural tannins as fixing agent is also more acceptable than any synthetic fixing agent; you can really get fiber / organic wires.
Mordant recipes that are used for wool and other protein fibers are clearly unsuitable for cotton and other cellulose fibers, but c hromium and copper by coating can be used to improve resistance to change shade dyeing or natural dye on fiber. To recall that, adding formic acid or acetic acid as a mordant are relevant for the protection of the coating bath are relevant for environmenta l protection.
IRON (FE) is not seen as a major problem in terms of environmental protection, but can be substituted successfully with natural products. Traditional river water or mud rich in iron have been used in paint with natural dyes, as well as "ferro us water, obtained by soaking a few pieces of iron in acidified water. All are acceptable as an alternative to replace chemical sources of iron, when a painter wants to use only natural products. These sources of iron may be added to bath dyeing and dye us ed to tint change, but in cellulosic fibers, together with tannin give this one used a fiber / fabric a shade of gray or black. The number of such alternative methods and fixing mordents are not entirely suitable for a large part of trading paint, but stil l small number of individual paintings and the cotton industry using

natural dyes on a large enough scale, began to grow, any of these alternatives helping to decrease environmental pollution, which is beneficial for the nature. [1]

With regard to fabric dyeing without mordant, it is practically a classic method of painting. Have been subjected to color a plant extract called turmeric colored fabric and a cotton wool. The extract is obtained using the following technique: - Grind stigmas of saffron in a mortar and glass. Aqueous extract was prepared as follows: 1g of mortar sample to 500ml of distilled water. The obtained mixture was well heated for 30 minutes to 60 ° C and then kept 24 hours in darkness. All features painting with saffron were detected by thin layer chromatography. The fabrics were dyed with a solution whose hidromodule was 30:1. Temperature was increased for 30 minutes at 90 ° C and then maintained at this level for a painted hour. The fabric were then washed and squeezed. For dyeing wool f abrics will be added in the dyeing bath and a few drops of 40% acetic acid. They then made several measurements of color Cielab method.[4]

It was found out that there is a difference of intensity between the two color structures for paint subject: wool fabric is about twice more intense than that of cotton. This difference may be partly attributable to differences between substrates subject to paint, but also can be correlated with various color changes (in the opening thereof), which also were visually con firmed. Opening of color rendered in wool fabrics can be attributed to specific features of dye and different fibers. When wool is dyed under acid medium used in this experiment, electrostatic forces between chain ends of the fiber protein and positively charged dye molecule, dye absorption were dominant role, in contrast, for dyeing cotton, van der Waals forces and hydrogen links is responsible for absorbing dye. Mordents usage was beneficial for cotton fabrics, an improvement was observed in all cases reg arding the change in color (gray scale from 0.5 to 1.5 standard units).

Regarding resistance to light, cotton have a medium resistance (4 -0 scale units of blue) to light , but if wool is mediocre (except the fixative used was copper sulfate) [4].

1. MORDANT VARIATIONS

MORDENTS CAN BE ACHIEVED IN THREE WAYS:

1. Premordentsation called mordant before dyeing;
2. Concomitant mordents with mordant painting called simultaneous;
3. Mordant after painting called postmordentsation.

1. PREMORDENTSATION

Premordentsation, is one of the most used methods of applying the fiber or fabric -backed mordents. Premordentsation is actually mordents treatment process before dyeing fibers and fabrics subjected to dyeing with vegetable dyes. The mordant is dissolved and then add ed to the bath containing the amount of water needed. Then add the bath that is fiber and then brought to the boil slowly, within about three quarters of an hour and then as if very fine wool fiber (processed wool top) still maintain more than one quarter hour to boil, and if is raw wool, it requires a longer time period. Then follows a cooling process, a process in which the fiber is moved very slightly to make sure that it will take a sufficient amount of mordant. Wool can be used immediately or being squ eezed easy or is subject to a spin-drying process very easy and should be the order of several seconds, two processes are necessary to remove mordant excess or fiber content that is stored for several days in a plastic bag (is like a developer), or may be stored for future use, the latter situation is possible only after the fiber / wool fabric was completely dried. [5]

Cromordentsation of wool should be taken with or after storage for several days in the dark, because these substances are very sensitive to light (it is the mordents residual effect on fiber, it remained after storage for several months in the dark).

2. SIMULTANEOUS MORDENTSATION WITH DYEING

This procedure gives results much faster than mordant taken as a separate process. It is a beneficia l process for less processed wool fiber although colors may not always be the same as those obtained by separate mordant. The first mordant is dissolved and then added the dye bath containing the preparation. Next phase is the introduction of dry fiber in that bath. The next step is to bring to boiling the painting bath in a pretty big time, while the fiber is moved and shaken gently in the JV while with a glass rod. Boiling is continued until exhaustion occurs in the dye bath until the fiber has reached th e required shade, bearing in mind that wool fiber tone changes several times along the rinsing and washing.

