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THE USE OF MULTIMEDIA TECHNOLOGY IN THE INSTRUCTIONAL DELIVERY OF THE COURSE „GARMENT CONSTRUCTION”

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Abstract: *Against the backdrop of the rapid change and growth of information and communication technology (ICT), the use of computer technology in education has become an essential requisite. With the Millennial generation, who has been surrounded by high volume of multimedia content, the concept of computer-assisted learning is intrinsic. Computer is simultaneously perceived as a toy, tool, and a source of information, which has ingrained in people's habits of communication, education and research. The concept of the computer-assisted learning refers to the delivery of new knowledge; the use, consolidation, and synthesis of the newly acquired knowledge. As suggested, computer technology is „the most important innovation in the modern pedagogy" for its impact on the efficiency of education. The pupil-computer interaction enables the diversification of teaching strategies and opens up a whole wealth of structured information with many opportunities for its visualisation. However, it is not the computer in itself with its multimedia configurations that lead to the educational enhancement; but, the quality of the digital learning resources and their appropriate incorporation in classroom aligned to the innovative pedagogy that counts the most. The modernisation of pedagogy involves, thus, the presence of hardware (computer), software (programs) and the capacity to use, adapt, and harness the ICT in the instructional environment. This paper presents the experience of the use of computer technology in one of the courses offered by vocational schools that aims to develop both general and professional competencies, as well as the capacity to work with diverse types of multimedia contents.*

Key words: *teaching and learning aids, ICT, professional competencies, vocational education and training*

1. INTRODUCTION

The key to the success of a clothing company is to manufacture high quality and competitive garments, which can only be made by highly qualified members of staff who have received innovative training. With the modernisation of clothing manufacture, the requirements for the future specialists are changing rapidly, leading to the review of the vocational education and training. There is an increasing call for the adaptation of the contents, evaluation of the teaching methods, and incorporation of computer technology in the instructional environment [1].

2. GENERAL INFORMATION

Over the last century, there have been many profound technological, socio-economic, and cultural transformations. The world is driven by an information explosion. According to statistics, the amount of published information grows by 200 millions of words or 5000 pages of information per hour; whereas a human being can typically learn 0,1 of one page of information during the same period of time. Accordingly, the acquired knowledge becomes obsolete very quickly. Because of the societal changes, the vocational education and training is becoming an indispensable foundation for the future professionals, who must become aware of the requisite of engaging in lifelong learning and developing their employability skills throughout their career.

The modern world is dominated by multimedia technology. With the growing use of computer technology in education sector, there has been an increase in the incorporation of multimedia technology and digital tools along the traditional methods [2] to facilitate the vocational education. Undoubtedly, it is hard to imagine that only two decades ago, the projectors and TVs were perceived as among the most advanced tools in education. Currently, the classroom includes multimedia systems [3], computers, projectors, and other „wonders" of the technology such as the interactive whiteboards equipped with Smart Boards systems and video cameras.

Alongside the significance of learning objectives, contents, methodology and methods; the teaching and learning aids constitute a major component of the instructional delivery. The appropriate use of teaching and learning aids ensures the efficiency and added-value of learning. The selection of teaching and learning aids have to be aligned to the learning objectives, course contents, methods and teaching techniques, the student age particularities and their individual needs.

Computer technology provides an excellent range of learning opportunities. The possibilities vary from the transmission of information with the help of a Power Point presentation projected on a screen to the incorporation of computer technology to deliver an entire lesson where technology assist the teaching, learning and assessment processes. The need to use computer technologies in education is grounded in the empirical studies suggesting that the interactive learning with its multimedia elements helps students to retain 75% of the transmitted information; whilst, engaging with only the audio-visual materials enables students to retain 20% of information. The multimedia tools typically include a mixture of text, graphics, audio, animation and video that can be viewed on a computer or any other mobile device. Using such multimedia tools to present new information, is said, to enhance student attention, facilitate their understanding and data interpretation, which in turn leads to the construction of their own knowledge.

ICT is the application of equipment to create, store, transmit, and share different types of information within different contexts (business, communication, still images, visual data, multimedia presentations, etc.). It is a term that comprises both communication and technology. Accordingly, the use of computer technology in education is an unequivocal matter and supported by many arguments. Computer technology has the potential to encourage innovative and interactive learning and to stimulate teacher and student creativity. It can increase the appeal to the scientific contents and the efficiency of information transmission. As has been shown, the application of technology can enable students to diversify their search and learning resources, learn at their own pace and develop digital skills through their experience of working on various school projects and tasks [4].

The application of ICT in education benefits both students and teachers to provide an enhancement of the teaching and learning process. Students can always return to digital resources and contents to check upon their understanding and construct their own knowledge, as well as to discover and explore complex concepts and experiments in virtual environment. Students and teachers can search, access and update the necessary information from any location. Teachers, like students, gain opportunities to demonstrate complex phenomenon taken from real-life contexts, which can be subsequently repeated by students in the virtual setting. It can also enable teachers to spend more time on additional explanations of certain notions and on working with individual students. The application of ICT helps teachers to make more interactive lessons, and therefore, to encourage students to take an active role in their own learning, which mirrors the key principles of the student-centred learning.

The use of computer technology should not be mistaken for the venture of putting the existing contents in new formats. Instead, this initiative should transform the way teachers think and deliver with a focus on the consideration of student individuality and capabilities. The learning technologies expand the communication and interaction venues where students and teachers can constantly engage. In this way, emails and chat rooms serve as a way of communicating and exchanging the assignments, documents, questions and answers [5].

3. EXPERIMENTAL RESEARCHES

There has been an increasing agreement that the traditional teaching methods can be uninspiring and cumbersome, often generating poor student performance. Additionally, they can be time-consuming, predominantly when the school goal is to achieve good academic performance. Given that, there is a shift towards the use of the computer technology in vocational education and training, with a particular attention given to the application of Microsoft Power Point, which is one the most popular software for creating lesson presentations. To become an effective pedagogical tool, Power Point presentation should essentially deliver an appropriate volume of information, which is accessible to the audience and aligned to the learning objectives set for that particular lesson.

The construction of garments constitutes one of the most fundamental components of the clothing manufacture, encompassing two consecutive steps:

- *Creative stage* includes the selection of the construction method and pattern making and sample making approach.
- *Technical stage* refers to the construction of the garment samples, prototypes and elements, as well as working on other technical documentation [6].

As part of the course „Garment Construction”, students get acquainted with a range of advanced and progressive methods regarding the industrial construction of clothing, with an important attention given to the human-clothing-environment system. Students are introduced to the fundamental notions of clothing construction, pattern-making, pattern grading to the wearer’s measurements and body shape, to the hygiene requirements, particularities of the fabrics, style and fashion trends. Students have possibilities to use different software to construct and design complex images and graphics. The application of Power Point tool helps to enhance the visualisation of the complex notions and procedures. For instance, with the help of Power Point application and other editing software, students can follow step-by-step the process of taking the body measurements (see fig. 1) and to trace step-by-step the construction stages (see fig. 2). Importantly, the presentation enables students to verify the position of the human body in motion and to make themselves the patterns of the garment (cut, join different elements). Such presentations are viewed as a particularly useful visual aid, which can be embedded in vocational education and training because they not only contain important factual content but also serve a practical and hands-on function.

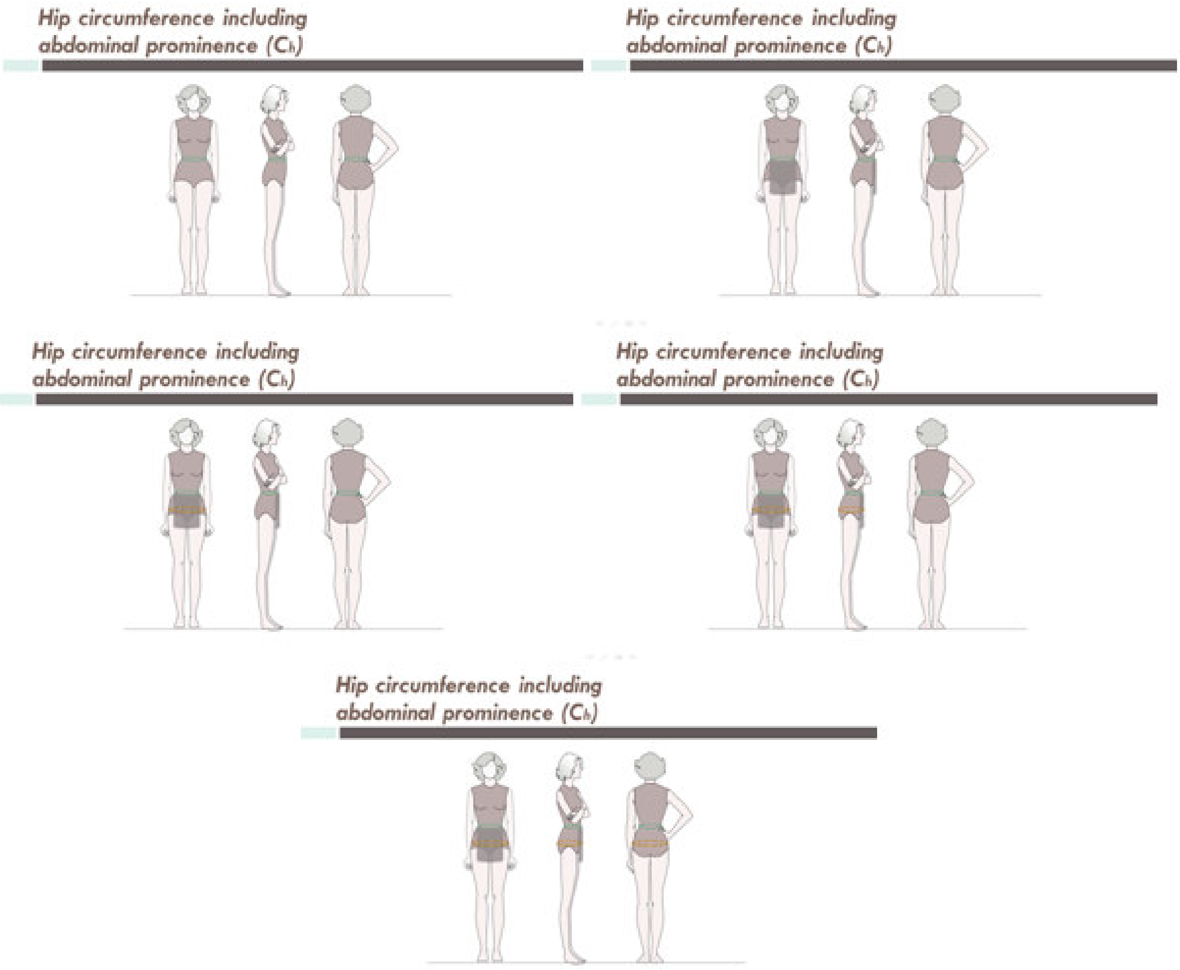

Fig. 1: *Step-by-step guide to take hip measurements, including the abdominal prominence.*

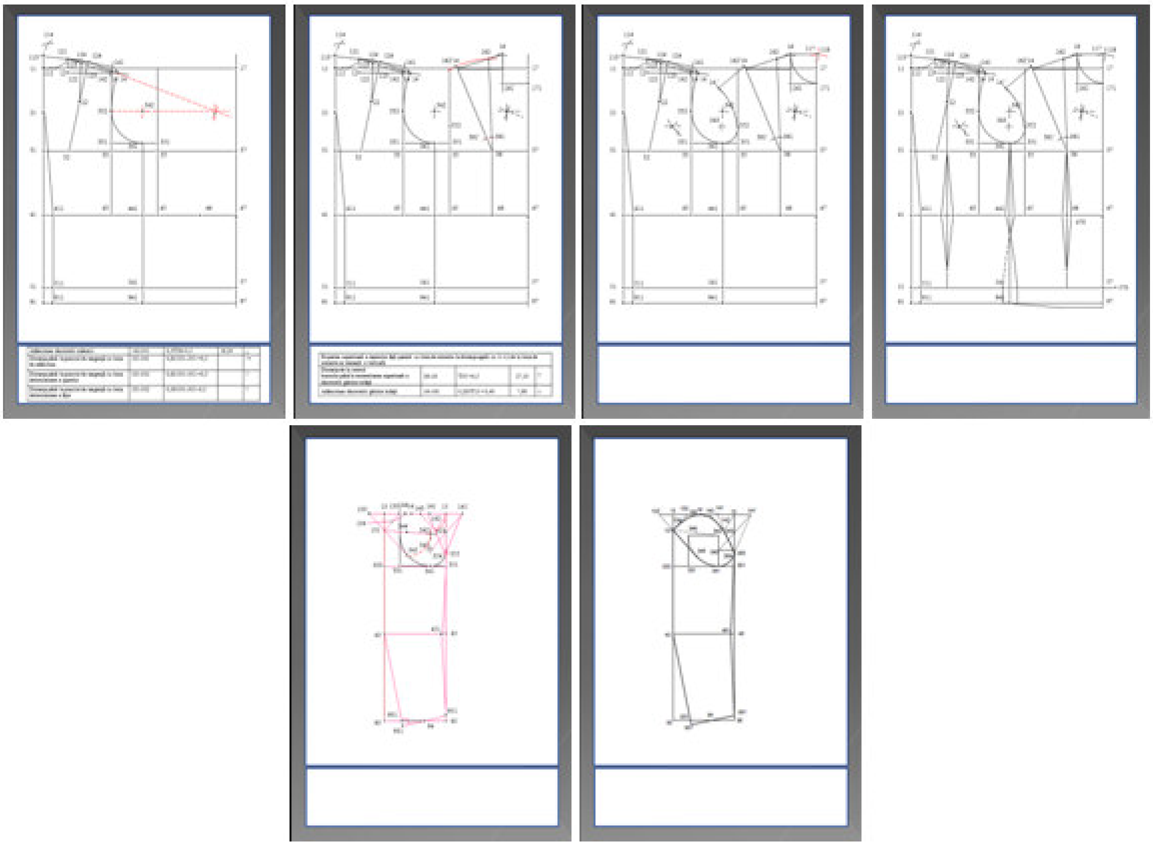

Fig. 2: *Step-by-step guide to pattern-making.*

As shown, the instructional delivery at the vocational education and training should necessarily include an element of art and aesthetics to introduce students to the field of their chosen profession and to contribute to the development of a more sophisticated set of professional competencies.

4. CONCLUSIONS

In conclusion, we believe that the modern teacher is morally obliged to use innovative teaching and learning materials to ensure one of the most important human rights – the right to a high quality education. The work of teachers in vocational schools should be centred on the incorporation and improvement of the application of ICT in their classroom. Such initiative is extremely vital for students as they engage with the computer technology and its numerous editing software to construct, design, visualise and showcase the results of their work, which will ultimately help them to become highly competitive and skilled specialists in their field of work.

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DYEING COTTON WITH EISENIA BICYCLIS AS NATURAL DYE USING DIFFERENT BIOMORDANTS

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Abstract: *Natural dyes are known for their use in colouring of food substrate, leather as well as natural protein fibres like wool, silk and cotton as major areas of application since pre-historic times. Nowadays, there has been revival of the growing interest on the application of natural dyes on natural fibres due to worldwide environmental consciousness. Some researchers focus their studies on the improvement of these dyes using mordants. Most works use metallic mordants like aluminum or iron are used, but some of them are hazardous. In this work we used a biomordant to solve environmental problems caused by metallic mordants. The effects of chitosan weight molecular in mordanting on the dyeing characteristics and the UV protection property were examined in this study. Chitosan mordanted Eisenia Bicyclis dyed cotton showed better dyeing characteristic and higher UV protection property compared with undyed cotton fabric. To analize the differences of the dyeing, reflection spectrophotometer was used, evaluating the results of CIELAB colour diference values and the strength colour (in terms of K/S value). We conclude that the type of chitosan used affect the dyeing efficiency and the UV protection, showing different behaviour between dye sample using chitosan with low or medium molecular weight.*

Key words: *Chitosan, natural dye, seaweed, UV protection, mordant.*

1. INTRODUCTION

Recently there has been increasing interest in the use of natural dyes in textile industry. This is a result of the enviromental standards imposed by many countries in a response of the toxic and allergic reactions associated with some synthetic dyes [1]. Several works have studied the properties of the natural colourants, which show more biodegradability and higher compatibility with the enviromen [2]. However, it is well known that the problems in dyeing with natural colorants are the low exhaustion colours and the poor fastness properties of dyed fabrics [3]. These problems have been solved using metallic salts as a modants to improve fastness properties ans to develop different shades with the same dye [4-6], but this type of compounds are more complex and it will take a long time for them to complete their natural cycles and return to nature, for this reason they cause a lot of environmental pollution.

Several biomordents have been studied by researches, such as chitosan. This is a deacetylated derivative of chitin, a natural polymer found in the shell of crabs and shrimps. Structurally, chitosan contains two main functional groups, namely hydroxyl and amino groups, as well as ether linkages. It has also been used to treat cotton in dyeing processes [7]. It was found that chitosan increase dye sorption on cotton.

The present study focuses on dyeng of cotton fibres, with the *Eisenia Bicyclis* (seaweed) extract using chitosan as a mordant, using two types of chitosan with diffierent molecular weight (low and medium). The purpose is also investigate the dyeing behaviour and fasteness properties. The comparasons between two different dyed samples were made, the depths of shade were evaluated by K/S value and CIELAB colour differences values of the dyed cotton fabrics and we analized the UV protection of each sample.

2. EXPERIMENTAL

2.1 Materials

The fabric used was a 100% cotton twill fabric with 210 g/m2, which had been chemically bleached in an industrial process. Both type of chitosan, medium and low molecular weight were purchased from the Aldrich Chemical Company and seaweed Eisenia Bicyclis … This seaweed is limited in distribution to temperate Pacific ocean waters, mostly around Japan, although it is deliberately cultured elsewhere, including South Korea and is a species of kelp best known for its use in Japanese cuisine.

2.2 Extract preparation

Aqueous extract was prepared by adding 2 g of Eisenia Bicylis to 200 ml distilled water. The mixture was heated at 100ºC for 1 hour, allowed to stand for 30 min and then filtered. The filtrate was used for dyeing.

2.3 Cotton pretreatment with chitosan and dyeing

A 5 g/L solution of chitosan was prepared, 3 g/L of acetic acid was need to dissolve the amount of chitosan. Were prepared two solutions using different chitosan in each one. Cotton fabrics were treatted by padding (80-85% pick-up). After this time the teatred fabrics were dried at 80 °C and then cured at 120 °C for 3 min.

Dyeing experiments were performed using M:L (material to liquor) ratio of 1:40 with manual agitation using 50% dye concentration. Dye baths temperatures were raised to 90-95ºC for 1 h.

2.4 Methods

Dyed samples were prepared for colour measurement, which was carried out by following a standard procedure. Colour values were evaluated by means of K/S and CIELAB colour-difference values (illuminant D65/10° observer) on Minolta CM-3600d UV-visible spectrophotometer.

The relative colour strength (in terms of K/S value) of different natural dyed cotton fabrics was measured by the light reflectance technique using the Kubelka–Munk equation [8-11].

K/S= (1 - R)2/2R **(1)**

where K is the coefficient of absorption; S is the coefficient of scattering and R is the reflectance.

The method to evaluate the ultraviolet protection factor was composed of an UV lamp, a digital detector of UV radiation and an opaque box [12]. The UV-lamp irradiates at 312 and 365 nm, which belongs to UVB and UVA radiation severally. The detector of ultraviolet rays is found perpendicular to the UV-lamp and the fabric is above it. The system is into an opaque box to avoid lighting interferences.

3. RESULTS

The colour values (L,a,b) and the colour difference values (DE*ab) of the undyed and dyed samples with different chitosan are given in table 1. L* represents lightness value, the higher the lightness value represent lower the colour yield. a* and b* Represent the tone of the colour, positive values of a* and b* represent redder and yellower tones while negative shows greener and bluer tones. As can be noticed, the lightness of the dyeing decreases in both cases while the a and b values are increases respect undyed sample. On the other hand, sample dyed with Eisenia Bicylis extract by using médium chitosan as a mordant show greater difference color.

Table 1: *Colour values and CIELAB colour difference values of each sample.*

	D65/10°			
	L*	**a***	**b***	**DE*ab**
Undyed sample	**95,2415**	**-0,1429**	**3,7158**	**-**
Low chitosan	76,5228	5,4044	12,4749	**21,40**
Medium chitosan	72,06	6,9572	13,2545	**26,05**

Figure 1 shows the value of strength colour K/S and it is clear that the medium chitosan used as mordant have a considerable effect on the dyeability of cotton fabrics with Eisenia Bicylis dye under the same conditions, using the chitosan with higher molecular weight the strength colour is greater.

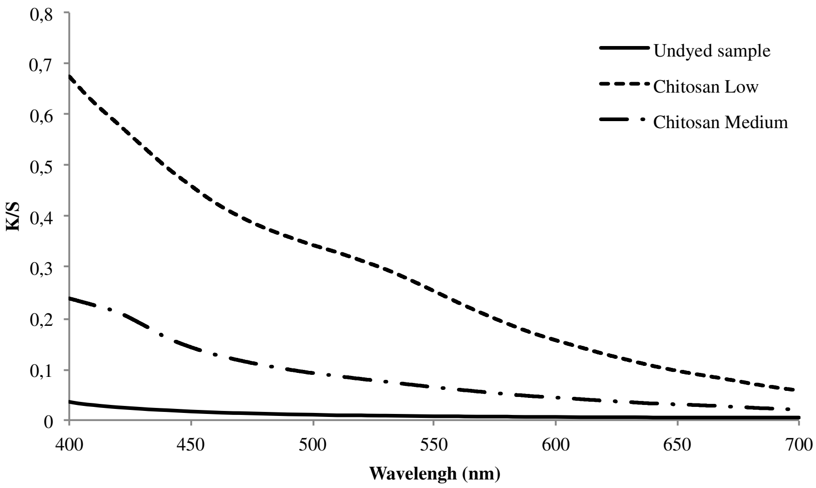

Fig. 1: *The colour strength (K/S) of undyed and dyed cotton fabrics using different types of chitosan*

The results of the UV protection (UPV) for each sample are shown in figure 2, it can observed that both treaments made in this study caused an improvement in UV protection of the cotton fabric.