Fiber can also get cool bath or painting taken from there and rinsed with very hot water followed by a continuous and progressive rinse with cold wa ter. Fiber should be easily washed with soap or detergent, less active, so as not to lose too much light. After the process of cleaning wool fiber is subjected to a slow straightening along drying. Stretched wool is dried in a towel and dressed in state stretched or wound on a roll. [5]

3. POSTMORDENTSATION

Mordant after painting, it is also possible, that tin and iron are commonly used in this process, after premordentsation or a simultaneous mordant with other substances. Mordents on tin lead to color within the meaning of its brightness, while those based on iron change the color and turn into a dark color. These color or paint are added to the bath in the last 5 -10 minutes of rinsing, is necessary to remove the fiber from the bath as long as there is that the salt dissolved by strong shaking bath.

Mordents action or other additional substances does not depend on the dilution of their fiber taking a proportionate quantity of these substances with their own weight.

One of the conditions is that the wool fiber is covered completely by water, so that to feel free in that bathroom (to be able to move one). Satisfactory results were obtained when the wool fiber was premordentsated with different salts in the same paint bath and as they once mixed with wool fi ber, metal ions do not react with others. Necessary in this case that each skein is labeled to be distinguished from one to another after painting, can use a knot system, when different fibers are attached to a short length hank; a fiber node treated with alum, two for chromium, three for copper, four for tin, and so on, orders to distinguish hank treated with acids, alkalis or other substances can be attached to other distinctive signs, in this case a report must be done exactly as the used method [5]

2. THE USE OF SEVERAL TYPES OF MORDANTS

1. ALUM - aluminum potassium sulfate (potassium alum or ammonium alum) $KAl(SO_4)_2 \times 12H_2O$

Mordant recipe: - 100g of wool;
- 18 g of alum;
- 6 g cream of tartar.

Place all in a pot containing about 5l of water, well shaken until the crystals dissolve completely then is placed cleaned and dry wool in adva nce. Bring to the boiling stage very easily in about an hour, then kept boiling for one hour and then the bath is slow cooled off. Wool should be turned easily over other mordant process to ensure the entire surface of wool fiber. It can be used immediatel y after its storage in a plastic bag for several days after drying with a longer storage, industrial painting using formic acid instead of cream of tartar. Thus, by using acid requires a small amount of alum but also the results obtained using mordents of aluminum, even if it is a cheap method, are much better in terms of eco - protection. From a point of view also for deliver brilliant colors, the following recipe was recommended:

- 8g potassium alum;
- 2ml concentrated formic acid [5].

2. CHROMIUM (Cr) - dichromatic potassium $K_2Cr_2O_7$

The mordant should be kept away from light to dark is quite disadvantageous because the usage of chromium is considered toxic, sensitive to light and some people are allergic to it. However, chromium lead to some pretty attractive colors, some of them having much better resistance than those obtained using treatment with alum and chromium also makes wool fiber becomes silky and shiny.

Mordant recipe: - 100g wool;
- 3 g chromium;
- 6 g cream of tartar.

The method is similar to those who used alum but then after mordant wool be completed immediately or stored in the dark for several days. [5]

3. Copper (Cu) - Copper sulfate $CuSO_4$

The usage of mordents of copper lead to some particularly tarnished hues in colors of red, brown and green shades can give when alum is used to obtain yellow color. Sometim es the colors are light resistant than those obtained using alum.

Mordant recipe: - 100g wool;
- 12g of copper sulphate;

- 6g cream of tartar;
or - 2g copper sulphate;
- 2ml acetic acid or 100ml vinegar.

Vinegar and acetic acid give an unpleasant smell but greatly reduce the residual content with what is important ecologically. [5]

4. Stanium (Sn) - stannous chloride

It can be used as premordant but is mainly used by adding to the end of the painting process, thus creating a bright color, especially in the case of a premordansated wool with alum. Tin can precipitate or discolor paint pigments contained in the b ath and can be as wool to be very rough and brittle, so it must be used very carefully. A sufficient quantity to be satisfactory outcome would be: - 3-4g tin

- 4g oxalic acid;
- 100g wool.