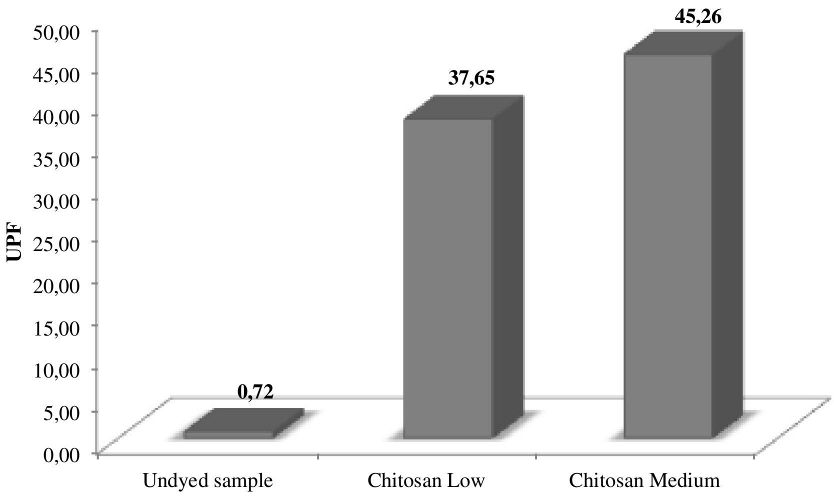

Fig. 2 : *UPF values of each sample*

Cotton fabric dyed with Eisenia Bicylis and chitosan as a mordant offering very good protection (UPF values between 25 and 39). However, there is a significant difference between the chitosan used, as cotton pre-treated with medium chitosan could be classified as excellent UV protection (UPF values equal or greater than 40).

4. CONCLUSIONS

In this study, it was observed that cotton fabrics dyed with a Eisenia Bicylis extract using two chitosan with different molecular weight (medium and low) showed that premordanting with this type of biomordant results an improvement of uniformity and color stregth of dyed cotton fabric. The pretreatment with medium chitosan produces higher K/S value and color differences respect undyed sample.

Bleached cotton fabric have no UV protection properties, whereas when this fabric is pretreated with chitosan and then, dyed with Eisenia Bicylis, we get very good UV protection, being excellent UV protection when chitosan medium is used.

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TEXTILE INDUSTRY APPLICATION OF THE 5S METHOD

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Abstract: *The paper presents the 5S method, developed to ensure ergonomics in the workplace, productivity growth, reducing defects and increasing cleaning. 5S is a fundamental tool to promote continuous improvement process in organizations and represents a transformation in 5 steps of a job, which is characterized by maximum efficiency at the micro level and minimum loss. The tools which can be used for implementing could be the Kaizen circles for training, analysis and implementation, as well as visual elements, posters or graphics. The 5 phases are Seiri, Seiton, Seiso, Seiketsu and Shitsuke, which can be translate as Sort, Set in order, Scrub, Standardize, and Sustain, focusing on orderliness and being applied especially in Japanese factories. The stages includes inputs objectives related to the efficiency and effectiveness of the process, but also subjective, which refers to moral values, education, training, culture. For each S stage, the most important elements which are underlying the implementation and maintain the compliance are described. Any company that applied the 5S program will have quick and visible results, reducing different types of waste. The final section presents a case study and some rules in order to sustain the designed standards and implement a continuous quality improvement. The concluding remarks could be considered as work instructions in order to implement the 5S rules.*

Key words: *TPS, kaizen, clothing industry, visual control*

1. INTRODUCTION

The 5S method was created and developed in Japan, as an important part of the Toyota Production System (TPS). This system was promoted by two Japanese experts, Osada and Hirano, as a way to keep the workspace clean, tidy and accessible, influencing self-esteem and morale [1]. Hiroyuki Hirano, in a case study on manufacturing systems, had firstly integrated production data and many western managers have considered that the phenomenon belongs to rational knowledge. In practice, the management is always based on the development of production and best practice elements and Hirano developed a structure for improving, a knowledge based production development management system. He pointed out a number of steps that can be identified, each being based on the previous one [2].

„ *Quality starts with yourself*" is the motto and as far as we know, the proper functioning base of a company are the trust and the climate of the working environment. The confidence is developing if each employee carries out correctly his duties and respects the existing rules. If there is certainty that each individual will do the right thing, the next step of the analysis is done more efficiently and with confidence. Quality begins with people and therefore, with order and cleanliness, that one can use the 5S methodologies to reach a high quality level.

5S is a fundamental tool to promote continuous improvement process in organizations and represents a transformation in 5 steps of a job, which is characterized by maximum efficiency at the micro level and minimum loss. The system creates an environment where all objects are easier to find and any deviation from the normal situation becomes apparent by visual management methods. In the same time, 5S techniques maintain quality, promote a significant costs reduction by eliminating the losses and provides the best framework for progress throughout the organization.

The 5 phases are *Seiri, Seiton, Seiso, Seiketsu* and *Shitsuke*, which can be translate as Sort, Set in order, Scrub, Standardize, and Sustain, focusing on orderliness and being applied especially in Japanese factories. There are several variants of the 5S method. Some are simpler and shorter, as other situations involve complex studies on a longer period of time and more space. In some companies, the 6th S is added – the Safety step, combining orderliness with safety and being described by clean, safe, and orderly. There are other phases as security and satisfaction that could be added, enhancing the consciousness. Originally, Toyota adopted a 4 phase system, the concept of “self discipline” or “sustain” being traditionally embedded in the Japanese culture.

2. A SHORT DESCRIPTION OF THE METHOD

Each stage includes inputs objectives related to the efficiency and effectiveness of the process, but also subjective, which refers to moral values, education, training, culture. Initial implementation should be fast and simple, which lasts one or two days, followed by a second phase a few months later by applying specific techniques. First, the focus is on selecting, cleaning and handiness of an individual workplace, so it can be seen improving the efficiency and effectiveness of a specific activity. Then, basic standardization for maintaining the initial situation is designed, and a Steering Committee for sustaining the activities is established. The 5S Teams must have 5 to 12 members, who work in the same sector of the department, while the Steering Committee is formed by 10 persons from all stages and levels. The 5S coordinator assists the teams and completes the policies of the Steering Committee.

The tools which can be used for implementing could be the Kaizen circles for training, analysis and implementation, as well as visual elements, posters or graphics, which are Visual Control tools also [3]. For each S stage, the most important elements which are underlying the implementation and maintain the compliance are presented [4].

2.1. Sort

To sort and classify means to divide and arrange according to type, size, categories or frequency of use, labeling with different colors (green, yellow, red, blue) and place in special locations. To achieve a high classification, it must begin to classify based on:

- What should you need and why?
- What is needed, why is it necessary?
- What is sufficiently, why is excessive? (to reduce costs)

In offices, halls, warehouses or shelves, more items than can be normally used are found in a disorderly manner. By classifying tools and objects, the following advantages can be observed:

- unoccupied spaces can be used for different purposes
- reducing of closets and shelves agglomeration etc.
- disposal of used items, thereby controlling the use lifetime
- elimination of spare parts for older models
- eliminating long storage time in inventory
- avoiding excessive inventories and unnecessary movements
- eliminating unnecessary costs.

2.2. Set in Order

To organize is to set in order a group of objects, to establish a rational, methodical and systematic order of all production elements (furniture, equipment, documents) with the aim to always have the necessary amount when they are needed. The organization is achieved in the following guidelines:

Fix a storage location (decide where things are preserved), with the steps:

- removal of unnecessary things
- selecting a classification and organization of the deposit
- standardization of elements titles - labels

Set-up a storage method (decide how to keep things), with the points:

- choose an appropriate method for storage type
- display the items titles
- facilitate storage and remove items

Maintain the regulations respecting the storage type, with the key points:

- daily control (not to be lack of material)
- improving of procedures
- training enhances efficiency for storage and disposal actions

For unnecessary objects, a central red area is fixed. Things that can be used in the future will be placed near the work place and the absolutely necessary elements are placed into the workplace.

2.3. Scrub

The implementation of 5S cleanliness is the first step to a flawlessly job and is obtained by removing what is not necessary to the workplace and keeping everything in the best possible state, based on maintenance and constant care.

There are 4 steps to implement the Scrub step:

Step 1: Divide the areas / roles or responsibilities
Step 2: Implement the cleaning by teams/on areas
Step 3: Find improvements
Step 4: Define regulations to improve

The instructions for maintaining cleanliness are:

1. Clean before starting to work;
2. Before leaving, set in order and clean: removing garbage, what is not necessary to ease general cleaning, rearrange each object in place;
3. Use appropriate places and remove garbage containers;
4. Create a custom for previous points: first cleaning the work place, then the equipment, the department and the company.

2.4. Standardization

Standardization denotes fixing specifications, using rules and procedures. Standardization is the key to maintain high standards of efficiency at work, ensuring visibility in the workplace can guarantee that the necessary measures are taken immediately. It is necessary that all employees, from management to operators are informed on the methodology of 5S and have at their disposal all the required information. There must be a communication between different departments of the company, in order to leverage the interest of all those who are not convinced [5].

Standardization of 5S activities refers to normal working activities and consists in developing work instructions: color schemes, aisle marking, cleanliness standards and cleaning schedules.

2.5. Sustain

Sustainment is usually the most difficult part of 5S. For a good sustenance and discipline, there are some aspects to improve:

• Understand the „empathy" concept as the ability to imagine you could be in that situation
• Develop collegiality at work, and share information with others
• Create conditions for each employee to apply what he had learned

All activities and attitudes should be standardized and repeated until they get to be part of the company culture. It is an eminently a human stage that can not be automated [6].

2.6. Conclusion

A 5S program can not be implemented without the commitment and responsibility of employers and employees. There are conditions necessary but not sufficient to be provided, such as:

- The employee must respect the following rules: compliance with personal hygiene, maintaining adequately the equipment and cleaning, not using alcohol, tobacco or similar substances, supply a correct hygienic environment, use an appropriate behavior in the workplace, benefit from adequate rest and sleep, positive attitude, compliance with regular medical examination, maintain a healthy life, recreation etc. and compliance with safety.
- The company must provide suitable working conditions and maintaining cleanness in appropriate conditions of a healthy environment: cleaning facilities, adequate lighting, eliminating excessive and harmful noise, subdivision of excessive noise areas, removing unwanted and toxic odors (smoke and dust), removing unwanted vibrations, and maintaining a pleasant working environment.

3. CASE STUDY

We have performed a case study in one of the departments of a garment factory. The steps of the 5S method for the organization of the work place have been followed and examples of good practices will be presented. The following remarks could be considered as work instructions in order to implement the 5S rules. For the Sustain stage, some operations have been watched over a period of 9 weeks, with daily records at the end of working hours.

Storage areas have been identified using marking with colored lines. Thus, for the finished products, the color used is green. In the case of nonconformities, defects or quarantined products, the area was flagged with red, and for waiting areas or packaging materials, we used blue. Crossing areas are marked by yellow lines. Figure 1 shows an example of complex correct marking.

Fig. 1*: Floor marking for different areas*

The floor lines must be visible and undamaged, respected and maintained by the work team. Figure 2 shows to examples of conform and nonconforming marks.

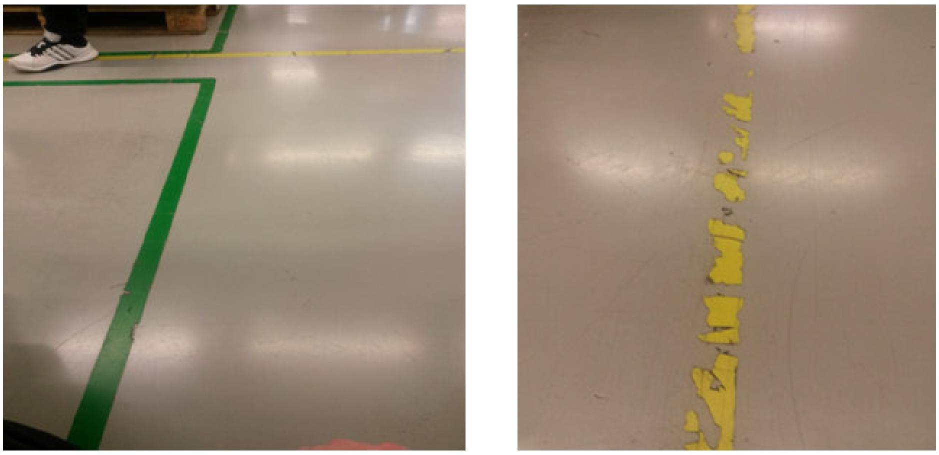


Fig. 2*. Conforming and non conforming aisle markings*

The storage cases used in the production facility have the following color coding and function:

- Red cases contain non-conforming products and are placed on the red marked areas
- Grey folding cases and blue ones containing finished products are stored on the spaces marked in green
- Large blue or grey cases are containing raw materials or components and have been placed on shelves or spaces marked in blue

All cases must be identified by standard labels, as shown in figure 3. The pools and cases must be clean and free from dust or other foreign objects. The products stored in grey pools and cases should not exceed the established height as this can lead to product mix or their contamination in the case of falling. The grey storage cases that have passed the metal detector must be covered with a cardboard or cover (if applicable) to prevent the fall of foreign objects and their contamination.

Broom and dustpan must always be stored on the standard panel for cleaning tools and arranged as presented in figure 5. The scissors and pencils must be mandatory attached together, while the metal rulers kept in optimal conditions, calibrated and store in their designated storage place. The dummy check for the metal detector, used in order to avoid product contamination with dangerous objects, needs to be calibrated and in good working order. Scissors must be attached to the work place, with a blunt tip to avoid puncturing the material.

Fig. 3*: Grey folding cases for finished products*

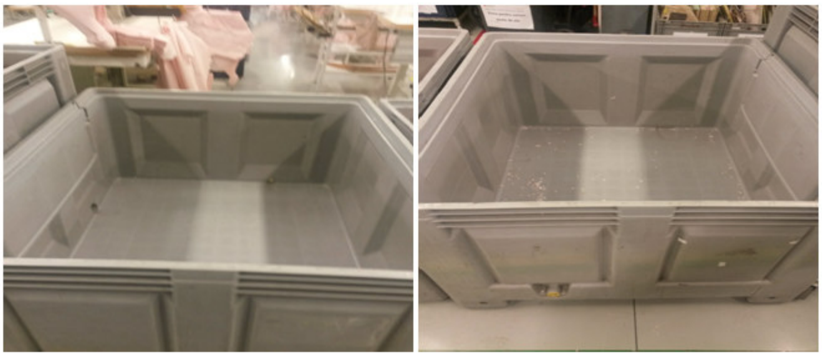


Fig. 4*: Conform and nonconforming pools*

Fig. 5*: Correct and incorrect positioning of cleaning tools*

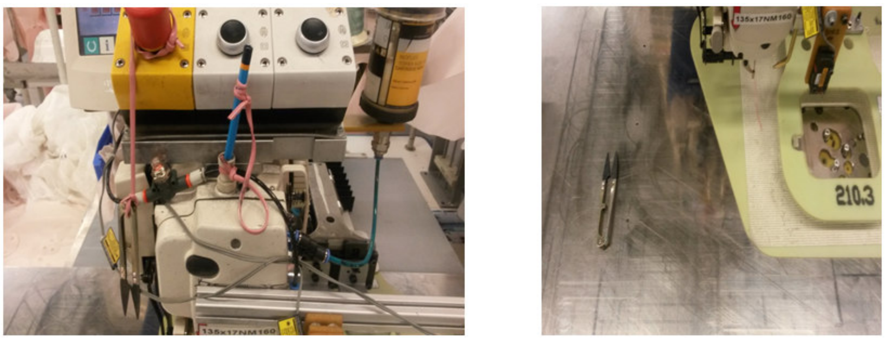
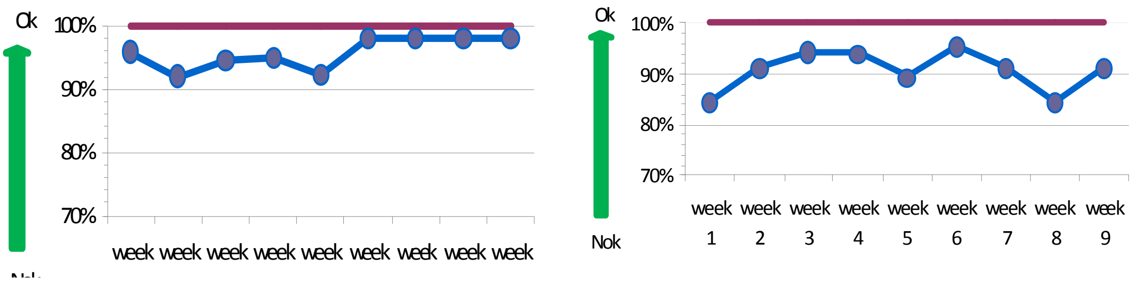


Fig. 6*: Conforming and nonconforming storage of scissors*

In order to sustain the 5S rules, the placement of cleaning tools and grey cases have been monitored during 9 weeks, with everyday sampling. Graphics in figure 7 presents the percentage of correct positioning for each week as a average value. The responsibility and awareness of the operators regarding the 5S rules have shown some improvement along the observed period of time.



a) b)

***Fig. 7**: Percentage of correct positioning of a) cleaning tools and b) product grey cases*

4. CONCLUSIONS

5S can be considered a philosophy, a way of life, which can raise the morale and create a good impression to customers and enhance the efficiency. Any company that applied the 5S program will have quick and visible results, reducing different types of waste, in respect of lean manufacturing principles, removing all the forms of waste from the value stream (cycle time, labor, materials, and energy).

The benefits of applying this method in the company are the following:

- support the timely delivery;
- improve the products quality and reduce the number of defects;
- increase the productivity;
- reduce the loss of material, time and space (prevents waste);
- reduce the warehousing and inventory costs;
- reduce the downtime due to equipment malfunction;
- increase employment security.

The employees will feel more comfortable at work and the continuous improvement actions will lead to less waste and better quality, affecting the company's profitability and competitiveness.

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GEOTEXTILES FROM RECOVERED FIBERS

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Abstract: *Technical textiles, present the the most dynamc branch of the textile industry and highest rates are recorded in geosynthetics, including geotextiles, geomembranes, geogrids, geocomposites and geocelule. In concordance with ASTM D 4439-87geotextile is "any permeable textile material used for foundations, soil, rock, earth, or other material geotehnic. In general, geosynthetics are planar structures produced from polymeric materials, for example synthetic fiber used with rocks, rocks, gravel and earth ground works''.The use of synthetic fibers in textile production recovered packaging is an effective way to ensure environmental protection. from fiber the first use, using the same process of punched by interweaving on the Spinnbau-Thibie-Asselin machine. In this paper presents research findings on some of the properties of spun fiber geotextiles from PET packaging compared to fiber geotextiles obtained from the first use, using the same process of punched by interweaving on the Spinnbau-Thibeau-Asselin machine.*
In Romania, after already outdated data, producing about 250 tons of unit doses PET of which about 10% is recovered by processing them into granules and /or fibers by the company Geenfibre Buzau and production of these fibers Iasi. Use untested materials, in general, and geotextiles in particular, contribute to improving the environment.

Key words: *nonwovens, polyester fibers, packaging, textile, characteristics*

1. INTRODUCTION

Technical textiles, present the the most dynamc branch of the textile industry and highest rates are recorded in geosynthetics, including geotextiles, geomembranes, geogrids, geocomposites and geocelule. In concordance with ASTM D 4439-87geotextile is "any permeable textile material used for foundations, soil, rock, earth, or other geotechnical material [1, 2, 3, 4].

Generaly geosynthetics are planar structures produced from polymeric materials, for example,synthetic fiber and used with rocks, rocks, gravel and earth ground works . Like any material manufactured in a controlled manner, geosynthetics has the advantage of uniformity over the entire surface properties and availability of their use on any site. If geosynthetics with reinforcement function, we obtain a considerable improvement in the mechanical properties of the earth's soil, which allows building otherwise difficult or even impossible (or nearly vertical support structures of vertical, steep slopes, land foundation very compressible etc.). The materials Geotex with the function like filter or drain its imposed by the ease with which a drainage system is achieved without the need for sorting granular material [3, 5, 6].

2. THE PRINCIPLE OF INTERWEAVING OPERATION

2.1 General aspects

By this technology results a non-woven fabric, with certain properties depending on destination, by consolidating and compacting layer of fiber due of felting process. The operation consists in tying or interweaving fibers to each other by means of needles provided with notches oriented to top disallowed. Normally to obtain interlaced woven textiles can be used all fiber types, even those with smooth body, provided that these fibers to be long enough to form loops.

The maximum depth of penetration of the needles is depends on the its type of used on their length, the distance between those plates, the height and angle of the blow. Use of the greater depth of penetration means a higher degree of felting of the fibers in the product. Also posibility to get high densities of materials, makes the interweaving technology to be specifically designed to obtain nonwoven textiles used as textile filters and geotextile. For obtain this material it use polyester fibers, polypropylene, polyethylene, bicomponent , bast, jute etc.

2.2 Experimental researches

The aim of the research was to obtain nonwoven textiles for use as geotextiles, width 5.40 m with fibers obtained of packaging PET and its quality analysing compared with nonwoven textiles for use as geotextiles, with the same recipe, wich used virgin polyethylene fibers.

Was obtained two types of materials nonwoven textiles for geotextile, geopetre and geoprint,using the fibers in next percentages of participation in the mixture:

1. geopetre -geotextil from recovered polyester fiber;
   - 80% fiber 6.7 dtex / 64 mm by recycling PET packaging;
   - 20% polypropylene fibers 6,7 dtex / 80 mm white from the first use;
2. geoprit - geotextil from fiber to first use:
   - 80% polyester fibers 6.7 dtex density length / 64 mm;
   - 20% polypropylene fibers 6,7 dtex density of length / 80 mm white from the first use.

Characteristics of polyester fibers, manufacturing SC GreenFiber International S.A. Buzau and China production are presented in table nr1.

***Table 1:** The characteristics of the polyester fibers 6.7 dtex / 64 mm*

Carachteristics	Values S.C.Minet S.A Rm. Valcea	Values China	Working method	
Length density [dtex]	6,7 ± 15%	6,61	6,64	STAS 8468-74
Tenacity [cN/tex]	> 26,5	30,48	31,25	STAS 8520-80
Elongation[%]	50 - 80	73,35	75,00	STAS 8520-80
Fiber Length [mm]	64 ± 10%	65,51	64,54	STAS 7638-77
Wrinkles number [nr./inch]	8 ± 1	8,67	8,88	STAS 91398-90
Oil content [%]	0,20 ± 0,07	0,22	0,23	STAS 8468-74

The analysis of data in the table 1 seen that measured characteristic values for the two types of fiber are within the limits required by the internal standard used. The differences are statistically allowed and allow assessment that as between the two versions of fibers does not appear essential differences. The characteristics of the density length polypropylene fibers 6,7 dtex / 80 mm are presented in table 2.