Stannous chloride will be dissolved in a small amou nt of water and then added in the dyeing bath for 5-10 minutes before the end of the boil. Safety should be removed from wool dyeing bath, because there can not be absorbed as mordant evenly on wool fiber. [5]

5. Iron (Fe)

Iron is used in a way similar to tin. Iron lead to a color cast (or tarnished) and excess iron is present in wool fiber that it becomes hard and brittle. The working method is: dissolve 5g ferrous sulphate crystals in water, for 100g of wool. In the bath dyeing for 5 -10 minutes before boiling end. [5]

3. AUXILIARIES USAGE AND MORDANT DYEING

Additional substances used in dyeing and mordant are often called "auxiliaries." Thereafter follows a list of the most used auxiliaries in dyeing with natural dyes. [5]

1. Tartar cream, tartar potassi um acid.

Often used with alum and sometimes with other types of mordents. In combination with metal salts of mordents they form what may be more easily connect fiber, also give brilliant colors and make the wool fiber very soft (nice touching that). As a c hemical used in food industry is known as sodium pyrophosphate, but does not meet the full requirements of dyeing auxiliary.

Additional substances used in dyeing and mordant are often called "auxiliaries." Thereafter follows a list of the most used in dyei ng auxiliaries.

2. Acetic acid

It is used especially when painting is made with dyes extracted from berries (e.g. blueberries). Commercial vinegar contains 4-6% acetic acid and is thus a convenient source. Garment dyed in bright color (intense) may have be tter resistance than a bright color, if after washing, they are rinsed in a little vinegar, as can be destroyed due to neutrality or alkalinity of the water used in dyeing [5].

3. Oxalic acid

Is toxic, plant originally found in nature called "Rhubarb", woo d sorrel and other plants. The vast majority are used to facilitate absorption of tin.

4. Tanning acid

It was found in many plant species, especially bark and bushes of trees. It is necessary in cotton dyeing.

5. Formic acid

It is used as an auxiliary in t he mordant chromium absorption. Acetic acid is chemically related to the fact that he smokes, but is quite unpleasant and may cause difficulties in use. He must first obtain an independent laboratory and then used in very small quantities [5].

6. Ammonia

A few drops of ammonia used by housewives, added in dyeing bath leading to changes in pH by the alkaline field, his presence will obviously change the color to fade and sometimes quite strong, the color is influenced by pH, so it is important to keep it cos t over rinses and washing [5].

7. Glauber's salt (sodium sulphate)

His usage is to decrease the speed painting absorbing dye in fiber. Salt is added in the dyeing bath during dyeing process to help fix the dye on the fiber and prevent "bleeding" of color. It is also used when a painting is made in two baths, in this case can go with fibers subjected to color tone but can be very close or in other words they will be equalized if treated with a solution containing this salt to boiling.

8. Sodium chloride, com mon salt

Is sometimes used to rinse and prevent hair dye from the fiber, so to get a better resistance to abrasion.

9. Sodium carbonate, laundry soda
It uses ammonia as well in the pH changes. This powerful attack of wool and his presence in excess leads to the complete dissolution of the fiber [5].Natural colors will always be used for dyeing textiles only in a small scale, even if used only by big commercial concerns. Therefore it is important to note how our gaze turned to ways of producing mordents and retainer required to be accepted by people in environmental protection. [1]
Growth of these colorful plants, available in Asia, can produce a large scale of its shades and low prices. With these existing and potential collector culture, growth of these pl ants is able to do a considerable amount of existing demand for dyes. Research continues regarding natural colors, as they cover the widest possible range of shades, working time, changes in temperature, variations in quantities of mordant used in dyeing, and the combination between mordant and water quality necessary for dyeing [3].

4. REFERENCES

1.”JSDC”-vol.109,ianuarie,1993, pg 8-9
2.”Colourage”-septembrie,1995, pg 37-38
3.”JSDC”- vol.109,ianuarie,1993, pg 5-7
4.”JSDC”-vol.110,ocombrie,1994,pg 313-315
5.John&Margaret Cannon-„Dye plants and dyeing”- Ed.The Royal Botanic Guakn Kew,U.K., 1994
6.”Industria uşoară”-nr. 10, 1986, pag.446-450
7.”Colour Index” –Ediţia a 3-a, 1975

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

PHYSIC-CHEMICAL ANALYSIS OF BINARY OR TERNARY FIBRE WASTE BLENDS

Monica Pustianu[1], Adina Bucevschi[1], Alexandru Popa[1], Erzsebet Airinei[1]

[1]*University "Aurel Vlaicu" of Arad, Romania*

Corresponding author: Pustianu Monica, pustianumonica@yahoo.com

***Abstract*:** The paper studies the qualitative and quantitative chemical a nalysis of waste blends. Tests were conducted on two types of samples collected from SC. FIRI Vigonia SA
For qualitative identification of raw material composition was used burn test that allows information indicative about the nature of the fibre. The obt ained data were completed and confirmed by microscopic analysis in natural light and polarized light.
For qualitative identification of the raw material composition was used the method of fibre' separation from binary or ternary blends based on selective d issolving of the fibres followed by a thorough washing to remove all dissolution products , drying to constant mass and weighting of the insoluble fibres.
***Key words*:** waste, quantitative chemical analysis, qualitative analysis

1. INTRODUCTION

Using fibre blends for different articles or knitted fabrics needs quantitative segregation of components. This operation is even more necessary in the textile industry because a part of waste fibres is reintroduced in production.
Quantitative determination of the b lend constituents is dictated by the necessity of understanding of the fibres' distribution in yarns' structure, keeping the blend composition during the technological process, irrational lost a particular type of fibre degradation detection, the origin of defects occurring finishing process.
Methods of quantitative chemical analysis of binary or ternary blends are intended to establish specific criteria for determining the quality of textile products, to provide solutions that can be used in the field of expertise, the current control of manufacturing and especially the substantial improvement of the content of quality standards

2. EXPERIMENTAL PART

Analyses have used two samples of waste from SC. FIRI Vigonia SA. Each sample was composed by different samples.

2.1. Materials:

Raw material for sample I:

- rests of knit
- rests of yarns
- rests of PAN band
- fly wool
- noil, condenser silver, yarns.

Raw materials for sample II:

- rests of knit
- cotton weaves borders
- rests of PAN yarn .

2.2. Reagents:

- Potassium hydroxide solution 0.5 N;
- dilute acetic acid;
- 65% nitric acid;
- soil. 75% sulphuric acid;
- soil ammoniac.

2.3. Procedure

2.3.1. Qualitative analysis of first sample components

For qualitative identification of raw material composition was used the burn test tha t allows indicative information about the nature of the fibres. The data obtained were completed and confirmed by microscopic analysis in natural light and polarized light.

At burn test the fibres loose stock must be parallelized. The fibres or the yarn is approached by a match flame or a gas burner and we examine its behaviour when it enters the flame, then arises how it burn, the smell that releases and the ash.

The results from tests are presented in table 1

Table 1. Behaviour of textile fibres in the burning process and the microscopic appearance

Type of waste	Reaction in the burning process	Smell released	Residue appearance	Microscopic appearance	Conclusions
Knit (lemon yellow)	burn with bright flame	horn burnt	Black, spongy	The presence of scales on the surface	Wool
Brown yarn	Melt, burn with soot	sweetish	Black, hard	Black in polarized light	PAN
Yellow yarn	Melts, burns with smoke	sweetish	Black, hard	Black in polarized light	PAN
Knit (yellow and black strips)	Luminous flame, melting	most burnt paper	Black, spongy	Ribbon-cotton, wool, PES	Bicomponent yarn
Sliver (brown)	Luminous flame, melting	horn burnt	Black, spongy	Presence of scales on the surface	Wool
White Band	Melts, burns with soot	Slightly sweetish	Black, hard	Black in polarized light	PAN
Orange knit	Luminous flame	Burnt paper	Ash	Ribbon	Cotton

We can concluded that the raw material is made of wool, cellulose fibres (cotton) and synthetic (PAN, PES).

2.3.2.Quantitative analysis of the second sample components

Fibres separation from binary or ternary blends based on selective dissolution of the fibres, followed by a thorough washing for removing all products of dissolution, drying to constant mass and weighting of insoluble fibres

a) Separation of protein fibres (wool)

Quantitative separation of wool and cellulose fibres from ternary blends with synthetic fibres is made after natural impurities and technological impurities removing and drying to constant mass. Wool was first removed by solubilisation in potassium hydroxide solution 0.5 N, 10 min. boiling, at H = 1:50. Weighing of samples was made on analytical balance Mettler Toledo. Solubilisation of wool was made on samples taken from different stages of technological process.

The results are presented in table 2

Table 2. Wool solubilisation by with potassium hydroxide solution 0.5 N treatment

Sample	Initial mass (g)	Mass of filter paper (g)	Sample + filter paper mass (g)	Sample mass after treatment (g)	Soluble wool (%)
willow	1,0011	0,3939	1,2031	0,8092	19,19
Sliver	1,0010	0,3942	1,1898	0,7956	20,54
Yarn	1,0001	0,4232	1,2798	0,8566	14,35

After wool solubilisation was found that mass loss is almost similar for sliver and for willow but is smaller for yarn. This is because of the irregularity of the samples taken from willow and sliver. Wool loss as a result of the technological process is 6.19%.
After wool solubilisation, the next step in quantitative analysis of PAN blends is to determine the quantity of PNA by solubilisation in 65% nitric acid.