***Table 2:** The characteristics of the density length polypropylene fibers 6,7 dtex / 80 mm*

Caractheristics		Lenth density variation [%]	Lenth of cut variation [%]	Tenacity [cN/tex]	Elongation [%]	Number winkles nr.wrk/10mm	Content finishing substances [%]
Quality specifications		± 10	± 10	Min 4,5	Max 90	Min 4	0,3 – 0,7
VHTS 6,7-80-100	7/PL1	+1,49	+4,00	5,24	87,4	4,3	0,52
VHTS 6,7-80-100	1/PL1	+1,19	+3,50	5,14	76,5	4,3	0,52
VHTS 6,7-80-100	2/PL1	+0,45	+4,25	5,20	82,1	4,3	0,48

Analyzing the data in table 2 is found that the values of fiber characterization corresponded to the specified internal norm. The machine Asselin, was regulate to work both versions of geotextiles to the following parameters presented in the table 3.Asselin punched machine was adjusted to work in both versions of the following parameters geotextiles (table 3).

2.3 Test conditions of nonwoven textile material properties for geotextile

The properties of geotextiles are extremely varied due to the specifics of the use .In this paper, we will analyze the mass per unit area, thickness, tear strength, elongation at break, resistance to punching. The Properties of Geotextile of fibers from PET packaging recycling were compared with those of geotextile from first use fibers and determinate in accordance with the following standard.

The physico-mechanical properties are: thick load of 20 kN / m^2, [mm], according EN 964-1: 1995; breaking force in the longitudinal direction and the transverse direction [kN / m] according SR

ISO 10319: 1997; elongation at break in the longitudinal direction and the transverse direction [%], according SR ISO 10319: 1997; punching CBR [N], according. EN ISO 12236: 07.

Table 3: *The works parameter of the machine Thibeau Asselin A50*

Interweaving density D [sinking/ cm^2]	180	187	180	190	180	180	187
PIL collectors tape speed [m/min]	2,4	2,4	2,4	2,4	2,4	2,4	2,4
TE conveyor belt speed [m/min]	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Draft between PIL – TE[%]	5	5	5	5	5	5	5
The speed of the stretching group SFD [m/min]	2,8	2,8	2,8	2,8	2,8	2,8	2,8
Draft between TE - SFD [%]	10	10	10	10	10	10	10
Output cylinder speed Vs [m / min]	5,5	5,5	5,5	5,5	5,5	5,5	5,5
Draft between SFD – Vs [%]	65	65	65	65	65	65	65
Dratf SFD [%]	20	20	20	20	20	20	20
Advance [mm]	6,4	6,2	6,4	6,1	6,4	6,4	6,2
D - punched density, PIL - band collectively TE- conveyor, SFD - group stretching fibrous layer Vs - cylinder output, VBC - tape speed card, VBP - speed folded strip							

All determinations were performed in compliance with the standard conditions of temperature and moisturing in laboratory tests for SC Minet S.A. who has credentials ISO 9001 - Quality Management System; ISO 14001 - Environmental Management System; OHSAS 18001 - Management System Occupational Health and Safety, and RENAR the accreditation certificate no. 337-L from 07.05.2007 in accordance with SR EN ISO 17025: 2001.

Table4: *Analyzed characteristics for each variant geotextile*

Analyzed characteristic		Geotextil variant		
		Geopetre	Geoprint	Percentage difference [%]
Thickness [cm]	Value	2,035	2,021	-0,69
	Coefficient of variation	10,57	8.97	-17
Breaking force in the longitudinal direction [KN/m]	Value	6,09	6,23	+2.25
	Coefficient of variation	6,48	4.32	-15
Elongation at break in the longitudinal direction [%]	Value	114,7	122,4	+12
	Coefficient of variation	5,62	10,25	+54,8
Breaking force in the transversal direction [KN/m]	Value	9,98	12,05	+11,82
	Coefficient of variation	4,42	6,13	+28
Elongation at break in the transversal direction [%]	Value	102,0	92,7	-10,03
	Coefficient of variation	2,76	1,45	-9,6
Punching force CRB[N]	Value	1284	1369	+6,21
	Coefficient of variation	9,29	4,14	-224
The moving at punching [mm]	Value	89,2	103,0	+13,4
	Coefficient of variation	3,73	4,12	+9,5

The data in the table 4 and histograms of figures 1,2,3,4,5,6 show that between the two variants geotextile are insignificant differences.

Regarding the geotextile thickness geopetre version is almost equal to geoprint version, but the coefficient of variation of the thickness geopetre variant is 17% higher than the variant geoprint.

This is probably due to the fact that fiber China has fiber length shorter than 1.5% Greenfiber fiber. But has a total of 4% more wrinkles. The task of breaking the longitudinal direction of geotextiles is identic for the two versions, the difference being insignificant 2.25% but to note that the coefficient of variation is lower for variant geoprint from the same reason mentioned above.

To note that the breaking load on transverse direction is 50% higher than the same parameter value in the longitudinal direction, while elongations have similar values. The explanation is predominantly longitudinal orientation of the fibers of the nonwoven layer component.

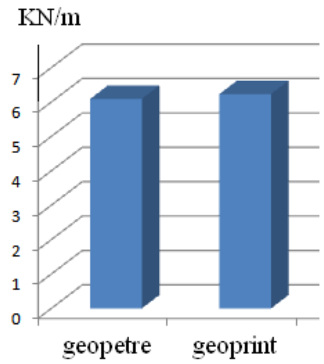

Fig.1: *Breaking force in the longitudinal direction*

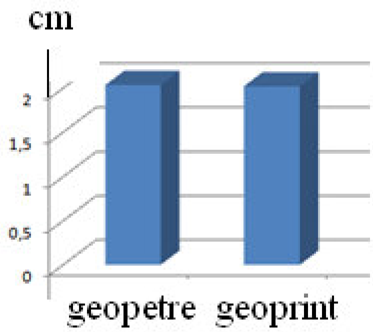

Fig2: *Thickness*

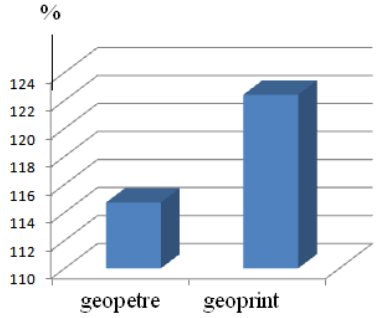

Fig 3*: Elongation at break in the longitudinal direction*

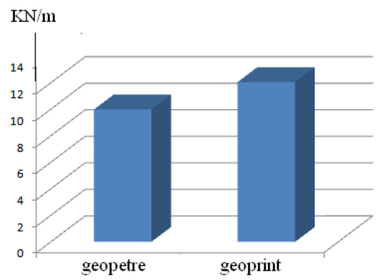

Fig 4: *Breaking force in the transversal direction*

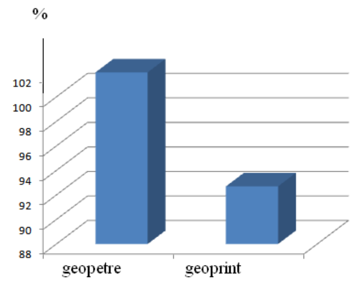

Fig.5: *Elongation at break in the transvesal direction*

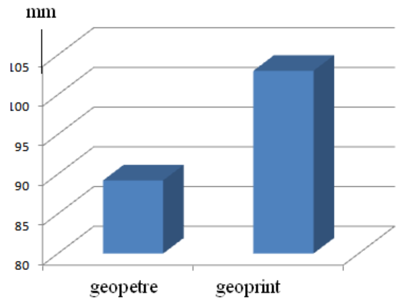

Fig. 6:*The moving at punching*

Geoprint punching force CRB, basic parameter value for material geotextile is of the same order of magnitude, but in version geoprint is about 7% more resistant, but this finding may be questionable when doing qualitative assessment considering size order of the parameter analyzed. For this reason and displacement parameter has greater value in the variant geoprint

5. CONCLUSIONS

Aanalyzed the defining properties of two types of geotextile called geopetre and geoprint.

The two geotextile variants have been carried out, using the same technolgie, from two blends with different fiber mixtures. Geopetre variant used polyester fibers recovered from waste while varainat geoprint used the same raw material but the first use.Analysis of laboratory data show that the two geotextile variants have anyway properties very aparopiate and therefore Greenfiber fiber can be used with succesfull.

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ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

WATERLESS DYEING [REVIEW]

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Abstract: *The textile industry is believed to be one of the biggest consumers of water. Water consumption and exhaustion in dyeing textile materials in conventional methods is an important environmental problem. The cost of waste water treatment will cause a prominent problem in the future as it does today. Increasing consideration of ecologic consequences of industrial processes as well as legislation enforcing the avoidance of environmental problems have caused a reorientation of thinking and promoted projects for replacement of conventional technologies. One of these new technologies is dyeing in supercritical fluids.*
Dyeing with supercritical carbon dioxide is a favourable concept considering the value of water as a natural resource and the cost of waste water treatment. This dyeing method offers many advantages over conventional aqueous dyeing: During this dyeing process no water is used, therefore there is no waste water problem, no other chemicals are required; the carbon dioxide can be recycled; the dystuff which is not adsorbed on the substrate can be collected and reused; The necessary energy consumption in this process is relatively lower than is needed to heat water in conventional methods of dyeing. Due to unnecessary of drying process, it helps to save both energy and time; and dyeing cycle is shorter compared with traditional methods. In addition carbon dioxide is non-toxic and non-flammable.

Key words: *Supercritical fluid, supercritical dyeing, disperse dyestuffs, solid-fluid equilibrium.*

1. INTRODUCTION

As a green, safe and environmentally friendly medium, supercritical carbon dioxide fluid, which was introduced at the first time in textile dyeing as an alternative to traditional water bath by E. Schollmeyer et al., in 1988 (Bach et al., 2002) and further developed by Knittel, has been worldwide investigated and tried for textile dyeing and other applications due to its essential advantages. Dyeing in supercritical carbon dioxide has been applied on synthetic fibers and especially on polyester fabrics. As the method has gained success on polyesters, the other fibers have begun to be applied too. Natural fibers, firstly cotton, than wool and silk fibers have been dyed in supercritical carbon dioxide. Supercritical fluid CO_2 enables polyester to be dyed with modified disperse dyes. It causes the polymer fibre to swell, allowing the disperse dye to diffuse and penetrate the pore and capillary structure of the fibres. The viscosity of the dye solution is lower, making the circulation of the dye solutions easier and less energy intensive [1], [2].

2.WHAT IS SUPERCRITICAL FLUID?

The supercritical state is sometimes referred to as the fourth state of matter. A supercritical fluid can be defined as a substance above its critical temperature and pressure. Under this conditions the fluid has unique properties, in that it does not condense or evaporate to form a liquid or a gas. Referring to the idealized pressure–temperature diagram for a pure substance shown in Figure 1, it is observed that the supercritical state exists at temperature and pressure conditions above the so-called criticalpoint. As the critical point of a substance is approached, its isothermal compressibility tends to infinity. Correspondingly, the specific volume or density of the substance changes dramatically. In the critical region, a substance that is a gas at normal conditions exhibits liquid-like density and a much-increased solvent capacity. This behavior occurs because increase in density decreases mean intermolecular distance resulting in an increase in the number of interactions between the solvent and solute. Even though liquid like densities are observed for supercritical fluids, other properties are similar to those of gases. For example, viscosity values are relatively low while diffusivity values are relatively high. Low viscosity results in supercritical fluids being easier to pump, but also somewhat more easily diverted. High diffusivity generally results in improved mass transfer [3,4].

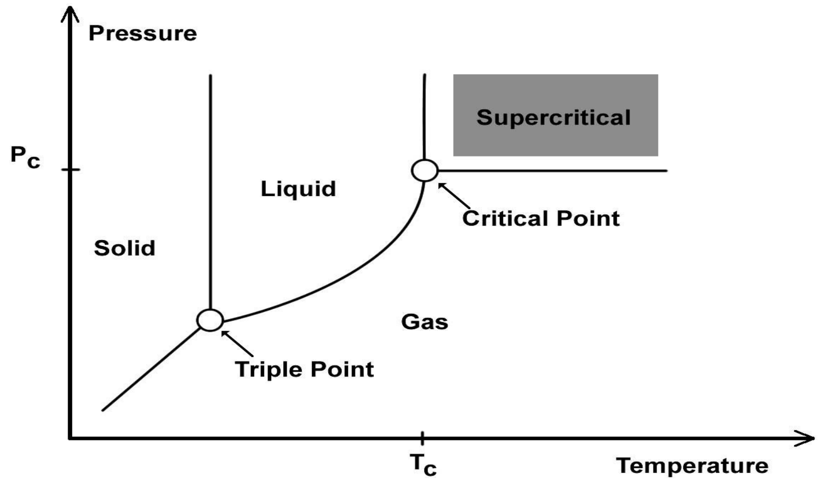

Fig.1. Pressure–Temperature Diagram [5].

3.DYEING IN SUPERCRITICAL CARBON DIOXIDE

The application of SCFs, especially supercritical carbon dioxide (SC-CO_2), in the textile industry has recently become an alternative technology for developing a more environmentally friendly dyeing process. Carbon dioxide, has so far been the most widely used, because of its convenient critical point (Tc=31◦C and Pc=74 bar), cheapness, chemical stability, non-flammability, stability in radioactive applications and non-toxicity. On account of its solvating ability towards non-polar or slightly polar organic molecules in the supercritical phase, CO_2 can be used to transport disperse dyes to polyester fibres, without having to use the traditional aqueous medium, thus avoiding pollution problems. Since polyester fibres typically have a very compact structure and high crystallinity, the choice of dyes for them is limited to the disperse dye range [4,5,6,7].
Table 1 provides an order of magnitude comparison of physical properties typical for gas, liquid and supercritical fluid state. Above the critical point, carbon dioxide has properties of both a liquid and a gas. In this way supercritical CO_2, has liquid-like densities, which is advantageous for dissolving hydrophobic dyes, and gas-like low viscosities and diffusion properties, which can lead to shorter dyeing times compared to water. Compared to water dyeing, the extraction of spinning oils, the dyeing and the removal of excess dye can all be carried out in one plant in the carbon dioxide dyeing process which involves only changing the temperature and pressure conditions; drying is not required because at the end of the process CO_2 is released in the gaseous state. The CO_2 can be recycled easily, up to 90% after precipitation of the extracted [5,8].

Table 1. *Order of magnitude comparison of physical properties substance[3].*

	Gas	**Liquid**	**Supercritical Fluid**
Density(gr/cm^3)	1/1000	1	0.6
Diffusivity(cm^2/sn)	1/10	5/10000	1/1000
Viscosity(gr/cmxsn)	1/10000	1/100	1/10000

The dyestuff/supercritical carbon dioxide/fiber system will in this respect, represent a three-component/ three-phase system. The three components are the gas, the dyestuff and the fiber polymer. In their solid state, dyestuff and polymer are present in the form of three separate phases besides the supercritical mixture. The dyestuff is dissolved in the supercritical fluid, transferred to, absorbed by and diffused into the fiber. Supercritical carbon dioxide is known to reduce considerably the glass transition temperature for many polimers, resulting in an increased mass transfer rate inside the polymeric matrix. In the first approximation the system is described as the distribution equilibrium of the dyestuff between fluid and fibers. A more exact definition of the thermodynamic processes involved in this system will have to consider the solubility of carbon dioxide in the polymer and in the solid dyestuff as well as the solubility of the polymer in the fluid. For the sake of simplification, the dyestuff will be considered as pure component, whereas the solubility of carbon dioxide and polymer in the solid dyestuff can be neglected. The solubility if the polymer in the fluid is so low that it can be neglected as well. All other mixtures can, however, significantly affect the dyeing process[2,5,9].

4. DYEING APPARATUS

A simple apparatus for dyeing in supercritical carbon dioxide is shown in figure 2. It consists of a temperature controller, a vessel heater which surrounds the vessel, a stainless steel dyeing vessel, a manometer, a carbon dioxide pump and a cooler for cooling the head of the carbon dioxide pump. The sample to be dyed is wrapped around a perforated stainless steel tube and mounted inside the autoclave around the stirrer. The apparatus is then sealed and heated to the working temperature and during this time carbon dioxide is pumped into the autoclave. The pressure rises to 350 bar, an isochoric process achieved by heating to 130◦C . Following a dye time the pressure within the autoclave is reduced to atmospheric temperature within about 2-3 minutes, the carbon dioxide being routed through a separating vessel in order to recuperate precipitated residual dye stuff. Dyestuff order is placed in the bottom of the vessel; the apparatus is sealed, purged with gaseous carbon dioxide, and preheated. When it reaches working temperature, carbon dioxide is isothermally compressed to the chosen working pressure under constant stirring. Pressure is maintained for a dyeing period up to 60 minutes and after wards released [2,4,5,10].

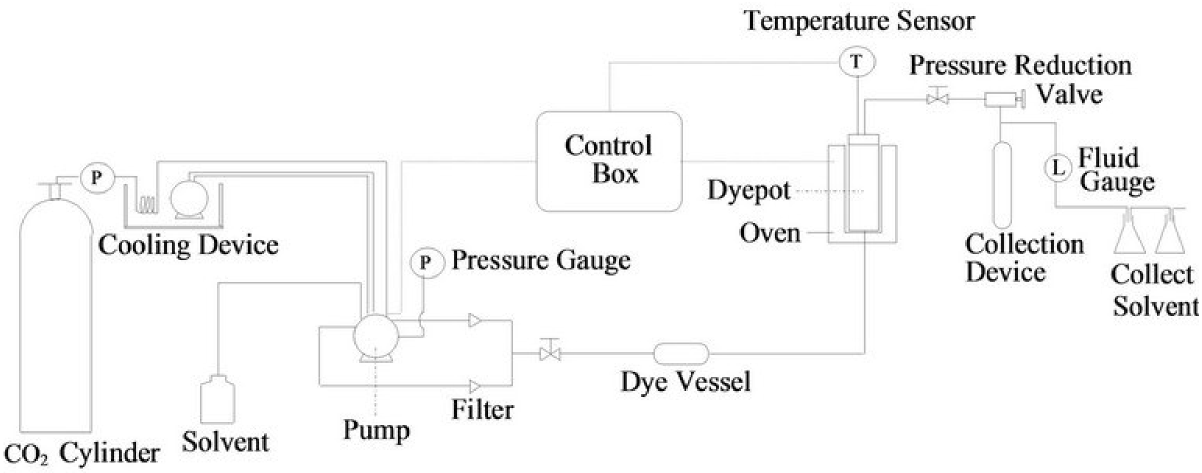

Fig. 2: Supercritical Dyeing Process [2].

5. CONCLUSIONS

Supercritical fluids have smaller densities, less viscosities but greater diffusion properties. Also supercritical fluids have greater penetration properties. Carbon dioxide, has so far been the most widely used, because of its convenient critical point , cheapness, chemical stability, non-flammability, stability in radioactive applications and non-toxicity. Owing to small viscosity of supercritical carbondioxide and to high diffusion coefficient of dyestuff molecules in this condition, disperse dyestuff molecules easily penetrate into fibres and as a result supercritical carbondioxide dyeing provides a better dyestuff transportation compared to dyeing in water [4,5,6,7,12].
Currently, supercritical dyeing requires higher pressures than are currently available in conventional jet dyeing machines. To obtain the required temperature and pressures, autoclaves with large holding capacities must be used in the dyeing process.

Supercritical dyeing has shorter dyeing cycles compared to aqueus dyeing. The major attraction of supercritical CO_2 is that it is a means of saving substantial amounts of water and energy, environmentally friendly, water and effluents free in the dyeing of textiles.

The investigation to study possibilities of using supercritical system for textile dyeing processes have in the first instance been performed with the aim of finding an ecologically acceptable alternative to conventional dyeing. Supercritical dyeing with CO_2 is confined to synthetic fibers. The technology has become a commercially viable system for dyeing polyester, elastane and nylon [11,12]. For natural fibers the diffusion of supercritical CO_2 is hampered by its inability to break the hydrogen bonds present in many natural fibers, including cotton, wool and silk. A further problem is that reactive dyes, direct dyes and acid dyes which are suitable for the dyeing of natural fibers are insoluble in supercritical CO_2. Further studies might be conducted on methods to modify naturel fibers or to develop new fixation mechanism in order to improve dyeing efficiency of natural fibers, as they are not easily dyed in supercritical conditions.

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INFLUENCE OF THE SHELL MATERIAL IN THE MICROCAPSULES FORMATION BY SPRAY DRYING

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Abstract: *Microencapsulation is a process of entrapment, packaging or immobilizing an active (core) material, which can be in the state of solid, liquid or gas, within a more stable, protective secondary (wall) material that can be released at controlled rates under specific conditions. There are several microencapsulation techniques such as: spray drying, spray cooling/chilling, freeze drying, extrusion, fluidized bed coating, coacervation, liposome entrapment, coextrusion, interfacial polymerization, radical polymerization, molecular inclusion in cyclodextrins, etc.*

Spray drying has been commonly applied due to their simplicity process, wide availability of equipment facilities, significant merits in terms of reductions in product volume, easy of handling, etc. In the spray drying process the wall materials (shells) and their properties are parameters to be considered to achieve proper encapsulation of the active ingredients (core materials). Some commonly used wall materials and their properties related to spray drying encapsulation, including proteins, carbohydrates, and other materials, or mixtures of some of them.

Proper encapsulation of the active ingredient (core) is essential to achieve this active material protecting the outer.

The aim of this work is encapsulated an essential oil, sage oil, using two differet wall materials in order to determine which is the best wall material.

Scanning electron microscopy (SEM) has been used in order to know the microcapsules morphology.

Key words: *Core, Shell, Gum Arabic, Alginate, Sage oil, Scanning Electron Microscopy (SEM)*

1. INTRODUCTION

The basic process of spray drying involves feeding a prepared solution or dispersion of actives into a spray dryer and then atomizing with a nozzle or spinning wheel in a chamber supplied with hot air; the droplet and hot air is contacted in the chamber and the solvent (water) is evaporated from the droplet by the hot air; the dried particles are then separated by a cyclone or bag-filter from the humid air and collected in powder form [1, 2].

In the process of application of spray drying, the core material is emulsified or dispersing in an aqueous solution of selected wall material. The spray drying encapsulated particles have a typical spherical shape and the particle size can be 10-50µm [3].