b) Separation of PAN component
The residue obtained from absolutely dry wool solubilisation is weighting ± 0.0001 g precision and placed in a conical flask. It is treated with nitric acid 65%, 1:50 for 15 min at 20 ± 10C, stirring continuously with mechanical shaking device. The sol ution is decanted through a previously tarred crucible. The residue from the flask is passing on the crucible with an additional quantity of nitric acid. The residue from the crucible is washed with water to neutral reaction. The remaining liquid from residue is removed by suction and then the crucible is dried to 105 ± 3 ^{0}C to constant mass. Cool for 30 minutes and then weighing with ± 0.0001 g. precisions.
The results are presented in table 3

Table 3. PAN solubilisation by treatment with 65% nitric acid solution

Sample	Initial mass (g)	Mass of crucible (g)	Mass of crucible + sample (g)	Sample mass after treatment (g)	Soluble PAN (%)
willow residue	0,8092	33,7101	34,2054	0,4953	38,79
sliver residue	0,7956	33,7107	34,1859	0,4752	40,27
yarn residue	0,8566	33,7112	34,1015	0,3903	54,43

c) Separation of the cellulose component
The residue obtained at previous solubilisation, absolutely dry, is transfer in a conical flask with glass stopper and is determined the insoluble residue mass by difference. Sulp huric acid is added 100 cm^3 to 1 g of sample and then the flask is closed with ground glass stopper. The contents of the flask is heated on water bath maintaining the flask temperature at (50 ± 5) ^{0} C for one hour and shaking in 10 to 10 minutes. The resulting solution is filtered through a crucible at constant mass. The residue is washed with 200 cm 3 sulphuric acid and transferred to crucible. Perform successive washing with distilled water and ammonia solution (40-50 cm^3), in two parts and again with distilled water to alkaline reaction disappear in presence of phenolphthalein as specified. The crucible with the residue is dried at (105 ± 3)^{0}C. Cool in desiccators for 30 min. than weigh with accuracy of ± 0.0001 g.
The results are presented in table 4:

Table 4. Cotton solubilisation by treatment with sulphuric acid solution 75%

Sample	Initial mass (g)	Mass of crucible (g)	Mass of crucible + sample (g)	Sample mass after treatment (g)	Soluble cotton (%)
willow residue	0,4953	33,7101	34,1756	0,4655	6,01
sliver residue	0,4752	33,7107	34,1678	0,4571	3,79
yarn residue	0,3903	33,7111	34,0891	0,3780	3,00

The difference was the polyester percentage in blend.
Percentages of fibres in blend are presented in table 5.

Table 5. The blend components on processing phases

Sample	**Wool (%)**	**PAN (%)**	**Cotton (%)**	**PES (%)**
willow residue	19,19	38,79	6,01	36,01
sliver residue	20,54	40,27	3,79	35,4
yarn residue	14,35	54,43	3	41,22

2.3.3. Qualitative analysis of second sample components

For qualitative identification of raw material composition was used the burn test that allows indicative information about the nature of the fibres. The data obtained were completed and confirmed by microscopic analysis in natural light and polarized light.

The tests results are presented in table 6.

Table 6. Behaviour of textile fibres in the burning process and microscopic appearance

Type of waste	Reaction in the burning process	Smell released	Residue appearance	Microscopic appearance	Conclusions
Cotton weaves edges	Burn with smouldering flame	paper	ash	ribbon	cotton
PAN yarn	Melts, burns with soot	sweetish	Black, hard	black in polarized light	PAN
White knitted	Luminous flame and melting	Slightly sweetish	ash and melting pearl	yellow and striped in polarized light	Viscose PES
Multicolour knit	Melts, burns with soot	sweetish	breakable	Black in polarized light	PAN
Knitted striped (black and pink)	Melts, burns with soot	sweetish	breakable	Black in polarized light	PAN

2.3.4. Quantitative analysis of second sample components

Tests concluded that the raw material consists of cellulose fibres (cotton), viscose and synthetic fibres (PAN, PES).

3. CONCLUSIONS

- Tests on the first sample conclude that the raw material is wool, cellulose fibres (cotton) and synthetic (PAN, PES).
- After wool solubilisation was found that mass loss is almost equal for willow and sliver and smaller for yarns. This is because of the irregularity of the samples taken from willow and sliver. Wool loss as a result of the technological process is 6.19%.
- Tests on the second sample show that the raw material is cellulose fibres (cotton), viscose and synthetic fibres (PAN, PES).

4. REFERENCES

1. Rusanovschi, M., Dragnea, A. , (1980), *Textile chemical analysis*, vol I, II, Technical Printing House, Bucharest.
2. Iliescu, E., Muresan, R., Muresan, A., (1997), *Quality control process of preparing and superior finishing of textiles*, Dosoftei Printing House, Iassy.
3. Butnaru, R., Bucur, M.S., (1996), *Physical-chemical finishing of cellulose textiles,* Dosoftei Printing House, Iassy.
4. Mihuţa, S., (2000), *Fibers,* Aurel Vlaicu University Printing House, Arad.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES- LEATHERWORK
Volume I, 2010, No. 1

ENVIRONMENT PROTECTION AND THE 21 ST CENTURY FIBERS

Lavinia Rusu

Universitatea Tehnica "Gh. Asachi" , Iasi, Romania

Corresponding author: Lavinia Rusu, lrusu@tex.tuiasi.ro

Abstract: The paper aims to emphasize the continuous on growing roll of environment protection in modern economy conditions and the importance of its recognition by entrepreneurs in every industry. This is especially true for textile industry as the green future in this area seams certain, international certification bodies in the field already putting foundation of international standards for organic textiles. Whether we refer to well-known fibers obtained in an organic manner or fibers from new sources and high-tech manufacturing processes the 21 st century fibers start to look different and certainly "greener".
Key words: environment protection, organic textiles, organic cotton, renewable resources.

1.INTRODUCTION

The organic approach is a "whole system" aiming agriculture as well as production and recognizing the close relationship between all stages of production starting from the soil and reaching the final consumer.

The UE Regulation on organic products is the legal basis for control of farming and processing of organic foods in Europe and contains standards for crop production and livestock husbandry, processing and labeling, requirements for inspection and certification of farmers, processors, wholesalers, distributors and importers, requirements for controlling inspection and certification by national authorities.

International Working Group on Global Organic Textile Standard (GOTS) was formed in 2002 at the initiative of the main standardization bodies in organic field in order to unify the various existing standards and draft standards on organic textiles which have caused confusion among market participants and consumers, representing an obstacle for free international trade of textile organic products. Key partners include: International Association Natural Textile Industry (IVN), based in Germany, as well as Social Association (England), OTA (USA) and Japan Organic Cotton Association (JOCA).

GOTS aims to define quality assurance requirements for eco-textile covering the entire production cycle, from harvesting raw materials to manufacturing and labeling and unify the various existing standards to provide the ultimate consumer confidence and credibility related to a environmentally and socially responsible manufacturing process including finishing, labeling, packaging, quality assurance and documents keeping.

Organic Standards state agricultural principles for producing high quality products in sufficient quantities, working in natural systems and cycles at all levels from soil to plants and animals, maintaining long-term fertility and soil biological activity, treating animals ethically, ensuring their physiological and behavioral needs and respecting the regional differences, environmental, climatic and geographical (if any) practices that have evolved in response to them. Environmental Principles are also included and aim promoting biodiversity and protect habitats and landscape, maximizing the use of renewable resources and recycling. Reduce pollution and waste.

But organic processes mean also social principles to provide fair and adequate quality of life, job satisfaction and a sustainable working environment, develop of environmentally responsible production process, processing and distribution systems, focusing on local systems.

Of all the principles which form the basis of organic system have been established practices as encouraging biological cycles involving microorganisms, soil fauna, plants and animals , sustainable crop rotation , nutrient recycling using manure and compost from vegetable waste , enhance and protect soil and its life , avoidance of soluble fertilizers , avoid pesticides agrochemicals.

The efforts of textile researchers in collaboration with s pecialists from other fields have led to organic fibers, new organic fibers that are devoid of chemicals that may appear during cultivation and processing. Organic fibers are natural fibers, some new, arising as a result of field research in recent decades; some are organic versions of conventional fibers used in industrial production.

2. AN OLD FIBER IN A NEW PERSPECTIVE

Of all the organic fibers/fabrics on the market today, organic cotton is by far the most popular. Considering that half of all fabrics that are manufactured in the world are cotton, and nearly entire other half have it in their composition, can be easily understand the enormous importance of this product in agriculture and the environment around the planet. In fact, the cultivation of this textile plant employs more than 100 million farmers and processors.

In addition to that pesticides used in conventional cotton plantations have led to important environment damages, methyl bromide and most other organ chlorine pesticides used to g row cotton are classified as potentially carcinogenic, and damaging in many cases the ozone layer. On the other hand, the dye industry is the world's most polluting, as the dyeing processes involving the issue, both groundwater and the atmosphere of large quantities of hydrogen peroxide, sodium, chlorine and sodium hypochlorite. Synthetic products are also outputs of dyeing process along with sulfur, chromium and petroleum, along with copper, nickel and other heavy metals.