The selection of an appropriate wall material it´s an imporatnt parameter to consider in the spray drying microencapsulation process. The ideal wall material should have some specific properties such as good film-forming properties, protection of the core material, control release of the core material, low viscosity at high solide levels, etc. [4,5].

Wall materials as Alginate and Arabic gum are carbohydrates materials that present good emulsifying properties and they can be use in the spray-drying microencapsulation process.

The aim of this work is to encapsulate natural oil, sage oil, using two different wall materials in order to determine which is the most effectiveness. The Scanning Electron Microscopy (SEM) allow us to know the microcapsules morphology and determinate the best wall material.

2. EXPERIMENTAL

2.1 Materials

A low viscosity sodium alginate with a 3,5% (w/w) of concentration and a Arabic Gum from Accacia Tree, both provided by SIGMA ALDRICH were used as shells materials. The active material was an essential oil, sage oil, provided by Esencias Lozano.

2.2 Microcapsules obtention

Spray-drying was performed using a spray-dryer BÜCHI B-290 with a standard 0.5 mm nozzle, it can be seen in figure 1. The same procedure was followed for all the emulsions prepared. First emulsion was composed of Arabic Gum (shell material) and sage oil (core material) with a mass ratio 1:2. Second emulsion was composed of Alginate with a 3,5 % (w/w) of concentration (wall material) and a sage oil (core material) with a mass ratio of 1:2 and 1:3.

Emuslison were prepared at a constant agitation speed of 1200 rpm, during 10-15 min at room temperature.

Two emulsions were spray-dried, separately, under the following conditions: solution and air flow rates, air pressure and inlet temperature were set at 6 mL/min (20%), 26,3m^3/h (75%), 6.0 bar and 160 °C, respectively. The outlet temperature, a consequence of the other experimental conditions and of the solution properties, was around 82 °C. The operating conditions have been selected considering preliminary studies [6].

Fig. 1: *Spray drying microencapsulation system*

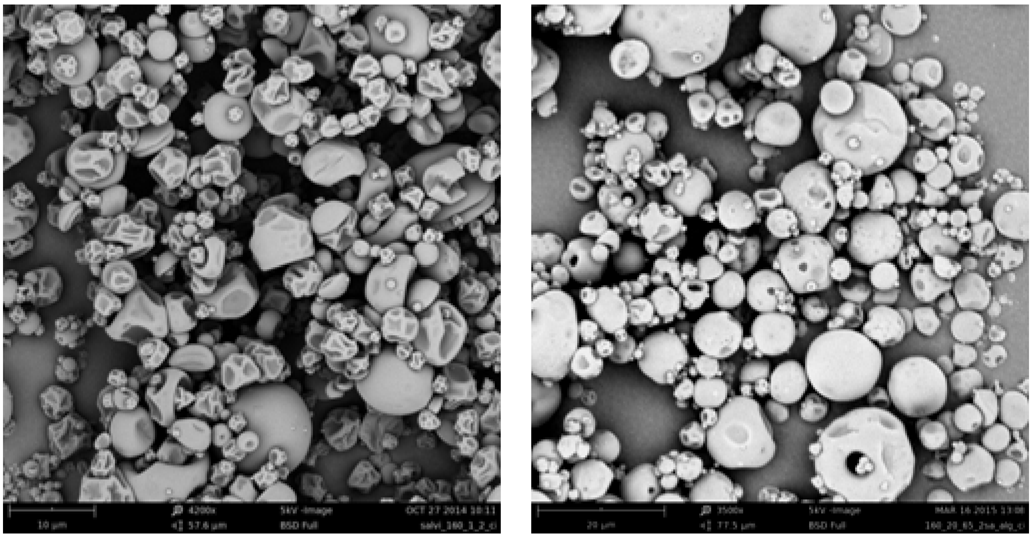
2.3 Instrumental techniques

A scanning electron microscopy Phenom microscope (FEI Company) was used to know the microcapsules morphology. Each sample was fixed on a standard sample holder and sputtered with gold.

3. RESULTS AND DISCUSSION

The wall material has to protection the core material, and in this case prevents the premature release of the core material, sage oil.

Figure 2 shows SEM micrographs of microcapsules composed of different wall materials, but using the same mass ratio (shell/core) materials 1:2.



A) *B)*

Fig. 2: *SEM Micrographs of microcapsules*
A) Shell material: Arabic Gum; B) Shell material: Alginate 3,5% (w/w)

In *Micrograph 2.B* can be observed microcapsules with better spherical shapes than *Micrograph 2.A*. It can be appreciated holes in the microcapsules, these can be problem, because the sage oil can be released prematurely therethrough.

The mass ratio between shell/core materials can be affect at the microcapsule morphology. In order to improve the microcapsules morphology using alginate 3,5% (w/w) as shell material, next micrograph shows microcapsules composed of Alginate 3,5 % (w/w) as shell material and a mass ratio (alginate/oil) 1:3. Certains differences can be observed, microcapsules have spherical shapes.

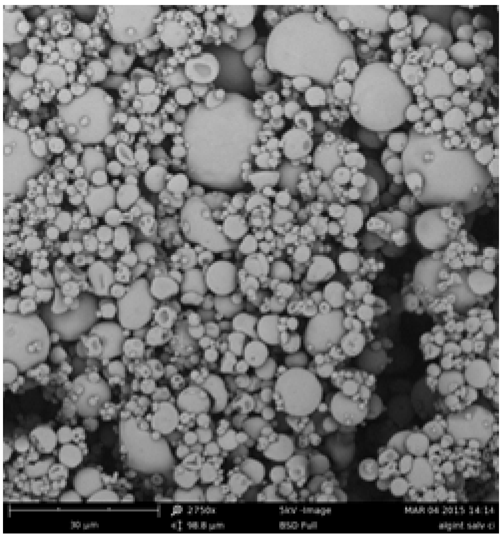


Fig. 3: *SEM Micrograph of microcapsules, mass ratio 1:3*

4. CONCLUSIONS

The present research compares the microcapsules morphology obtained by spray drying microencapsulation method, using two wall (shell) materials. Results show us that both wall materials using the same mass ratio, 1:2, don´t allow obtain microcapsules with spherical shapes, the shape offers best results using alginate 3,5% (w/w) as shell material.

Alginate microcapsules present holes in their walls, with consequent oil loss. Mass ratio between (shell/core) can improve the microcapsules morphology. Also considering in the microcapsules formation, other parameters such as: inlet and oulet temperature, air flow rate, air pressure, etc.

ACKNOWLEDGEMENTS

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CYCLODEXTRINS TO RECOVER TEXTILE DYES IN WASTE WATER

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Abstract: *Cyclodextrins are cyclic oligosaccharides with a special toroid shape, obtained by the action of glucosyltransferase enzyme (CGTase) on starch molecule. Their peculiar structure allows the accommodation of different guest molecules inside their cavity forming molecular inclusion complexes. There are different types depending on the glucose units that are formed, called native. The cyclodextrins can be modified incorporating different groups (hydroxipropyl, methyl...) that changes their properties. Due their versatility in size, properties and the variety of inclusion complex can form is employed in many different industries like pharmacy, food or cosmetics to protect the molecule or to reduce their volatility. As the guest molecule is not bond with the cyclodextrin with the appropriate conditions it can release easily. In textile industry had been use in different areas: to remove surfactants from washed textiles, to substitute surfactants, in the dyeing process, in detergents… Due their capacity to fix onto textile allows the functionalization of the fabrics giving them new properties like UV protection, antimicrobial or insect repellents depending on the guest molecule, in. The project DYES4EVER employs the cyclodextrins to encapsulate dyes not fixed during the dye process that remains in the wastewater and aims to go one step further and reuse the dyes recovered as a raw material in new dyeing processes.*

Key words: *reuse, textile dyes, cyclodextrins, inclusion complex, epichlorohydrin-Cyclodextrin .*

1. INTRODUCTION

1.1 Layout

Cyclodextrins (CDs) are cyclic oligosaccharides obtaining treating enzymatically starch with cyclodextrin trans glycosylase. α-, β-, and γ-CDs comprise 6, 7, and 8 D-glucose units, respectively, connected through α-1,4 linkages. Each CyD is shaped more or less like a thick-walled bucket, with a hydrophobic cavity and hydrophilic exterior. This unique structure enables CDs to form an inclusion complex, entrapping the whole, or part, of a "guest" molecule inside its cavity, principally by means of weak forces, such as van der Waals forces, dipole-dipole interactions, and hydrogen bonding. [1].

The most familiar applications of cyclodextrins are in pharmacy [2] to drug release and masking taste, in nutrition [3] to remove fats and for flavor release and cosmetics [4] to protect the active ingredients. The applications of cyclodextrin is growing and it can find use in agro industry [5] [6] to encapsulate pesticides, herbicides or insect repellents and in environmental sciences to removal organic pollutants from water, soil and air [7].

Is this point where DYES4EVER project is focused: in remove textile dyes from the wastewater and recover to reuse in new process of dyeing improving their life cycle. The investigation was focus in direct dyes in concrete in: direct yellow 106, direct red 83:1 and Direct black 112.

2. EXPERIMENTAL

2.1. Materials

Epichlorohydrin, Cyclodextrins, Sodium borohydride and sodium hydroxide were purchased from Sigma-Aldrich.

2.2. Methods

In a first step an Epichlorohydrin-Cyclodextrin was synthetized. The procedure described by Solms and Egli [8], and extended by Komiyama et al. [9] was used with some modifications, consisting of an increase in the amount of crosslinking agent in order to obtain mechanically stable polymers containing the same amounts of β-CD or γ-CD, as it can see in table 1

Table 1: *Experimental conditions carried out in the experiments.*

Epichlorohydrin (g)	Tª (ºC)	Time (h)	NaOH (mL)	$NaBH_4$ (mg)	CDs	CDs (g)
132	50	2	13	30	HP- βCD	12
132	50	2	13	30	γ-CD	12

There are several methods of preparing CDs inclusion complexes [10] depending on the type of molecule to encapsulate. The employed in the previous works done in the lab were stirring the wastewater solution with CDs in a ratio 50:1 v/w and filtering off the precipitated complex. This method is replicate in the prototype constructed in Colorprint Fashion facilities, which collect part of the waste water and after 2 h. of stirring is emptied by filtering off to recover the Epi-CDs polymer with the dye encapsulated.

Fig. 1: *Recovery prototype*

The last step is use the complex formed between EPI-CDs polymer and dyes as a raw material in a new lab dyeing process with the conditions showed in table 2.

Table 2: *Experimental conditions in dyeing process.*

wof.complex (%)	Liquor rate	Temperature (ºC)	Time (min)	Auxiliaries (g/l)
6	1/15	95	60	15 Sodic sulphate

3. RESULTS AND DISCUSSION

The water waste (figure 2) was analyzed before and after treated with the two cyclodextrins polymers with the results showed in the figure 3.

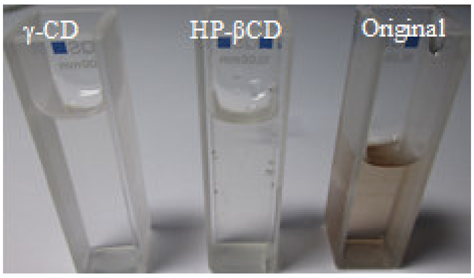

Fig. 2: *wastewater.*

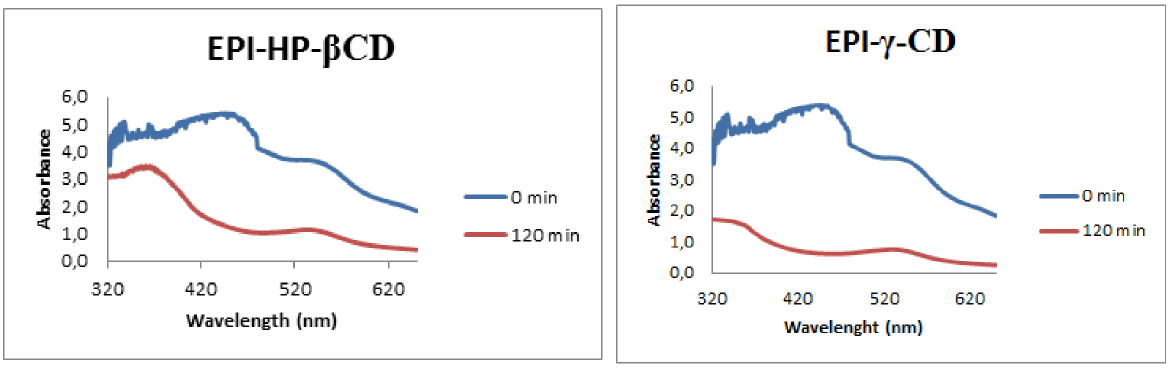

Fig. 3: *Recovery prototype*

In the figure 4 the textile dyed are showed. The named as original is the textile obtained with the formulation mix of three direct dyes that generate the waste water with which is form the complex. This complex recovered is used as a new material to dyed in the first use and recovered and use again in the second dyeing process.

Fig. 4: *Recovery prototype*

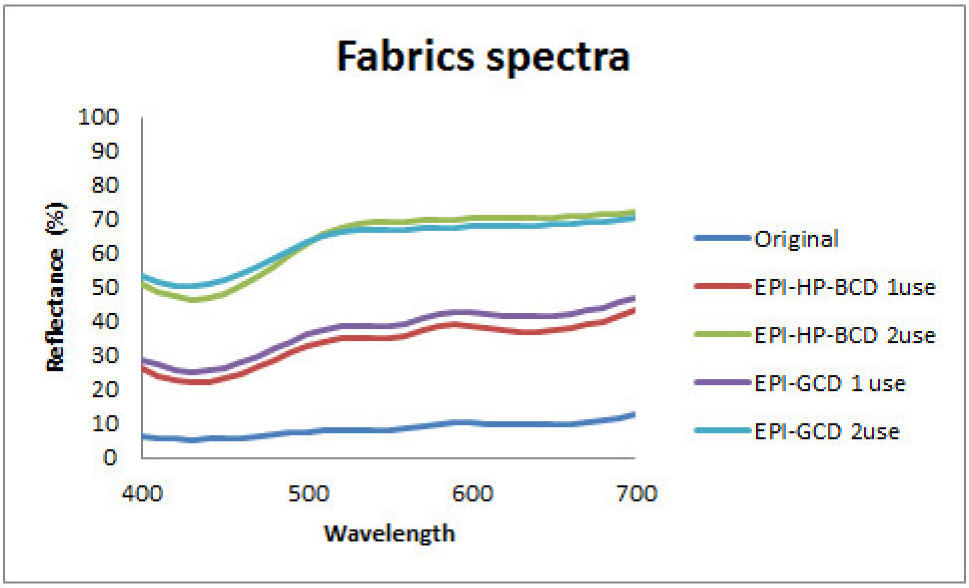

Fig. 5: *Spectra of fabrics dyed.*

4. CONCLUSIONS

The cyclodextrins are good agents to encapsulate dyes un-fixed in the waste water after a dyeing process reducing the amount of dye in the water effectiveness. The dye recovered could be use in news dyeing process obtaining a textile dyed with very low intensity that the original formulation but with the same spectra despite to encapsulate three different dyes with different release form. The EPI-HP-β-CDs polymers obtain slightly better results about the intensity of the fabric that the obtained with the EPI-γ-CDs polymers.

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COMPARATIVE ASPECTS CONCERNING METHODS USED TO DETERMINE COTTON FIBERS STRENGTH PER DENIER

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Abstract: *This work has shown to you a study about the determination of tensile strenght by three methods of stress, using the four varieties of the cotton fibers: Russian 2A, Russian 1A, Sudanese Baracat 5x5, Pakistani SLM (Medium IV). The methods of the tensile stress used in this study are: the method of requesting of a bundle containing all categories of fibers from the sample, using the DS-3M dynamometer; the the method of application of flat bundles of fibers containing fibers previously sorted by length classes using the mechanical fibrometer and then subjected to tensile strength determination on the dynamometer DS-3M; the method of application of the three fiber bundles corresponding to the class with the highest fiber content.*
From the comparative analysis of these three methods of stress,we can find that the index for assessing the tensile strength, called the toughness mode, obtained by the third method, combining the advantages of the first method and eliminating the disadvantages of the second, can be an optimal index to express it. From the experimental results and the graphical representations as the distribution diagram of the cotton fiber length, depending on their mass,we can find that the fiber mass belonged to the classes with the highest fiber content is about 35-55% of the total mass of the sample, an enough approximation for the tenacity, the toughness mode, to be expressed, using a coefficient ,named the average tenacity, measured by the disclosed methods .
The third proposed method has a double productivity of conventional methods, it reduces the time required for all determinations by 55%, it is not required the counting of the fibers per a milligram and also, it is possible to determine the mode length of the fibers at the same time /with the tenacity.

Key words: *tensile strength, fiber length, cotton, average tenacity, stress methods*

1. INTRODUCTION

Tensile strength of cotton fibers is important at various stages of processing such as ginning, spinning and weaving. Inferior tensile properties lead to poor fiber length distribution, increased short fiber content, poor yarn quality, lower fabric appearance and low productivity. Studies on the relationships between cotton fiber quality measurements and physical properties of ring spun yarn revealed that longer and stronger cotton fibers can be spun into finer yarns [1], [2].

An untwisted fibre stream has a certain tensile strength thanks to the cohesion of fibres. The cohesion of fibres which form the stream is a characteristic feature of these fibres. The value of cohesion is influenced by the kind of fibre materials, by the fibre slenderness and the surface properties of the fibres [3], [4].

Despite all the competition from their artifi cial counterparts, cotton is still the best-selling fi ber material in the world, and mostly in the textile industries [5], [6].

Cotton fiber quality parameters – It is a set of dimensional and mechanical properties of cotton fibers (such as length, maturity, strength, and fineness) which defines the market value of a bale of cotton [7].

2. EXPERIMENTAL PART

2.1. Materials and Methods

Study was conducted on these sorts of cotton: Russian 2A, Russian 1A, Sudanese Baracat 5x5, Pakistani SLM (Medium IV), whose characteristics are shown in Table 1.

Table 1: *Physico-mechanical characteristics of fibers*

Cotton type	Spinner length, [mm]	Fibers count [mtex]	Pressley index	Impurities with tweezers [mg]
Russian 2A	31/32	161	86177	3,7
Russian 1A	31/32	143	90327	3,5
Sudanese Baracat 5x5	33/34	130	96900	5,3
Pakistani SLM (Medium IV)	29/30	169	97220	10,18

Among the methods used to determine the breaking strength of the cotton fibers, the following were used in the present work:

- The method of stressing a bundle that contains all the categories of fibers from the sample, using a DS-3M dynamometer, method that permits to compute the mean breaking force of a fiber by means of the relation:

$$P_{[cN/\rho b]} = \frac{Q[cN]}{m[mg] \cdot n_f \cdot 0{,}675} \tag{1}$$

with: Q is the breaking load, [cN];
m- the fiber mass [mg];
n_f -number of fibers from 1 mg;
non-simultaneity factor (of 0.675) due to asynchronous breaking of the sample fibers.

- The method of stressing some flat fibers bundles that contain fibers previously sorted in classes according to their length by means of a mechanical fiber-meter, then determining the breaking load on DS-3M dynamometer, thus determining the breaking load corresponding to fibers from each length class, as well as the mean strength per denier of the cotton fibers from the analyzed batch.
- The method of stressing only three fiber bundles corresponding to the classes with the highest fibers content.

This last method represents a direct consequence of the possibility to sort the fibers in classes according to their length by means of the mechanical fiber-meter. It is simple, much more operative and implies the determination of breaking load on DS-3M dynamometer [8], [9].

The classes with the highest fibers content (Fig.1) are identified from the sample sorted in length classes.

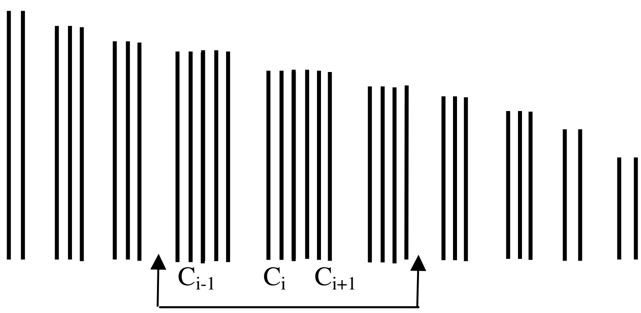

Fig. 1: *Sample sorted in length classes*

Supposing that the class C_i is the class corresponding to the **mod** length, the breaking load will be determined for the fibers from the classes C_{i-1}, C_i and C_{i+1}.

Each bundle is weighted at torsion balance. As the length of the fibers from the respective classes is known, the yarn count and mean strength corresponding to the 3 fibers classes are determined.

2.2. RESULTS AND DISCUSSIONS

The mean values of the breaking load per fiber (P_i) and fiber strength τ[cN/tex].
The formula used for calculation is:

$$\tau[\text{cN/tex}] = \text{P}[\text{cN/fibra}] \cdot \frac{1}{T_{tf}} \quad (2)$$

with: T_{tf} – fiber count [tex]. The results are shown in Table 2.

***Table 2:** The mean values of the breaking load per fiber and fiber's tenacity*

Cotton type	P[cN/fibra]	T_{tf} [tex]	τ [cN/tex]
Russian cotton 1A	2.7	0.143	19.3
Sudanese cotton Baracat 5x5	2.6	0.130	20.02
Pakistanis cotton SLM (M. IV)	2.2	0.169	12.78
Russian cotton 2A	2.71	0.161	16.7

The determination of cotton fibers breaking load through bundle method by means of DS-3M dynamometer implies theoretically the realization of a 3 mg sample that contains all the types of fibers from the batch in the same proportion in which they exist in the entire fibrous mass (total batch). Yet, practically, when forming the bundle, due to the 10 combings of the fibers' bundle ends, the doer has the tendency to eliminate the short fibers, which results in errors related to bundle mass and fibers' strength.

During samples stressing at a null spacing between dynamometer clamps, the fibers with the length smaller than half the bundle length will not participate in the stress, the breaking load being taken up by the long fibers with higher strength per denier, such that the obtained value will exceed the real average. Given the fact that the determinations are carried out with DS-3M dynamometer, in the calculation of the breaking load P [cN/fiber], the relationship, will intervene a non-simultaneity factor (of 0.675) due to asynchronous breaking of the sample fibers.

This factor is influenced by the doer, namely by fiber combing manner, hand perspiration and the fastening of dynamometer clamps. Its utilization prevents getting an erroneous value as compared to the real value. From the curves of mass distribution in terms of cotton fibers length (Fig. 2, Fig. 3, Fig. 4), it was noticed that the mass of the fibers from the classes including the highest fibers content represents about 35÷55% of the total mass of the sample, a sufficient approximation for the mod strength to be expressed by means of a mean strength measured through the presented methods.