The certificated organic cotton is free from all of this. The certification, reviewed by state agencies, ensures that the fields have not been treated with any chemical in at least three years and the minimum distances from other fields with crops that can use any polluting product is respected. Organic cotton brands such as Fox-Fibre go further and say that the fields have been three to ten years without being treated with chemicals, maintain the security strip around, and of course, do not use any product that is not natural during cultivation. Even the common pests of these plants are controlled with biological control. Organic cotton is grown using methods and materials that have a low impact on the environment. Organic production systems replenish and maintain soil fertility, reduce the use of toxic and persistent pesticides and fertilizers, and build biologically diverse agriculture. Third -party certification organizations verify that organic producers use only methods and materials allowed in organic production.

Organic cotton fiber is used in everything from personal care items (sanitary products, make -up removal pads, cotton puffs and ear swabs), to home furnishings (towels, bathrobes, sheets, blankets, bedding), children’s products (toys, diapers), and clothes. In addition , organic cottonseed is used for animal feed, and organic cottonseed oil is used in a variety of food products, including cookies and chips.

However it is not commonly known that cotton can grow in colors other than white. It is a fact that 5,000 years ago in America the cotton was grown in shades of brown or green, in Tehuacán (Mexico) or Huaca Prieta, on the north coast of Peru. The Industrial Revolution and the subsequent emergence of cheaper chemical dyes in the early twentieth century, replace the plantations of color grown cotton being cheaper to grow white cotton and then dye it. In addition, in this industrial system, the color palette is unlimited. The cotton plantations of color were relegated to a few indigenous tribes of the Andes but now Fox Fiber has recovered these color varieties of cotton in Buffalo, Coyote, Palo Verde and Green, increasingly known and appreciated.

3. TEXTILE FIBERS FROM HIGHLY RENEWABLE RESOURCE

Bamboo is not a tree, but a grass. It is easily sustainable as it can handle drought as well as flooding. Farming bamboo is not harmful to the environment because it does not require any pesticides or herbicides. In addition, bamboo can be replanted each year. One of its greatest qualities, as far as textile production, is that it is very fast growing. Bamboo can grow 75 feet in 45 to 60 days.

The more global warming gets attention in the news, the more appealing organic bamboo production becomes. Just like wood, bamboo can be used as a building material, and it is extremel y popular for flooring. The difference is that bamboo grows and spreads quickly and is easily replaced. It does not take years to reach its full size like most trees do. In fact, it can grow several feet in one day. Bamboo grows faster than any other plant in the world, making it one of the most sustainable products in existence. Another advantage to organic bamboo is that it is simple to grow. Bamboo is not a natural target for pests since it is simply a grass, which means growing it without pesticides, is very easy.

Using pesticides on bamboo is the exception, not the norm. Moreover, bamboo fiber is a unique biodegradable textile. As natural cellulose fiber is 100% biodegradable in soil by microorganisms and sunshine. Decomposition process produces no environmental pollution. Bamboo fiber comes from nature and everything returns to nature in the end.

Many Asian countries overall development policy is to make limited use of natural resources, concentrating on the renewable ones. This policy recognizes the importance of rural activities, such as agriculture, forestry and handicrafts production. Bamboo is involved in all of these. The demand for bamboo is bound to increase over time, particularly for use as fodder and other multipurpose uses. There is ample scope for greater bamboo production, especially in the higher areas where communities are widely dispersed and agriculture is less profitable.

The bamboo species for textile production is *Phyllostachys heterocycla pubescens*, commonly known as *Moso bamboo*. It is primarily grown in China where there are the most textile mills. *Moso bamboo* is the largest of the temperate zone bamboo species, is grown on family-owned farms, provides edible shoots, but is not what beloved panda bears eat.

There are two ways to process bamboo to make the plant into a textile substrate: mechanically and chemically.

Mechanical process: The woody parts of the bamboo plant are crushed and then natural enzymes are used to break the bamboo walls into a mushy mass so that the natural fibers can be mechanically combed out and spun into yarn. This is treated as an eco-friendly manufacturing process. Bamboo fiber product made from this process is sometimes called "bamboo linen". Very little bamboo linen is manufactured for clothing because it is more labor intensive and costly.

Chemical process: Chemically manufactured bamboo fiber is a regenerated cellulose fiber similar to rayon or modal. Chemically manufactured bamboo is sometimes called bamboo rayon because of the many similarities in the way it is chemically manufactured and similarities in its feel and hand. Bamboo fiber is chemically manufactured by "cooking" the bamboo leaves and woody shoots in strong chemical solvents such as sodium hydroxide and carbon disulfide in a process also known as hydrolysis alkalization combined with multi-phase bleaching. This is basically the same process used to make rayon from wood or cotton waste by products.

Eco friendly process to produce bamboo fiber The chemical manufacturing process used to produce lyocell from wood cellulose can be modified to use bamboo cellulose. The lyocell process, also used to manufacture tencel, uses N-methylmorpholine-N-oxide (NMMO) as a solvent to dissolve the bamboo cellulose into a viscose solution. Hydrogen peroxide is added as a stabilizer and the solution is forced through spinnerets into a hardening bath which causes the thin streams of viscose bamboo solution to harden into bamboo cellulose fiber threads. The hardening bath is usually a solution of water and methanol, ethanol or a similar alcohol. The regenerated bamboo fiber threads can be spun into bamboo yarn for weaving into fabric. This lyocell processing is substantially healthier and more eco-friendly because N-methylmorpholine-N-oxide is supposedly non-toxic to humans and the chemical manufacturing processes are closed-loop so 99.5% of the chemicals used during the processing are captured and recycled to be used again. Only trace amounts escape into the atmosphere or into waste waters and waste products.

Because bamboo fabric has excellent wicking properties, it is a perfect choice for fabric in garments that will be worn close to your skin like workout clothes or undergarments. Bamboo is commonly woven with cotton in order to make it cost effective to produce as well as to allow for more stability and color variations. Bamboo can thrive naturally without the use of pesticides as it is seldom eaten by pests or infected by pathogen. Bamboo contains a unique anti-bacteria and bacteriostasis bio-agent. This substance is maintained in the finished bamboo fabric as it is bound tightly to the bamboo cellulose molecule. Bacteria will propagate rapidly in cotton and other fibers obtained from wood pulp, forming bad smell and even cause early degradation of the fiber in some cases. But it will be killed 75% after 24 hours later in bamboo fiber. People who have sensitive skin or who are allergic to fabrics made from wool or hemp find that they can wear organic bamboo fabric without any problems. Bamboo fabric is often compared to cashmere because is it so soft and smooth. Clothing made from organic bamboo fabric tends to be warmer in the winter and cooler in the summer. This makes it a versatile option that is easy on the pocketbook as well as the environment.

Bamboo fiber is considered a "natural, green and eco-friendly fiber the new type of fiber of 21st century."

4. CONCLUSIONS

Frequent changes in fashion trends lead to increased and mostly useless production, but also to excessive pollution. Textile industry produces 2 million tons of waste annually, 3 million tones of CO2 and 70 millions tones of wastewater. In particular dyeing process is of great environmental harm. This extreme waste of resources and environmental pollution can be stop ped by using organic textiles, but also by a set of simple measures taken by proper authorities in identifying and labeling organic textile products in order to help the consumer in a conscious choice.

The world is in a continuous changing process and surviving on the market it would be possible only for those organizations that will be able to adapt there's activities to the present conditions of the limited energetic resources and awareness of the impact of environment pollution on the quality of human life.

Among the advantages for the production and use of organic clothing, can be mentioned less pollution released into the environment and lower risk for skin intoxication, because the natural fibers contain less allergen that fibers treated wi th chemicals. It also allows reducing the intensive cultivation of cotton, which damages the environment.

5. REFERENCES

1. Drambei Petronela, Fibre textile ecologice naturale. Bumbacul, *Industria Textila*, **Vol. 51:** 159-162 , No.3/2000, Bucuresti.
2. Ingram Mirill: Producing the natural fibre naturally: Technological change and the US organic cotton industry, Agriculture and Human Values , Vol. 19: 325 –336, 2002, Kluwer Academic Publishers, Netherland.
3. Jiborn Per, Grolink AB: Ecotextiles, *Available from* http://www.grolink.se/Resources/studies/ecotextiles.PDF , *Accessed:* 2009-07-15
4. Militký Jiří and Pavel Jančík, Organic Cotton – Myth or Reality, 16th International Conference Strutex, December 2009, Liberec
5. International Working Group on Global Organic Textile Standard , *Available from* http://www.global-standard.org/, *Accessed:*5.10.2009
6. Organic Trade Association, http://www.ota.com, *Accessed:* 2009-04-21
7. International Cotton Advisory Committee, (I.C.A.C.), www.daff.gov.au/agriculture-food/wheat-sugar-crops/crops/market_access/international-cotton, *Accessed:* 2009-02-07
8. "Tencel HS260" fibre properties, *Asian Textile Business*, June 1, 2003, *Available from* http://www.questia.com/, , *Accessed:* 2009-08-23
9. International Organic Exchange Organization, http://www.organicexchange.org/Documents/press_08market.pdf , *Accessed:* 2009-04-12