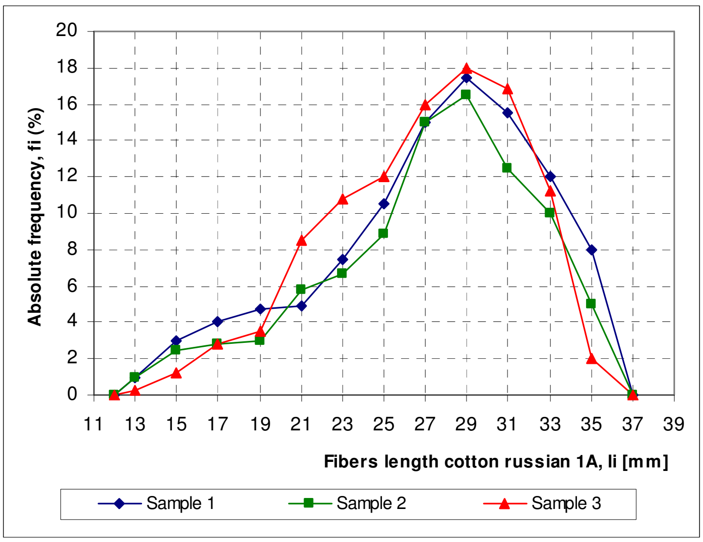

***Fig.2:** Curves of mass distribution in terms of cotton Russian 1A fibers length*

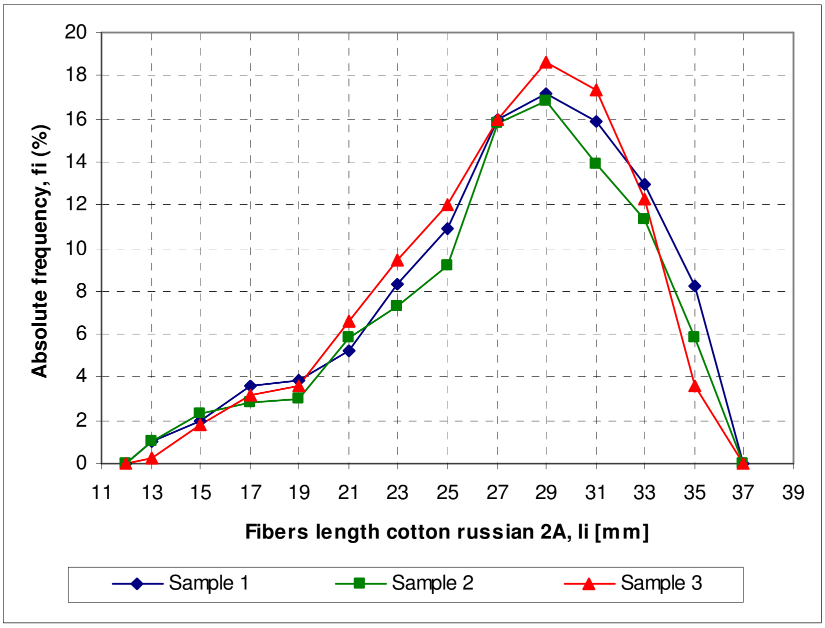

Fig. 3: *Curves of mass distribution in terms of cotton Russian 2A fibers length*

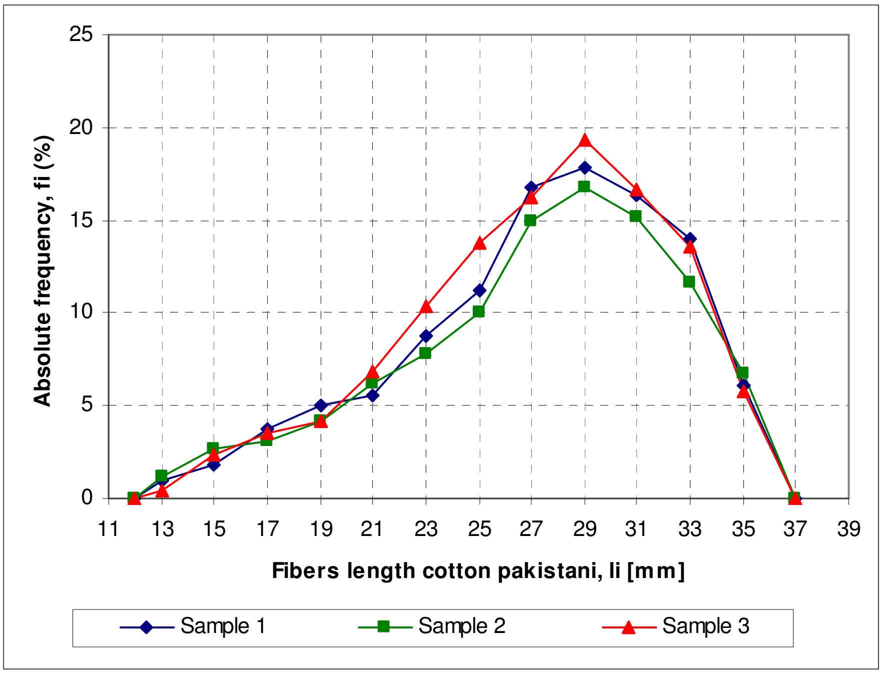

Fig. 4: *Curves of mass distribution in terms of cotton pakistani fibers length*

One can notice an increasing variation of the strength with fiber length within the same sample. By determining the strength through the flat bundle method, from reasons already mentioned at the theoretical premises of method applications, the obtained value will have a certain deviation from the real value. The curves show certain non-uniformity due to various factors of influence (lack of breaking simultaneity, sample clamping mode, hands humidity). Since the mod strength was found as the value of/between a mean strength obtained by completely sorting up the sample in classes, and that obtained with DS-3M, combining the advantages of the first method and eliminating the shortcomings of the second one, it can represent an optimum index of its expression (Fig. 5).

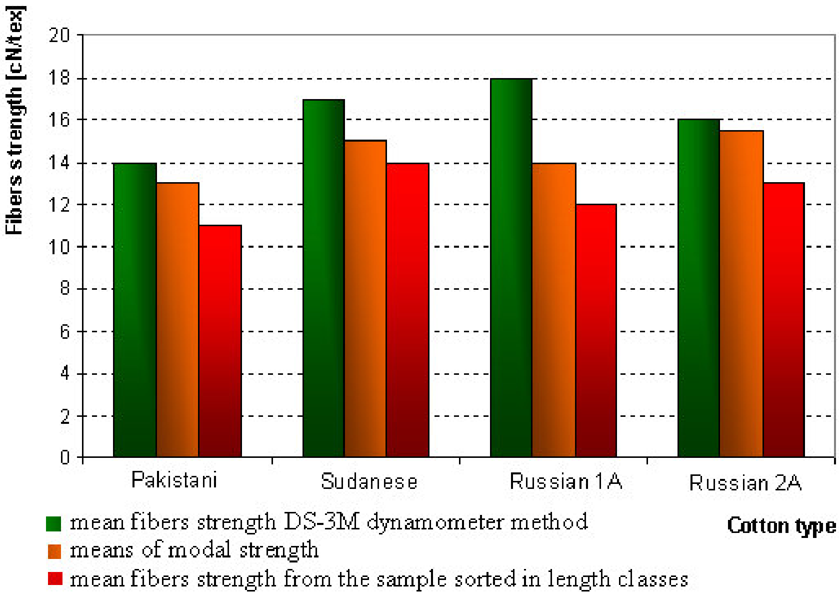

Fig. 5: *Variation mean fibers strength from the methods used to determine the breaking strength of the cotton fibers*

Table 3: *Values of breaking load through bundle method by means of DS-3M dynamometer*

Cotton type	T_{mtex}	n_f/mg		Breaking load Q									
				1	2	3	4	5	6	7	8	9	10
Russian 1A	143	252	Sample mass	3,1	3,7	3,7	3,4	3,2	3,0	3,0	3,0	3,0	3,0
			Q	1444	1800	1780	1760	1520	1404	1498	1579	1215	1579
			P[cN/f_b]	2,7	2,8	2,8	3,0	2,7	2,7	2,75	3,0	2,3	3,0
Sudanese Baracat 5x5	130	234	Sample mass	3,1	3,7	3,7	3,4	3,2	3,0	3,0	3,0	3,0	3,0
			Q	1404	1500	1400	1560	1441	1269	1228	1093	1295	1336
			P[cN/f_b]	2,3	2,78	2,7	2,9	2,7	2,6	2,5	2,2	2,5	2,7
Pakistani	169	247	Sample mass	2,5	2,5	2,7	2,8	3,0	3,0	3,0	3,0	3,0	3,0
			Q	999	1039	985,5	945	1296	1134	1026	999	1228	1242
			P[cN/f_b]	2,3	2,4	2,1	2,02	2,59	2,26	2,05	1,99	2,4	2,5
Russian 2A	161	245	Sample mass	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0
			Q	1336	1336	1255	1201	1552	1404	985	1296	1606	1066
			P[cN/f_b]	2,69	2,69	2,52	2,4	3,1	2,8	1,9	2,6	3,2	2,1

We carried out10 determinations for each sample. The utilized calculus formula (1)

3. CONCLUSIONS

- The representation of cotton fibers length variation reveals the existence of 3 classes that contain about 33 ÷ 55% of the total sample mass, offering the possibility to express the mean fibers strength by means of modal strength corresponding to these classes (Fig. 1).
- One can notice an increasing variation of the strength with fiber length within the same sample. By determining the strength through the flat bundle method, the obtained value will have a certain deviation from the real value. The curves show certain non-uniformity due to various factors of influence (lack of breaking simultaneity, sample clamping mode, hands humidity) (Fig. 2, Fig. 3, Fig. 4).
- Since the mod strength was found as the value of/between a mean strength obtained by completely sorting up the sample in classes, and that obtained with DS-3M, combining the advantages of the first method and eliminating the shortcomings of the second one, it can represent an optimum index of its expression (Fig. 5).

- The method presents a good reproducibility. It was verified on four types of cotton, the values obtained for mod strength within the same cotton type for all the variants being close to each other.
- Method efficiency. The method efficiency is twice the efficiency of the classical methods, which reduces the determinations time by 55%.
- The effort of the operator who carries out the determinations is reduced (it is not necessary to count the number of the fibers from 1 mg).
- There is the possibility to simultaneously determine the fiber mod length and the strength.

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THE USE OF CORELDRAW PROGRAM FOR THE REPRESENTATION OF WEFT KNITTED STRUCTURES

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Abstract: *The representation weft knitted fabrics covers a wide range of methods, which may vary from country to country or may be similar, being used identical or slightly modified. In Romania, currently, for the weft knitted fabrics are used four methods of representing the knitted structures, namely: structural or analytical representation, representation using knitting notations, symbolic representation of the section of stitch courses and representation of drawing design. Generalization of knitted fabrics design using CAD systems determined the development of software design, including 2D representation that can be used for any type of machine. 2D representation of stitches solves the modeling problems and is possible to be executed using different computer graphics programs (CorelDRAW, AUTOCAD, etc). With the help of the graphic editor CORELDRAW it is possible to make the graphical representation of the structure of any kind of weft knitted fabric regardless of its complexity, strating from the simplest ones such as knits with basic weaves (single jersey, rib fabric, links, links and links patterns) to the most complex structures such as knitted fabrics with different evolutionary changes of normal stitches (tuck loop knits, missed stitches knits, racked stitches knits, etc.) or those with combined designs (knitted jacquard, intarsia knits etc.).*
This paper presents the possibility of using the CorelDRAW application for representing knitted structures.

Key words: *CAD systems, CorelDRAW, knitting, structure, weft knitted fabrics*

1. INTRODUCTION

The representation of weft knitted fabrics covers a wide range of methods, which may vary from country to country or may be similar, being used identical or slightly modified. The graphical representation of the knitted fabric structure consists in transferring on drawing the yarn position and the form of component elements (normal stitches, elements with modified evolution, additional yarns) from yarns of the same color or different colors of yarns. From a graphical representation, besides the evolution of yarn (yarns) may further result: drawing and drawing rate, some technological indications and the effect created by the structure on the knitted fabric.

For the graphical representation of knitted fabrics are used differnet methods that, worldwide, have different areas of usage.

In Romania, currently, for the weft knitted fabrics are used the following methods:structural representation, (analytical); representation using knitting notations; symbolic representation of the section of stitch courses; representation of drawing design.[1]

All electronic knitting machines use programming stations based on code-machine system. The generalization of knitted design using CAD systems has determined the development of design softwares, including 2D representation that can be used for any type of machine. 2D representation of stitches solves the problems of modeling and it is possible to achieve using computer graphics programs (CorelDraw, AutoCAD, etc), but mostly specialized software.

CorelDRAW is a graphics software package that provides automatic drawing facilities and also objects processing and the use of special effects facilities. [2], [3], [4] Next we will show how this program can be used to achieve a graphical representation of weft knitted structures by the 4 methods.

2. REPRESENTATION OF WEFT KNITTED FABRICS WITH CORELDRAW GRAPHIC EDITOR

2.1. Structural representation of weft knitted fabrics

The structural (analytical) representation accurately reproduces the yarn (yarns) geometry within the knitted fabric, its position within the ratio. This method allows the representation of the knitted fabric structure in two layouts: theoretical and real. In the case of theoretical layout, the shanks of the loop and the connecting segments are considered line segments and the needle and sinker loops are half circles.

In the case of real structural representation, both the positions of the yarn and also of the stitches are presented, suggesting their placement in denuded condition. Compared to the theoretical method, in free representation there occur changes of the stitches position, difficult to represent exactly in the drawing and the yarn is no longer represented by a line as in the case of of theoretical representation.

The analytical representation of the knitted structure is a time-consuming method, but it is the one presenting the most complete information regarding the fabric structure.

With CorelDRAW graphics editor the structural representation of a weft knit begins with drawing of a stitch, multiplying it according to size report and then processing the ratio to obtain the desired characteristics. [4]

We will start with drawing the stitch model. Thus, click the button ***Elipse*** and select command ***Arc***  to draw the needle loops. Then press **Ctrl+D** on the keyboard to create a duplicate of stitches. Then draw straight lines with the help of the tool ***Bezier Tool***  , lines that represent the shanks of the loops. Using ***Ctrl+D*** we can create a duplicate of the arc of the circle and choose from menu ***Arrange*** → we choose ***Transformations*** → ***Rotate*** for obtaining sinker loops. We rotate the arc to 180 degrees and we positioned it at the end of the line.

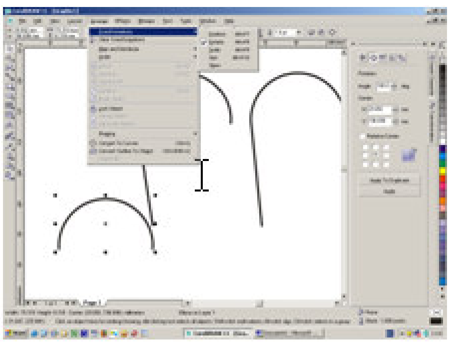

Fig. 1: *Drawing the needle loops*

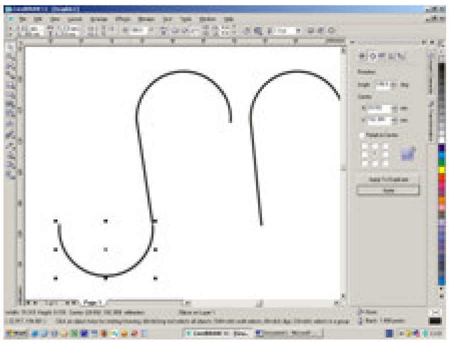

Fig. 2: *Drawing the sinker loops*

We will continue this procedures until all stitches are obtained in a row. Then we select the stitches and group them using ***Group*** from ***Arrange*** menu or by pressing ***Ctrl G***. The figure thus obtained is multiplied vertically, depending on the number of rows in the report.

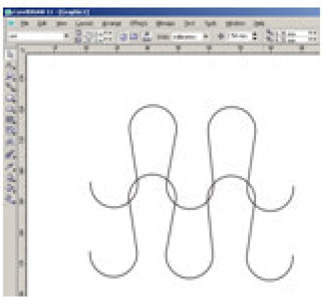

Fig.3: *Multiplying the stitches vertically, according to the number of rows from the report*

Highlighting the yarns overlapping is achieved by interrupting the shanks or the needle and sinker loops according to the form of the drawn stitch. To do this, we select the line or the loop we want to interrupt. Click the right button on the mouse and choose option ***Break Apart***. We select the points where we want to interrupt the shanks or the needle and sinker loops and we delete the segment with the help of ***Delete*** command. The result consists in interrupting the segments between the two selected points. We will continue this action all over the report.

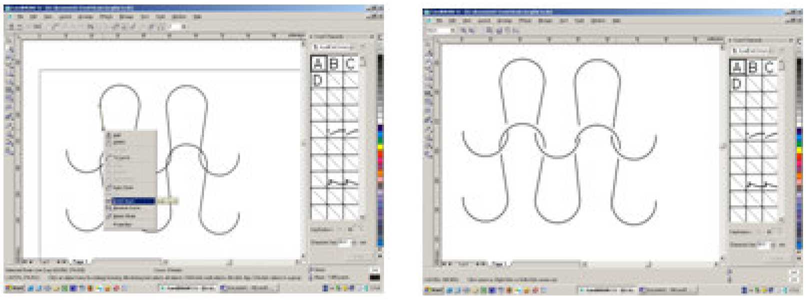

Fig. 4: *The interruption of the shanks or the needle and sinker loops according to the aspect of the drawn stitch*

In the following tables som example of irregular jacquard are given.

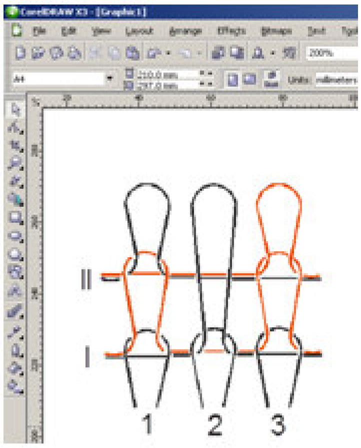

Fig. 5*: Irregular jacquard*

2.2. Representation using knitting notations of a weft knit

The representation using knitting notations consists in representing certain signs of the knitted structure, for each component element proposing one symbol.

Different variants for the representation of the component elements can be used. In Romania the method most widely used uses the following conventional signs [5]:

x = front stitch;
o = rear stitch
- = float stitch
∧ = loop

The representation using knitting notations with the help of the graphic editor CORELDRAW implies covering the following phases:

a. ***Setting up the framing net (fig. 6)***

Next in the options toolbox choose ***Polygon Tool*** . and click ***Graph Paper Tool*** . Then determine the number of rows and columns according to the report dimensions.

b. ***Drawing the normal stitches with rear stitch (fig. 7)***

Click the button ***Elipse*** then position the cursor where you want the stitch to appear. In order to represent a normal stitch made on the back needle bed (symbolised by a circle) hold the ***Crtl.*** key.

c. Drawing the normal stitches with front stitch (fig. 8)

Click the button ***Free Hand Tool*** , select ***Bezier Tool*** and draw two lines so that you get a normal stitch made on the front needle bed.

d.Drawing a loop (fig. 9)

Click the button ***Free Hand Tool*** . Select ***Bezier Tool*** . You have to click where you want to make the first knot. Then click where you wnat to make the second knot so that you get the representation of a loop.

e. Drawing a float (fig. 10)

Click the button *Free Hand Tool* , select ***Bezier Tool*** and draw a horizontal line – the graphic symbol of a float.

f. Counting the number of rows and the columns (fig. 11)

After filling in all the squares from the net with conventional signs associated with the desired report, we strat counting the number of rows and columns by clicking the ***Text Tool*** button on the toolbar.

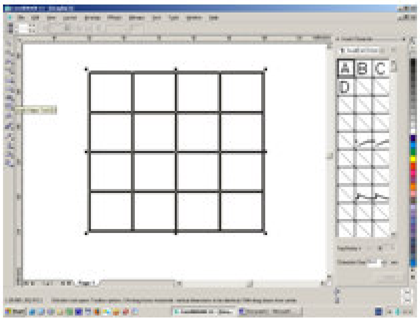

Fig. 6: *Seting up the framing net*

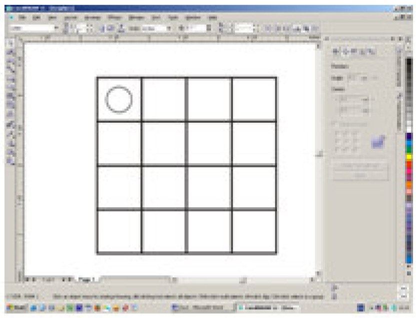

Fig. 7: *Drawing the normal stitches with rear stitch*

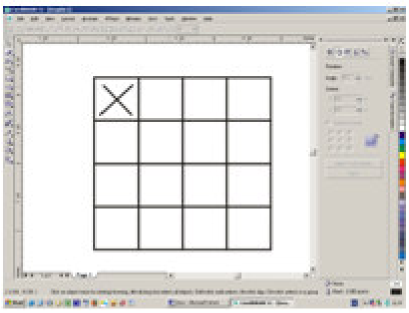

Fig. 8: *Drawing the normal stitches with front stitch*

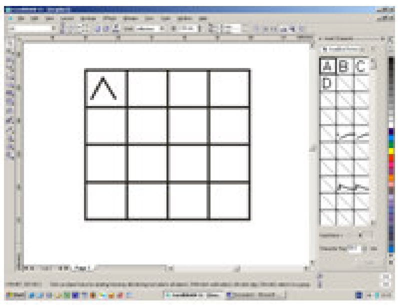

Fig. 9: *Drawing a loop*

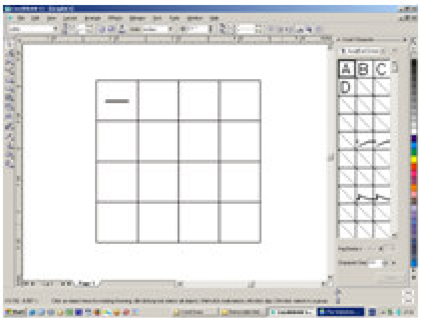

Fig. 10: *Drawing a float*

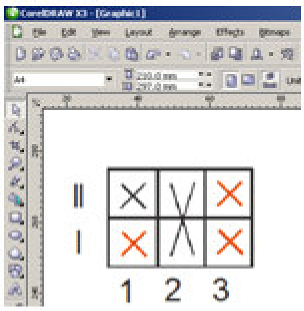

Fig. 11: *Counting the number of rows and columns for irregular jacquard*

2.3. Symbolic representation of the section of stitch courses for a weft knit

The symbolic representation of row stitches consists in translating on paper of the position of yarns compared to the needles, in the respective row of stitches.

The needles are represented by points and are placed according to thier position on the needle bed.

The method has the advantage of giving information on the knitting process (number of needle beds, relative needle position, the way the needles work). [6]

Symbolic representation of the section of stitches rows with the help of the graphic editor CorelDRAW is done as follows:

For ***drawing the stitch with front stitch***, from the options toolbox we choose ***Polygon Tool*** . and then click ***Graph Paper Tool*** . Then we establish thenumber of rows and columns of the report. Next we click ***Free Hand Tool*** , we select ***Bezier Tool*** and we draw 2 lines that will represent the sinker semiloops of the stitch. We click ***Elipse***. By holding down the ***Ctrl*** key we draw a circle to represent the body of the stitch. Then we draw the point that represents the needle which forms the respective stitch.

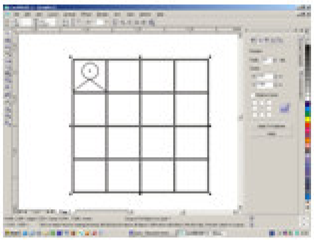

Fig. 12: *Drawing with front stitch*

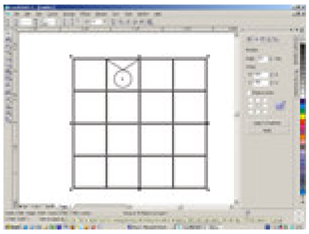

Fig. 13: *Drawing with rear stitch*

For ***drawing a loop with front stitch*** represented by an arc, we click ***Elipse*** button and select ***Arc*** . We draw 2 straight lines with the help of ***Bezier Tool*** . Then we draw the point that represents the arc forming the respective loop.

For ***drawing a loop with rear stitch*** we select the loop obtained with front stitch. From menu ***Arrange*** choose ***Group*** command. Then press ***Ctrl+D*** keys to create a duplicate. From menu ***Arrange*** select → ***Transformations*** → ***Rotate***. We rotate the figure to 180 degrees and we get ***loop with rear stitch***.

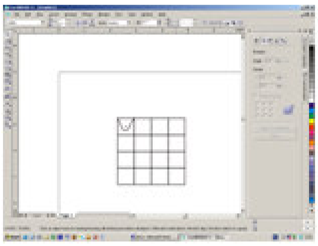

Fig. 14: *Drawing a loop with front stitch*

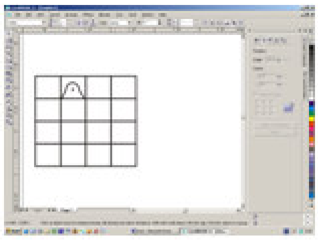

Fig. 15: *Drawing a loop with rear stitch*

With the help of ***Ctrl+D*** command on the keyboard we draw the main structure by positioning each element in the dedired position. Then we select the network and delete it with the help of ***Delete*** command from ***Edit*** menu. By using the method described we will make all the rows corresponding to the report. After representing the report the rows and columns will be numbered through the section of the stitches rows by clicking ***Text Tool*** button.

In the following figure is given an example of representing the section of stitches rows for irregular jacquard.

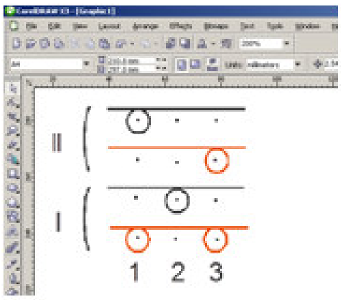

Fig. 16: *Representation of a section of stitches rows for irregular jacquard*

In the case of knitted fabrics with large drawings, made on machines with two fonts, it is recommended to use in addition to the representation of the knitted structure through one of the methods presented previously and the representation of the drawing aspect on the front side of the knitted fabric. For this we use a mesh with the size of the report on which stitches of diffenere colours are shown, according to the drawing. We use the stitch symbol for front stitch "x" or we highlight in the respective colour the square reserved for one stitch. [5]

With the help of the graphic editor CorelDRAW the representation of the deisgn involves goining through some stages whose sequence is presented below.

From toolbox choose ***Polygon Tool*** . and click the ***Graph Paper Tool*** . Then determine the number of rows and columns. Using the ***Pick Tool*** selected the network. Click on the ***Fill Color*** and select the first color. For the representation of stitches of other color follow the next steps: where there are stitches of other colour, click the ***Graph Paper Tool*** and draw a cell over the previously drawn one. Changing the color of the cell is made by clicking the ***Fill Color*** button.

In the following figure is presented the layout of the drawing for irregular jacquard.

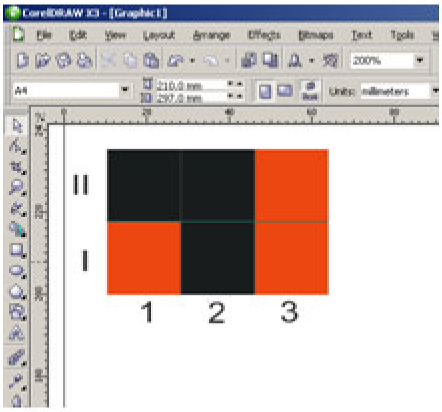

Fig. 17: *Representation of layout design for irregular jacquard.*

3. CONCLUSIONS

With the help of the graphic editor CORELDRAW we can make the graphical representation of the structure of any kind of weft knitted fabric regardless of its complexity, strating from the simplest ones such as knits with basic weaves (single jersey, rib fabric, links, links and links patterns) to the most complex structures such as knitted fabrics with different evolutionary changes of normal stitches (tuck loop knits, missed stitches knits, racked stitches knits, etc.) or those with combined designs (knitted jacquard, intarsia knits etc.).

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ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

PRODUCTION WITH 3D PRINTERS IN TEXTILES [REVIEW]

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Abstract: *3D printers are gaining more attention, finding different applications and 3D printing is being regarded as a 'revolution' of the 2010s for production. 3D printing is a production method that produces 3-dimensional objects by combining very thin layers over and over to form the object using 3D scanners or via softwares either private or open source. 3D printed materials find application in a large range of fields including aerospace, automotive, medicine and material science. There are several 3D printing methods such as fused deposition modeling (FDM), stereolithographic apparatus (SLA), selective laser sintering (SLS), inkjet 3D printing and laminated object manufacturing (LOM).*
3D printing process involves three steps: production of the 3D model file, conversion of the 3D model file into G-code and printing the object. 3D printing finds a large variety of applications in many fields; however, textile applications of 3D printing remain rare. There are several textile-like 3D printed products mostly for use in fashion design, for research purposes, for technical textile applications and for substituting traditional textiles suchas weft-knitted structures and lace patterns. 3D printed textile-like structures are not strong enough for textile applications as they tend to break easily and although they have the drape of a textile material, they still lack the flexibility of textiles. 3D printing technology has to gain improvement to produce materials that will be an equivalent for textile materials, and has to be a faster method to compete with traditional textile production methods.

Key words: *3D printing, additive production, textile-like printed materials, 3-dimensional printed objects.*

1. INTRODUCTION

3D printers are gaining more attention, finding different applications and 3D printing is being regarded as a 'revolution' of the 2010s for production [1, 2]. 3D printing is a production method that produces 3-dimensional objects by combining very thin layers over and over to form the object. Traditional production methods are substractive production methods which result in huge material losses, while 3D printing is an additive production method.

The 3D-printed car 'Strati', which was produced in 44 hours, and announced in 2014 [3], 3D printed guns [4] and 3D printed buildings [5] are among 3D printed examples.

3D printing (3DP) technique is being researched in many areas ranging from material science to medicine. Stent prototypes [6], production of pelvic models having fractures for surgical management [7], production of 3-dimensional bone support structures for lesion sites [8], production of bone tissue scaffolds to mimic the physical structure of bone [9, 10], ceramic implants [11], fabrication of individual tablets [12], production of biomaterials [13] and regenerative medicine [14] are among several studies of 3DP in medicine area. Production of auxetic metamaterials [15], printing Cu, which is highly viscous metal in molten state, 3D structures [16], particles having Cu core and Ag shell [17], production of composite membrane structures [18], and chip production [19] are among applications of 3DP in materials science. Research studies are conducted to ensure precise printing to measure thickness [20] and to enable remote controlling [21].

2. 3D PRINTING

3D printing process involves three steps: production of the 3D model file, conversion of the 3D model file into G-code and printing the object. Production of the 3D model file might be done using 3D scanners or via softwares either private or open source. The conversion time depends on the object size; and the conversion time takes longer as the object has asymmetries, complex surfaces or hollow surfaces. The conversion time takes minutes for a 0,2m x 0,2m x 0,1 m object while it takes more than 1 week for a 1m x 1m x 0,8m object [22]. There are several 3D printing methods such as fused deposition modeling (FDM), stereolithographic apparatus (SLA), selective laser sintering (SLS), inkjet 3D printing and laminated object manufacturing (LOM).

The fused deposition modelling (FDM) technique uses a plastic filament which is pushed through a heated extrusion nozzle that melts the material, most inexpensive 3D printers use the FDM process [23].

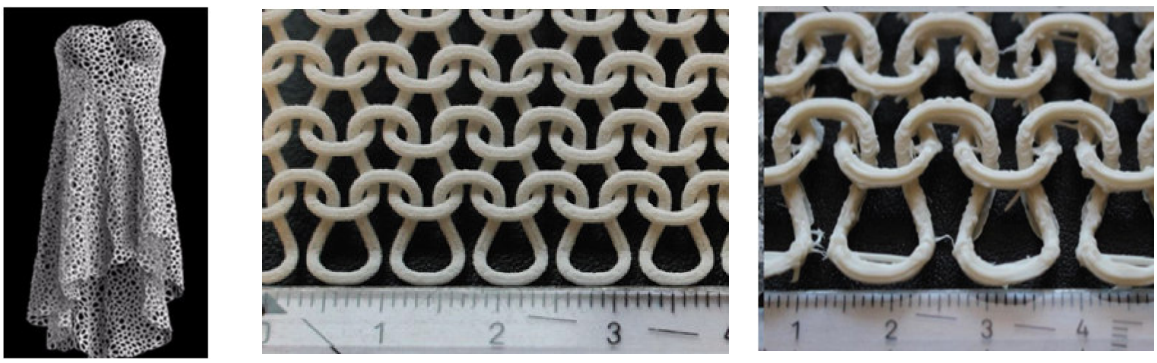
Stereolithographic apparatus (SLA) has a UV laser which cures the liquid polymer used and prints parts layer by layer [24]. Selective laser sintering (SLS) uses a variety of materials including polymers, ceramics and metal materials; SLS forms parts layer by layer from bottom to the top using a laser beam which selectively sinters the powdered material layer [25, 26].

In inkjet 3D printing, layers are formed by depositing a powder and selectively solidifying the powder with a liquid sprayed through the inkjet printhead to print the object [27].

Laminated object manufacturing (LOM) is capable of producing objects at a large variety of materials such as paper, cellulose, plastics, metals and fiber reinforced materials. LOM produces 3D objects by stacking layers of sheet material using a deposition tool; layers are bonded on top of the previous layers and then cut to a specific shape according to the cross-sections of this layer from the software model [28].

3. 3D PRINTING FOR TEXTILE MATERIALS

There are several textile-like 3D printed products mostly for use in fashion designs [29, 30, 31] and for research purposes [32, 33]. The printed dresses are more like a plastic, do not have the textile structure which is flexible and durable [29, 30, 31]. For technical textile applications, wearable technology applications [34] and flexible heating systems developed by Mangre et al [33] are examples; and for 3D printed traditional textiles, examples are weft-knitted structures and lace patterns produced by SLS and FDM printing methods [23]. The printed weft-knitted structures were produced in larger size than traditional knitted fabrics to obtain a thickness that holds the structure in one piece; and the lace produced was not flexible after printing, a second process of soaking in water was applied to give the lace flexibility [23]. Figure 1 shows a 3D printed gown [29] and weft-knitted structures produced by Melnikova et al [23].



(a) (b) (c)

Fig. 1: *(a) 3D printed gown [29], (b)Weft knitted fabric produced by SLS method[23], (c) Weft knitted fabric produced by FDM method [23]*

4. CONCLUSIONS

3D printing finds a large variety of applications in many fields; however, textile applications of 3D printing remain rare [23]. Although 3D printing looks like a new breath in production as it makes it possible to produce prototypes of almost any product, 3D printing needs improvements to make it a faster and more versatile method to produce flexible textile materials. In literature, we could not find any research on the comfort properties of 3D printed textiles.; therefore, comfort properties of

3D printed materials are opportunities for future research studies.

There are some applications of 3D printed fabrics mostly used for fashion designs and research [23, 30, 31, 32]. Still those structures are not strong enough for textile applications as they tend to break easily and even though they have the drape of a textile material, they still lack the flexibility of textiles. 3D printing technology has to gain improvement to produce materials that will be an equivalent for textile materials; and yet has to be a quick production method since traditional textile manufacturing methods are already in mass production stage. However, 3D printing seems to be a promising method for producing prototypes of textile materials such as medical textiles, which will save time and money to predict the properties of the end-product.

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THE STUDY OF IRREGULARITY ELONGATION OF YARNS OF WOOL IN MIXTURE WITH SILK USING THE USTER® TENSOJET 4 MACHINE

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Abstract: *The purpose of the study is to assess the irregularity elongation of wool yarn in a mixture with silk with the smoothness and torque of 470 Nm 34/1 twists / m, for knitted products. The study was conducted on two groups of yarns, batch 1 came from South Africa, and batch 2 from Asia, which was painted. In both groups there was 75% wool yarn and 25% silk. The measurements were carried out using the USTER® TENSOJET 4 machine, the analysis being performed on ten samples from each batch of yarns.*
During the mechanical processing and also during the use of textiles, the yarns are solicited by tensile forces, but most often by forces inferior to tearing forces. To highlight the behavior of yarns during strains to smaller stresses than those causing tearing itself, we must examine the stress-elongation diagrams and the irregularity regarding stress (tearing load and elongation to tearing). These stress characteristics have a major influence on deformability characteristics, dimensional stability, knitted products for which these yarns are intended.
Thus it was found that the yarns from Asia, have a higher quality from the point of view of the tensional proprieties having a lower irregularity defect from this point of view, contributing to obtaining a higher quality of the knitted product with a better dimensional stability than the products obtained from South Africa.

Key words: *yarns, tensile properties, fineness, irregularity, USTER® TENSOJET 4.*

1. INTRODUCTION

During the mechanical processing and also during the use of textiles, the yarns are solicited by tensile forces, but most often by forces inferior to tearing forces. To highlight the behavior of yarns during strains to smaller stresses than those causing tearing itself, we must examine the stress-elongation diagrams and the irregularity regarding stress to tearing load and elongation to yarns tearing. It is necessary to analyze the main tensile proprieties of yarns and their irregularities, in order to create knitted or vowen textile products of good quality.

When the yarns are being stretched they are deformed longitudinally, deformation that occurs at the moment of tearing and is called elongation to tearing. It is needed a study of yarns deformability in the field of knitted fabrics due to their specific contexture and also due to the fact that yarns with less torsion are necessary compared to warp and weft yarns used for knitted fabrics [1] [2].

The resistance of yarns, is a transfer characteristic of the yarns resistance depending on the following factors:

- nature of raw materials
- yarns fineness
- torsion (depending on final use)
- fiber characteristics (strength, fineness, length, surface condition)
- yarns structure
- mechanical, chemical, thermal treatments, etc. [3].

The irregularity to resistance is considered according to the variation coefficient to tearing load and it influences the behavior of yarns when being processed, determining the work efficiency during mechanical processing machines and also the quality of the final product [4] [5].

2. THE EXPERIMENTAL PART

USTER® TENSOJET 4 is a unique control system that gives an accurate forecast of yarn behavior in subsequent processing, especially on high-performance weaving and knitting machinery. Its precise measurements of tensile force and elongation also verify the yarn's suitability for the end-product, as well as facilitating analysis of the yarn production process and fault tracing. The USTER® TENSOJET 4 measures across 100 000 breaks, the basis for an accurate and targeted forecast of yarn processability on downstream machinery. Its enormous test capacity of 30 000 breaks per hour means it can detect seldom-occurring yarn faults or isolated weak places – an important benefit, since such problems are difficult or impossible to predict reliably with conventional testers or on the basis of statistics or probability theory. The massive increases in weaving-machine speeds over the years have resulted in ever higher peak loads on both warp and weft yarns, and when this leads to more frequent thread breakages the impact on production efficiency is similarly magnified. So, weavers need to source yarns with no weak places at which strength and elongation are insufficient to cope with peak stresses on their machines. The causes of infrequent and isolated weak places can include extremely thin places, thick places with little twist, and yarn contamination with vegetable matter, fly or foreign fibers. The only way to detect such faults is to make a large number of random tests within a short time frame, and it is essential to ensure this is done with realistic loads to recreate mill conditions.

Tests have shown that on weaving machines, force is applied on yarns within about 3 milliseconds of a break. The high test speed of the USTER® TENSOJET 4 actually simulates the dynamometric stress on the yarn during weft insertion, which occurs during the 3 – 6 milliseconds time phase. The pressing need to avoid end breaks is illustrated by the example of yarns used in the beaming process, before weaving. Whereas other applications would regard one end break more or less in 100 000 meters of yarn as way of classifying a yarn as 'good' or 'bad', for beaming the critical figure can be as little as 0.8 end breaks in one million meters! The USTER® TENSOJET 4 thus has an obvious and highly significant role in quality control for weaving yarns. But there is an increasing realization that knitting machines too need stronger yarns, in contrast to the faulty perception that strength testing is not required for this application. Knitting productivity has risen considerably in the past 20 years and high needle speeds on today's knitting machines call for improved yarn tenacity, as well as the accepted elongation factor. The high degree of precision and accuracy of measurements on the USTER® TENSOJET 4 provide test results with increased statistical significance, and their value is enhanced by the fact that the instrument has inbuilt correlation with the USTER® TENSORAPID tester, as well as integration with USTER® STATISTICS benchmarks.

Thus we have analysed two batches of yarns, batch 1 coming from South Africa, and batch 2 from Asia, which was painted. In both batches, there is 75% wool and 25% natural silk with the fineness Nm 34/1 and torsion of 470 twists/m, for knitted products. The measurements were carried out using the USTER® TENSOJET 4 machine from Figure 1, analysing ten samples from each batch

***Fig.1:** The USTER® TENSOJET 4 machine [6]*

The first batch taken for analysis is the woolen yarn from South Africa (Batch 1)

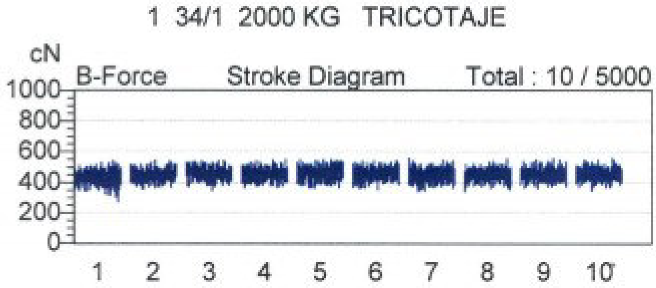

Fig.2: *Dispersion diagram of resitance to tearing for the yarns from batch 1*

In Figure 2, is represented the dispersion diagram of resitance to tearing for the yarns of batch 1, rendering, the irregularity of the resistance to tearing of yarns for the ten samples from batch 1.

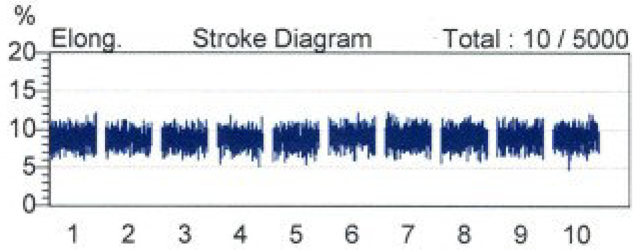

Fig.3: *Dispersion diagram of yarns elongation up to tearing from batch 1*

In Figure 3 is shown the dispersion diagram of the elongation to tearing for the yarns from the batch 1, rendering, the irregularity of elongation to tearing for the ten samples of yarns from batch 1.

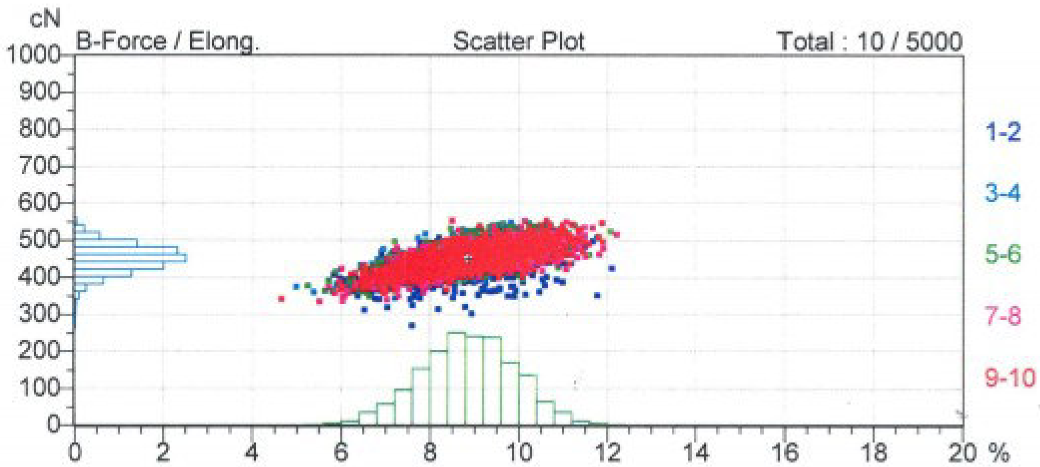

Fig.4: *Diagram of yarns effort - elongation from batch 1*

In Figure 4, is represented the effort-elongation diagram that shows the variation of tensile strength and elongation to tearing for the ten yarns from batch 1.

Total : 10 / 5000 Single test(s)

Nr	B-Force cN	Elong. %	Tenacity cN/tex	B-Work cN.cm
1/500	430.9	8.77	14.65	1253
2/500	445.5	8.69	15.15	1274
3/500	456.0	8.72	15.51	1306
4/500	453.9	8.73	15.43	1305
5/500	456.9	8.76	15.54	1314
6/500	456.0	9.13	15.50	1358
7/500	447.9	9.01	15.23	1324
8/500	447.8	8.87	15.23	1308
9/500	447.8	8.94	15.23	1328
10/500	451.4	8.95	15.35	1323
Mean	449.4	8.86	15.28	1309
CV	7.95	12.02	7.95	19.31
s	35.74	1.07	1.22	252.8
Q95	0.991	0.03	0.03	7.009
Min	267.8	4.66	9.11	459.8
Max	551.9	12.21	18.77	2161
P0.01 (0)				
P0.05 (2)	310.3	5.23	10.55	546.7
P0.1 (5)	316.1	5.52	10.75	604.7
P0.5 (25)	348.4	6.05	11.85	694.9

Fig.5: *The statistical and mathematical processing of yarns individual data - batch 1*

In Figure 5 are found the individual values for the tensile forces of the ten samples of yarns and elongation to tearing corresponding to these forces. Based on these data it is achieved the statistical and mathematical processing of such individual data thus obtaining: tenacity, arithmetic mean, coefficient of variation, for yarns from - batch 1.

The second batch is taken for analysis of woolen yarn from Asia (batch 2)

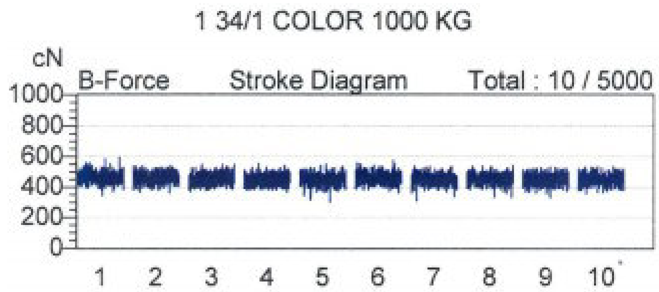

Fig.6: *Dispersion diagram for the resitance to tearing of the yarns from batch 2*

In Figure 6 is represented the disperson diagram of the resistance to tearing of the yarns from batch 2, rendering, the irregularity of tear-resistant yarns for the ten samples from batch 2.

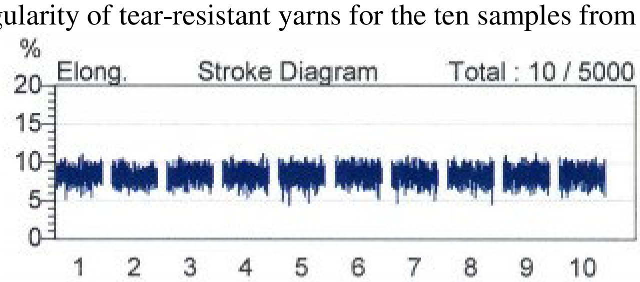

Fig.7: *Dispersion diagram of yarns elongation up to tearing from batch 2*

In Figure 7, there is shown the diagram of the dispersal of the elongation at rupture of the yarn from batch 2, rendering, the irregularity of elongation at tearing for the ten samples of yarns from batch 2.

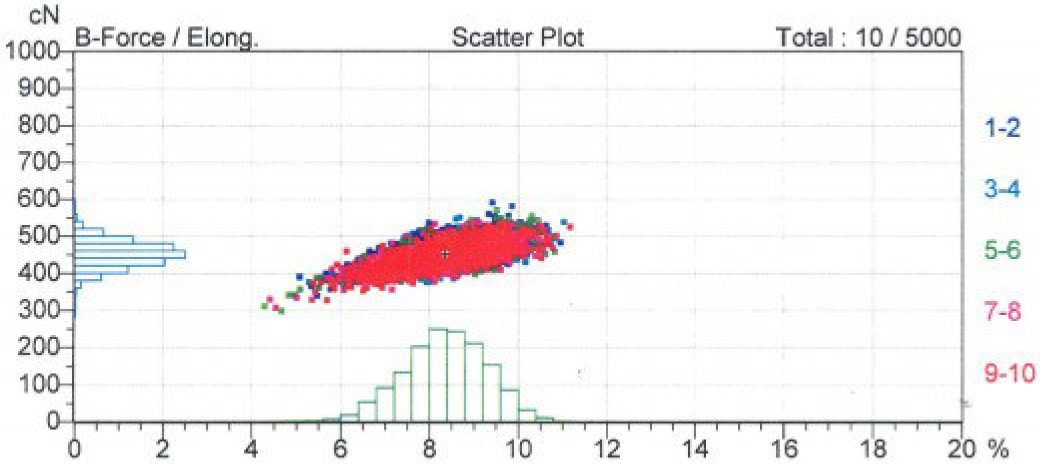

Fig.8: *Diagram effort-elongation of yarns from batch 2*

In Figure 8, is represented the diagram of effort-elongation that shows the variation of tensile strength and elongation to tearing for the ten yarns in batch 2.

Total : 10 / 5000 Single test(s)

Nr	B-Force cN	Elong. %	Tenacity cN/tex	B-Work cN.cm
1/500	459.5	8.32	15.62	1252
2/500	459.0	8.19	15.61	1229
3/500	451.8	8.39	15.36	1247
4/500	446.2	8.36	15.17	1228
5/500	447.0	8.38	15.20	1235
6/500	459.7	8.53	15.63	1289
7/500	447.3	8.30	15.21	1213
8/500	446.5	8.30	15.18	1218
9/500	448.6	8.37	15.25	1233
10/500	449.1	8.40	15.27	1245
Mean	451.5	8.35	15.35	1239
CV	7.60	11.23	7.60	18.33
s	34.30	0.94	1.17	227.1
Q95	0.951	0.03	0.03	6.297
Min	297.7	4.28	10.12	410.8
Max	590.7	11.17	20.08	2029
P0.01 (0)				
P0.05 (2)	310.6	4.53	10.56	437.7
P0.1 (5)	327.3	4.83	11.13	507.0
P0.5 (25)	364.0	5.72	12.38	666.8

Fig.9: *The statistical and mathematical processing of yarns individual data - batch 2*

In Figure 9 are found individual values for the tensile forces of the ten samples of yarns and elongation to tearing corresponding to these forces. Based on these data it is achieved the statistical and mathematical processing of such individual data, thus obtaining: tenacity, arithmetic mean, coefficient of variation, for yarns from - batch 2.

3. CONCLUSIONS

As a result of the analysis made, statistical and mathematical processing was performed resulting the coefficient of variation of resistance to tearing for the two groups of yarns: CV1 = 7.95 for the first batch and CV2 = 7.6 for the second batch.

Thus it was found that the yarns from Asia, have a higher quality from the point of view of the tensional proprieties having a lower irregularity defect from this point of view, contributing to obtaining a higher quality of the knitted product with a better dimensional stability than the products obtained from South Africa.

ACKNOWLEDGEMENTS

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ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

CHARACTERISTICS STUDY OF UNCONVENTIONAL TEXTILE FIBERS RECOVERED FROM RECYCLABLE MATERIALS - PART I

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Abstract: *Unconventional textiles are manufactured different from those obtained by the classic spinning weaving and knitting. They are obtained by mechanical or chemical consolidation of a textile backing up of fibrous layers or combinations of layers of fiber and yarn, fabrics and yarns, fabrics or knitted fabrics and fibers. The non-conventional textiles can be obtained by mechanical or chemical consolidation of a system or several systems of wires.*
The increasing trend of chemical fiber production compared to natural fibers found also in the unconventional fabrics. In addition emphasis is laid increasingly on the use of recyclable materials recovered fibers and preforms or debris resulting from a regular textile processing. Processing unconventional fibers that are recovered from such materials are best suited for the production of unconventional textile. The production of unconventional textile fiber made from layers have the largest share. The fiber layers may have fibers oriented in a single direction, in two or more directions. The fiber layers can enhance mechanical, chemical and mixed. This produces textile auxiliaries for clothing, replacement canvas for buckram wadding, sanitary ware carpet filters, support for synthetic leather, cloth, wallpapers.

Key words: *skin, specimens, canvas, manufacturing, standard atmosphere, stopwatch fabric.*

1. INTRODUCTION

The physical and mechanical for tests to enforce the parameters that characterize the environment, namely: 200C temperature, relative humidity 60% and pressure of 760mm Hg. [1] The room's laboratories carrying out measurements must meet the following conditions:

- Be bright and clean;
- To be located so that the vibration from various disturbing factors do not influence the following measurements;
- To be protected from sources of dust, water vapor and gases;
- To have ventilation and air conditioning so as to maintain the temperature and humidity values required by current standards.

For proper operation of the measuring instruments and control and eliminate error sources, it is recommended; placing squares on independent foundations or supports that exclude the vibrations, the settlement devices away from sources of heat, placing devices so as to avoid the negative influence of magnetic and electric fields. [2] The number of samples taken depending on the size of the lot and can not be less than 5. The shape and dimensions of the specimens depends upon physico-chemical tests and the measuring method used will be specified in each determination. All specimens are subjected to climate. For cooling of tested samples, the physical and mechanical materials must be kept in standard atmosphere until steady state is established between the water molecules absorbed and transferred. It is considered that the material has reached equilibrium with the standard atmosphere when two successive weighings are made at hourly intervals do not show a difference of more than 0.1% over the first weighing [3, 4]. Testing is performed in test specimens of unconventional textile fiber made from layers have the largest share.

2. THE PHYSICAL AND MECHANICAL TESTS FOR UNCONVENTIONAL TEXTILES

2.1. Determination of thickness and the apparent density

To determine the thickness of the textile using a timer. [5] The measuring accuracy of the device is 0.01 mm and the maximum thickness which can be measured is 10 cm. The apparent density is expressed in g / cm3 and is calculated according to the mass M of the specimen in grams and dimensions of square shape specimen, expressed in m and the average thickness d in mm. The calculations made shall be centralized in Table 1.

- The apparent density;

$$\gamma = \frac{M \cdot 10^3}{L \cdot l \cdot d} \tag{1}$$

- The mass of the specimen;

$$M_{mp} = \frac{M}{L \cdot l} \tag{2}$$

$$\gamma = \frac{M_{mp} \cdot 10^3}{d} \tag{3}$$

Table 1: *The values obtained for the specimen mass*

Crt. No.	Variant 1			Variant 2		
	M_{1mp}[g]	D1[mm]	γn[kg/m^3]	M_{1mp}[g]	D1[mm]	ϒn[kg/m^3]
1	270,73	4,25	63701,17	375,66	5,2	72242,308
2	239,19	4,79	49935,28	376,66	4,72	79800,84
3	234,09	4,25	35080	371,56	4,75	78223,15
4	179,93	3,28	54856,707	335,2	4,7	71219,19
5	175,75	3,21	54741,433	365,8	4,35	84112,64
6	172,05	3,18	55179,602	443,88	4,62	106900,43
7	187,87	3,38	55556,213	452,82	4,52	100196,9
8	189,9	3,25	58430,7669	395,11	5,73	68954,625
9	187,1	3,21	58286,604	419,11	5,05	82992,079
10	269,46	4,84	55673,554	414	5,5	75272,272
X	210,59	3,74	56144,136	399,9	4,91	82001,487
Ϭ	38,86	0,68	3523,4517	0,44	0,44	12474,142
ω	18,54	18,32	6,275	11,63	9,04	15,21

2.3.Determination of tensile strength.

To determine the tensile strength used car tried to drive - dynamometer. [5] The breaking load P can be read directly on the scale stated on the device because the device pedulul may apply different weights additional device on the face can be entered several graduated scales. Elongation after absolute rupture is read on a scale inscribed on the dial. The value of breaking elongation may be expressed in mm, according to the initial distance between the clamps at the time of rupture and the distance between the clamps.

- Elongation after rupture:

$$\Delta l = l - l_o \tag{4}$$

The ratio of the elongation at absolute rupture and the initial distance representing an relative elongation in mm.

$$\sum = \frac{l - l_0}{l_0} \cdot 100 = \frac{\Delta l}{l_0} \cdot 100[\%] \tag{5}$$

It may also cause specific tensile strength according to the breaking load and the specimen sectional area A.

$$\tau = \frac{P}{A} = \frac{P}{l_{E \cdot d}} \tag{6}$$

In Tables 2 and 3, variant 1 and 2 are shown the data taken from the dynamometer and the calculation of the specific resistance to rupture for the two variants of the nonwoven and the calculation parameters and the scattering tendency to break and the specific tensile strength.

***Table 2**: The values obtained in calculating specific resistance to tearing and scattering parameters tendency to rupture and specific tensile strength for variant 1*

Specimen No.	Direction	Di[mm]	$A = di \cdot 50$	P[da/N]	$\Delta l[mm]$	$\sum = \frac{\Delta l}{l_0} \cdot 100$	$\sigma = \frac{P}{A}$
1	longitudinal	4,52	226	4,2	18	6	185
2		4,62	231	4,3	20	6,66	186
3		4,7	235	3,9	22	7,33	168
4		4,65	232,5	4,2	18	6	181
X		4,62	231,125	4,15	19,5	6,49	180
Ϭ		0,075	3,79	0,173	1,914	0,63	8,1
Ω		1,64	1,64	4,17	9,81	9,79	4,48
10	transversal	4,35	217	0	30	10	0
2		4,05	202	0	20	6,66	0
3		4,25	212	0	25	8,33	0
4		4,45	222,5	0	18	6	0
X		4,27	213,75	0	23,25	7,74	0
σ		0,17	8,53	0	5,37	1,79	0
ω		3,99	3,99	0	23,12	23,14	0
1	longitudinal	4,6	230	1,5	174,3	49,1	65,21
2		4,52	226	1,2	136	45,3	53,09
3		4,45	222,5	1,7	145	48,3	76,57
4		3,95	197,5	1	168,3	56,1	50,76
X		4,38	219	1,35	149,15	49,7	61,43
σ		0,29	14,65	0,3109	13,66	4,56	11,93
ω		6,69	6,69	23,03	9,16	9,19	19,42
1	transversal	3,98	191	0,3	136	9,19	19,42
2		4,52	226	0,6	146	48,9	26,54
3		4,62	231	0,3	124	41,3	12,98
4		4,6	230	0,8	150	50	34,78
X		4,39	219,5	0,5	139	46,37	22,50
σ		0,39	19,12	0,24	11,60	3,93	10,06
ω		8,71	8,71	48,98	8,34	8,48	44,71

***Table 3:** The values obtained in calculating specific resistance to tearing and scattering parameters tendency to rupture and specific tensile strength for variant 2*

Specimen No.	Direction	Di[mm]	$A = di \cdot 50$	P[da/N]	$\Delta l[mm]$	$\sum = \frac{\Delta l}{l_0} \cdot 100$	$\sigma = \frac{P}{A}$
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	longitudinal	4,62	231	1,8	7,2	36	77,922
2		4,35	226	1,8	5	25	79,646
3		4,70	217,5	1,75	6,2	31	80,459
4		4,57	235	2,1	6,6	22	89,361
X		4,52	227	1,82	6,25	31,25	81,84
σ		0,158	7,54	0,16	0,92	4,6654	81,847
Ω		3,317	3,317	8,59	2,97	14,86	5
							Continuare tabel 4
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**

1	transversal	4,35	217,5	0,6	1,8	9	27,64
2		4,62	231	0,8	1	5	34,63
3		4,2	210	0,05	1,4	7	2,38
4		4,52	226	0,4	1	5	17,69
X		4,42	221	0,4625	1,3	6,5	20,57
σ		0,18	9,27	0,31	0,38	1,91	13,97
ω		1,19	4,19	69,152	29,45	29,45	67,93
1	45^0	5,05	252,5	1,15	5,2	26	54,544
2		4,75	237,5	1,1	6,6	33	56,315
3		4,65	232,5	0,7	4,8	24	30,1
4		4,72	236	0,65	4,8	24	27,54
X		4,79	239,62	0,9	5,35	26,75	37,37
σ		0,17	8,83	0,26	0,54	4,272	9,938
ω		3,68	3,687	23,045	7,98	15,97	56,59
1	135^0	4,52	226	0,7	6,6	33	26,92
2		4,25	217,5	0,5	5,8	29	22,98
3		4,54	227	0,4	5	25	17,62
4		4,05	202,5	0,2	3	15	9,876
X		4,36	218,25	0,45	5,6	28	19,352
σ		0,22	11,33	0,208	0,765	3,829	7,378
ω		5,19	5,192	46,259	2,7359	13,677	38,126

3. CONCLUSIONS

As noted in laboratory experiments, the article made in two variants allows some different properties. The first version of the fabric shows the average weight per m^2 and average thickness smaller than the latter.

The second variant has a better thermal insulation capacity and a lower permeability. After measurements were calculated average values of parameters and coefficient of variation to highlight the degree of unevenness.

The irregularity average weight, average thickness and density averaged are included within the normal variation in both materials. Load after rupture in the transverse direction has the maximum value and the minimum value in the longitudinal direction in inverse proportion to the elongation after rupture.

Both irregularity breaking load and in ultimate elongation is normal.

The material 1 is not resistant to repeated tensile stress. The rupture load values are small but is very high elongation. In variant 2 inter-weaving hard pulvotex makes the material have good tensile strength. All pulvotex support gives good material resistant to fatigue.

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CHARACTERISTICS STUDY OF UNCONVENTIONAL TEXTILE FIBERS RECOVERED FROM RECYCLABLE MATERIALS - PART II

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Abstract: *Unconventional textiles can be obtained by strengthening the fibrous layer using wires, thereby achieving auxiliary materials for clothing, apparel linings, carpets. The fiber layers can be reinforced backing fabric using mechanical or mixed methods. The products are designed as filter materials, basic clothing. The global market for raw materials there is a continuing concern for material recovery specialists and their reintroduction into the economic cycle. Reconsideration materials as technological losses in production processes and in the sphere of consumption as factors polunaţi environment on the one hand and as a source of raw materials and energy, on the other hand, gave rise to different views regarding society's attitudes also potential resources and practical concepts that operate in these areas are unforgettable.*
Researches in order to create new unconventional textile fiber content of recyclable materials recovered were considered objectives:
-The establishment of new wool upholstery variants which besides reusable textile fibers recoveredto be entered and recovered fiber in textile products
-Make gre-lightweight textile per unit area that could be used in land drainage works on clay as filter elements covering plastic tubes.

Key words: *hysteresis, air permeability, recovered fibers.*

1. PERMEABILITY TO AIR

The property of textiles to let air pass through them are called air permeability [1,2]. Air permeability at a pressure difference will be expressed by the ratio of the specimen surface airflow and went through the air.

$$P_{a\Delta p} = \frac{\sum \Delta p}{A} \tag{1}$$

In order to determine the air permeability penetrometer using known apparatus. Calculation of permeability to air at a desired pressure differential is expressed in m3 / min m2 depending on air flow rate, expressed in liters / hour depending on the sectional area of the suction mouth.

$$P_{a\Delta p} = \frac{\sum \Delta p \cdot 10^{-3}}{60 \cdot A} \tag{2}$$

$$A = \frac{\pi \Delta^2}{4} = 1{,}96 \cdot 10^{-3} \tag{3}$$

$$K = \frac{10^{-3}}{A \cdot 60} = 17{,}32 \cdot 10^{-3} \tag{4}$$

$$P_{a\Delta p} = K \cdot \sum \Delta P \tag{5}$$

Table 1 presents data taken from the device for specimens of the two versions of nonwoven and processing them according to the relations above calculation.

Table 1: *Values obtained by calculating air permeability*

Crt. No.		$p\Delta p[l/h]$ $\Delta la = 10N/m^2$	$p\Delta p[l/h]$ $\Delta la = 50N/m^2$	$Pa\Delta p = K \cdot p\Delta p$	$Pa\Delta p = K \cdot p\Delta p$
1	Variant 1	330	1650	5,71	28,58
2		550	2150	9,52	37,24
3		550	2400	9,52	41,57
4		575	2400	9,96	41,57
5		825	3200	14,29	55,43
6		640	3900	11,08	50,23
7		625	3500	10,82	43,30
8		625	3600	10,82	45,03
9		610	2600	10,56	45,03
10		575	2300	9,96	39,84
X		590,5	2470	10,22	42,78
σ		121,057	417,133	2,09	7,22
ω		20,49	16,88	20,49	16,88
1	Variant 2	460	1900	7,96	32,91
2		310	1650	5,37	28,58
3		360	1950	33,77	33,77
4		425	1900	7,36	32,91
5		410	2100	7,10	36,37
6		325	1900	5,62	32,91
7		250	1400	4,33	24,25
8		190	1100	3,29	19,055
9		450	2100	7,79	36,37
10		225	1200	3,89	20,78
X		340,5	1720	5,89	29,79
σ		96,59	365,3	1,67	6,32
ω		28,36	21,23	28,36	21,23

2. DETERMINATION OF MASS IRREGULARITY PER UNIT AREA

To determine the mass irregularity following method is recommended:

- Cropping specimens with dimensions of 10 cm;
- Cooling the specimens;
- Specimens weighing with analytical balance,
- Calculation of the mass per unit area;

$$M_{mp} = \frac{M}{S} \tag{6}$$

- Calculation of tendency and scattering parameters
  - an arithmetic average of the masses specimens:

$$M = \frac{\sum_{i=1}^{n} Mi}{n} \tag{7}$$

  - the standard deviation:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(0{,}01Mi - M)^{2}}{n-1}} \tag{8}$$

In Table 1 are presented the readings analytical balance for 10 specimens of each variant of unconventional fabric also the tendency and scattering parameters calculation

Table 1: *The values calculated the trend and scattering parameters.*

Crt. No.	Variant 1		Variant 2	
	Mi[g]	Mmp[g/m^2]	Mi[g]	Mmp[g/m^2]
1	2,70	270,73	3,75	375,66
2	2,39	239,19	3,76	376,66
3	2,34	234,09	3,71	371,56
4	1,79	179,93	3,35	335,2
5	1,75	175,72	3,65	365,89
6	1,72	172,05	4,98	493,88
7	1,87	187,87	4,58	542,83
8	1,89	189,9	3,95	395,11
9	1,871	187,1	4,19	419,11
10	2,69	269,46	4,14	414
X	2,10	210,59	3,99	399,9
б	0,38	38,86	0,46	46,54
ω	18,45	18,45	11,63	11,63

3. DETERMINATION OF RESISTANCE TO REPEATED REQUESTS OF TENSION

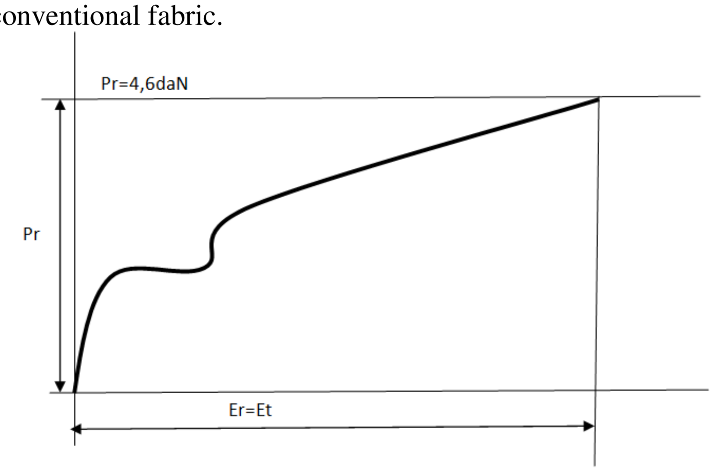
Trying unconventional fabrics resistance to cyclic tensile stress is known as fatigue. [3] The test piece of fabric tension is applied in a certain direction in the form (T) less than the value corresponding to the load after rupture. After each charge will following to descharge. [4,5] Thus the action of the tension T1 is expressed by the elongation deformation occurs if the load condition is followed by an absolute discharge hysteresis occurs. Following the diagram recorded by the camera can be seen that as the number of loading and unloading ciclilord increase deformations also will increase. At the beginning of charging curves - download distinguish very well, then they begin to overlap, an effect corresponding to a given condition due to high internal frtecări so, from one cycle to the other deformations grow very slowly. By breaking points binding fter some time loading and unloading curves are again visible with larger deformations from one cycle to another and finally rupture the analyzed material. The specimens may be required for a predetermined time after that can investigate changes on other features of the fabric unconventional.[6]

$$T_0 = F + G \cdot sin\alpha$$

G= 3,65daN, $\alpha = 30$, F=35,77daN (9)

$$T_0 = 53{,}655daN$$

In the following figures, diagrams are provided from the apparatus for specimens taken from the two variants unconventional fabric.



a)

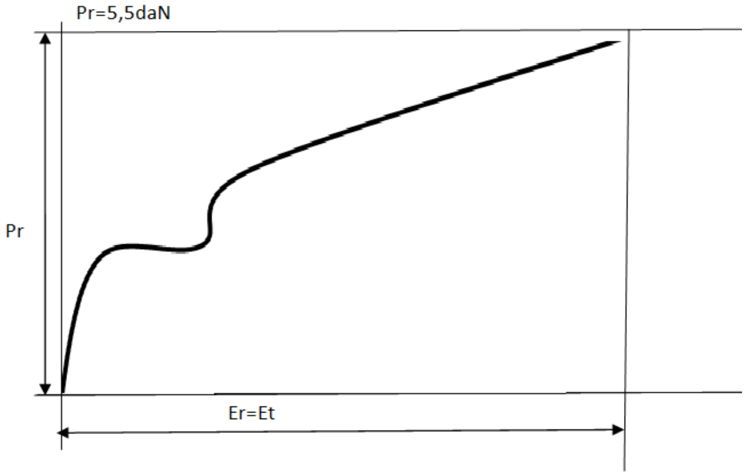
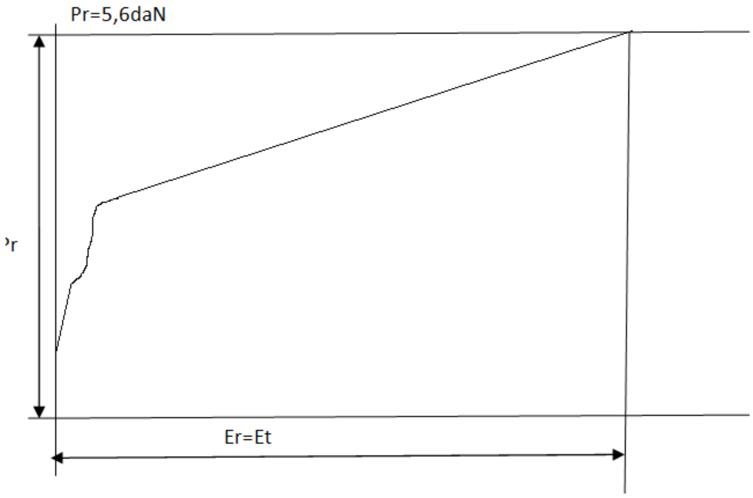


Fig.1-a), b): *Diagram direction 0 -180*



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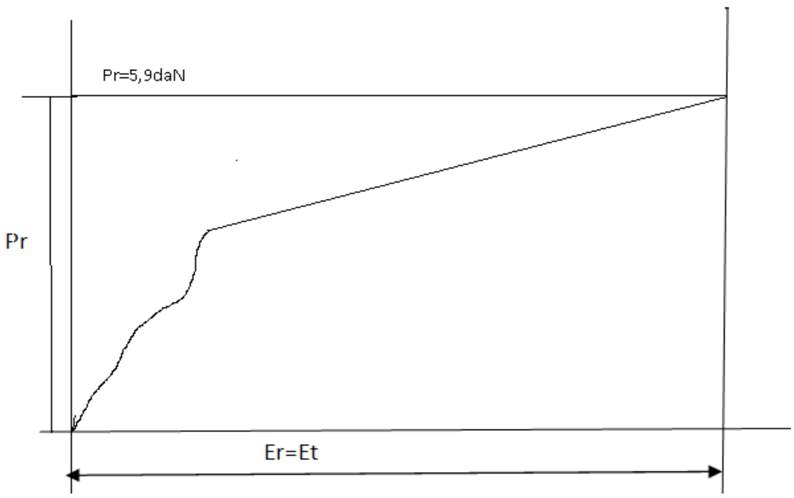
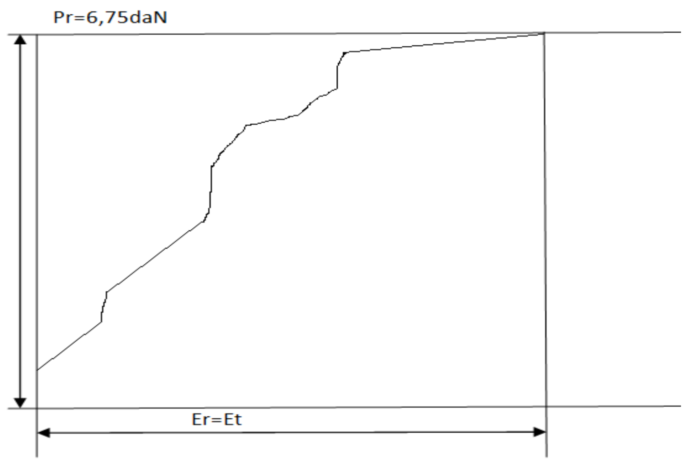


b)

Fig.2-a), b): *Diagram direction 135 -315*



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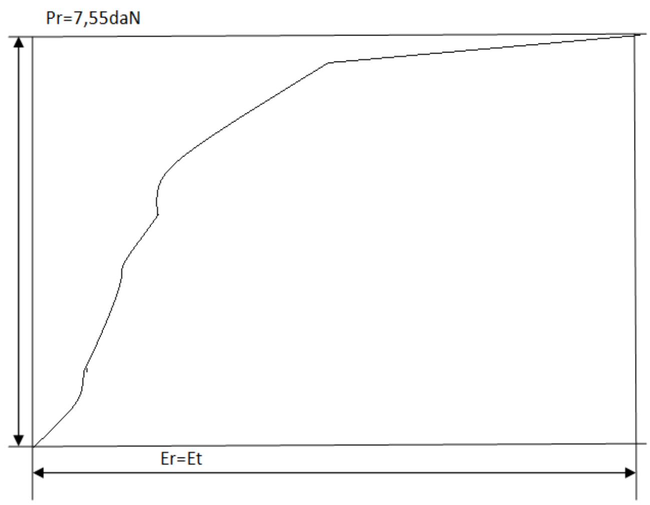
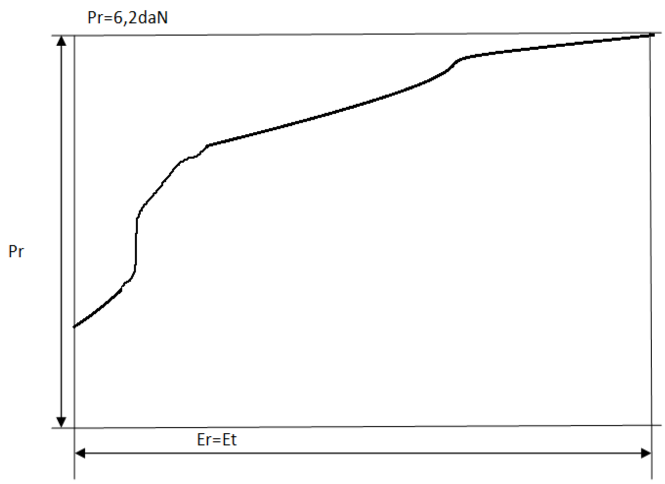
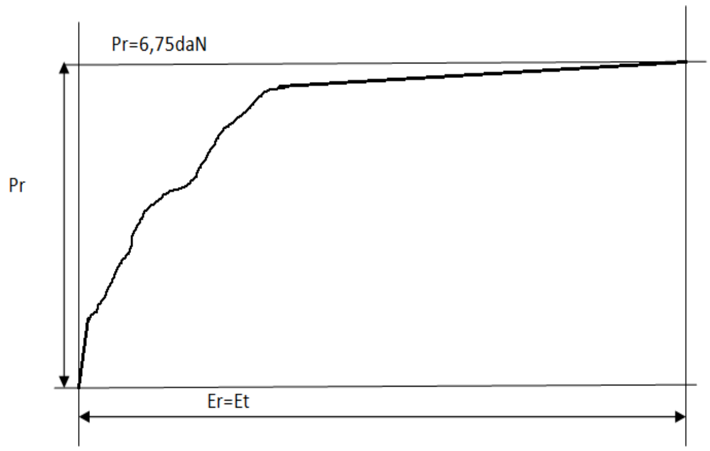


b)

Fig.3-a), b): *Diagram direction 90 -270*



a)



b)

Fig.4-a), b): *Diagram direction 45-225*

4. CONCLUSIONS

As noted in laboratory experiments, the article made in two variants allows some different properties. The first version of the fabric shows the average weight per m2 and average thickness less than the second variant. The second variant has a better thermal insulation capacity and a lower permeability.After measurements have been calculated the average values of parameters and coefficient of variation to highlight the degree of unevenness.

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Both irregularity breaking load and elongation at break is normal. The material 1 is not resistant to repeated tensile stress. Breaking load value is small but has very high elongation. In variant 2 inter-weaving hard pulvotex makes the material have good tensile strength. All pulvotex support gives good material resistant to fatigue.

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ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

INNOVATIVE CLOTHING DESIGN FOR WOMEN DURING PREGNANCY

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Abstract: *During pregnancy there is an evident change in the physical appearance of a woman's body. The most evident change is the substantial weight gain, increased abdominal region, torso and hip, and limbs thickening. Physical changes leads to the need of a wardrobe changing, especially in the fourth month of pregnancy.*
Given these factors the question arises is to identify the transformations of body conformation and ensure a maximum comfort in developing clothing products for this category. Because it is a continuous transformation, the products must be designed to be adjustable and versatile, ensuring their usability for a long period of the pregnancy and even after birth. The paper presents the specific algorithms for body conformations during pregnancy and the patterns designed based on these algorithms with the proper modifications. The principle of designing clothes for pregnant women refers to the introduction of pregnancy-related size changes in the standard method of pattern design.
The research was conducted by INCDTP during the initial stage of a project, financed through national founds, consisting in a documentary study on morphologic indicators of women during the pregnancy period, the changes observe and their application in pattern design. Following the principles specific to the product group studied regarding comfort and style, INCDTP specialists have developed and produced a collection of clothing products for women during pregnancy.

Key words: *Pregnancy, algorithms, proportions, morphological indices, pattern design, clothing, changes*

1. INTRODUCTION

During pregnancy there is an evident change in the physical appearance of a woman's body. The most evident change is the substantial weight gain, increased abdominal region, torso and hip, and limbs thickening. Physical changes leads to the need of a wardrobe changing, especially in the fourth month of pregnancy. Given these factors the question arises is to identify the transformations of body conformation and ensure a maximum comfort in developing clothing products for this category.[1] Clothing products are divided into two categories in terms of support on the body: garments with support on shoulders and garments with support on waist. Because in designing patterns for both categories are used parameters that are changing during pregnancy, comes into sight the necessity to define algorithms for all products.[2]

The changes are observed in the circumferences. A woman is mature in the gestation period and for that reason their height does not change. During pregnancy, the changes of proportion are in the following regions: thoracic area, abdominal area, gluteal area, femoral area and arm area. The biggest change is in the abdominal region. During pregnancy, especially in the last months of pregnancy when the body suffers the greatest changes, both in terms of conformational and functional, the main function that must fulfill aspecific clothing item of this category is comfort.[3]

For clothing items adressed to pregnant women it is necessary to be given special attention to psychosensorial and social characteristics, which refers to the hue and harmony of colors, design, elegant tailoring, applying decorative elements (stitches, applications). [2]

2. STUDY ON WOMAN'S BODY CHANGES DURING PREGNANCY

Body changes during pregnancy were studied in medical literature and clothing design. There are four major changes: changes in body shape, body size, posture and weight. All of these modifications lead to the need of redesign patterns in order to obtain clothing items which comply to the new conformations. The current research conducted by INCDTP, is related to the analisys of physical changes during the maternity period that influences design patterns and to the redesign of patterns using specific algorithms for body conformations during pregnancy.[1]

2.1.Changes in body shape

Trimesters of pregnancy are divided into three stages of three months each. First trimester includes the first 12 weeks after conception. The second trimester starts from week 13 and lasts until week 28. Last quarter begins in week 28 of pregnancy until birth. During pregnancy women suffer rapid changes of shape and body size in a relatively short period of time. The first external physical changes happens after four months (Gersh & Gersh, 1981) and are visible in the upper body of the stomach. The proportions of a woman's body before pregnancy and at the end of pregnancy suffer the greatest changes (Figure 1). The changes are observed in the circumferences. A woman is mature in the gestation period and for that reason their height does not change. During pregnancy, the changes of proportion are in the following regions: thoracic area, abdominal area, gluteal area, femoral area and arm area. The biggest change is in the abdominal region.

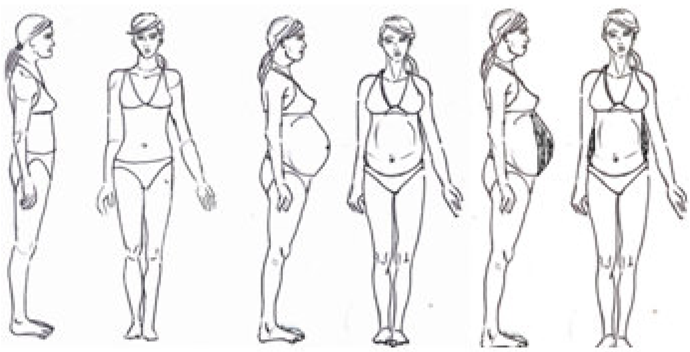

Fig.1: *Comparison of the female body proportions before and at the end of pregnancy*

2.2 Changes in body size

Most women will notice an increase from 20 to 26 centimeters around the waist during pregnancy (Sadler, 1974). Manley (1991) found that the largest changes of dimensions (10-12 cm) have occured in the waistline and abdomen followed by bust and hips size. Abdominal prominent among pregnant women varies depending on the position of the fetus in the upper or lower abdomen. Bust size changes during pregnancy with an average of 5-8 cm circumference (figure 2).

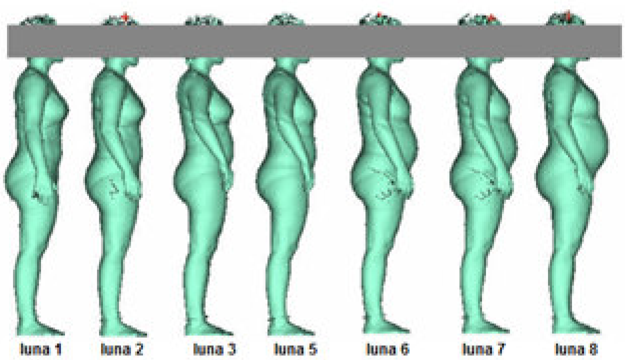

Fig. 2*: Body changes of a pregnant woman*

2.3 Changes of body posture

Regardless of the specifics of each woman's pregnancy, the body balance must be maintained, resulting in a temporary curvature of the spine. This curvature change the body posture tilting it backwards (Fite & Roberts, 1984). Nicholls and Grieve (1992) found that body posture goes through a major change, especially in the second and third trimester of pregnancy.

Numerous studies have shown that size and body posture changes affects the proper fir of the clothes (Goldsberry, Shim & Reich, 1996).

2.4 Weight Changes

Generally, the ideal excess weight that a woman should gain during 40 weeks of pregnancy is about 13 kg (Girandola, Khodiguian, Mittelmark & Wiswell, 1991).
All these physical changes due to pregnancy requires a special attention to comfort, shape and size in designing clothing articles for the maternity period. Considering the variety of body shapes and sizes, physical changes occur differently for each pregnant woman. For example, pregnant women who have a low body mass index (BMI) tend to take more weight than those who have a high BMI. Also, depending on the position of the fetus, abdominal forms varies from person to person.[1]

3. SETTING ALGORITHMS TO DESIGN PATTERNS FOR BODY CONFORMATIONS DURING PREGNANCY

Establishing specific algorithms to design patterns for body conformations during pregnancy after a careful analysis of the dimensional differences after the measurements made on a sample of 30 pregnant women by researchers in the field. The necessary dimensions taken over are shown in Figure 3.[2]

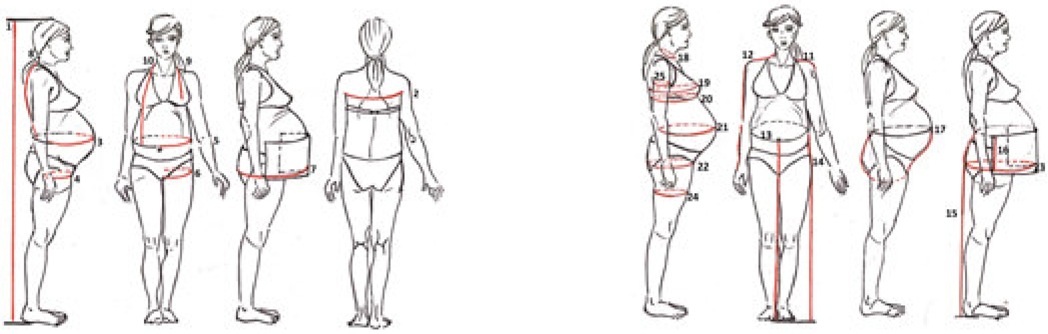

Fig. 3: *Body measurements – measured during pregnancy*

3.1. Pattern design for pregnant women

An important modification of the basic pattern design method is the addition of pregnancy allowances that are calculated as an average of the difference in measurements before and at the end of pregnancy (Figure 4). The difference in bust girth is 6,3% from the original bust girth. 6,3% is the pregnancy allowance added to total bust girth. The difference in hip girth is 5,25% from the original hip girth. 5,25% is the pregnancy allowance to total hip girth. The difference in waist girths is 37,04% from the original waist girth. This would be the addition to waist circumference, but it is difficult to add, since the change in waist size during pregnancy is not symmetrical for both parts of the blouse.
Pattern design for the group with weight gain over 12 kg is described in the paper for comparison. The difference is in extending the first part, 30%, of the pregnancy allowance in the waistline. The omitting of the front and side darts and the loosening of the back centre line is the same, but the change is in the reduction of the back dart. Another change is in having a bigger extension of the front centre line within the bounds of the interval. [3]

Based on these changes, the patterns were redesigned during the initial stage of a project, financed through national founds conducted by INCDTP, using automatic software design patterns Gemini Cad, Made-to-Measure module for the following clothing products: blouse, trousers and skirt. (Fig.4, Fig. 5 and Fig. 6).[2]

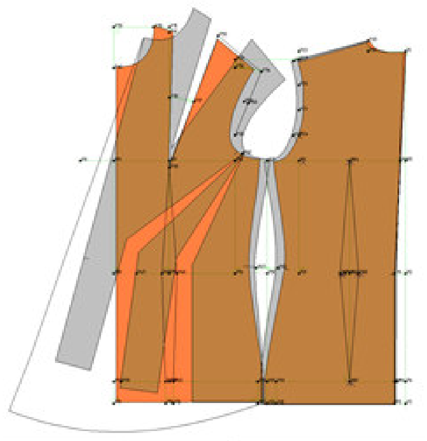

***Fig. 4:**. Final styling modification of a blouse pattern design for pregnant women*

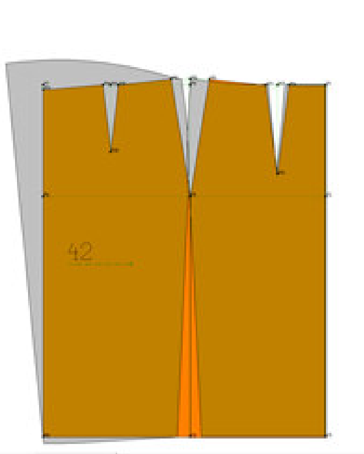

***Fig. 5:**. Final styling modification of a skirt pattern design for pregnant woman*

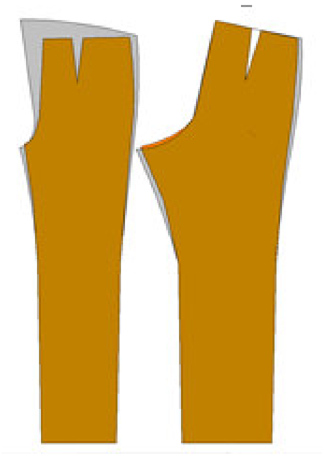

***Fig. 6:** Final styling modification of a trousers pattern design for pregnant women*

4. DESIGNING AND MANUFACTURING CLOTHING PRODUCTS FOR WOMEN DURING PREGNANCY

4.1 Getting the comfort and style of clothing products for women during pregnancy

During pregnancy, especially in the last months of pregnancy when the body suffers the greatest changes, both in terms of conformational and functional, the main function that a clothing item specific to this category must fulfill is comfort. Comfort is an enjoyable state of physical, physiological and psychological harmony between man and the environment (Slater).

This objective can largely be achieved in case of clothing for pregnant women identifying the changes on the body and knowing the states of discomfort that appear with their installation. Comfortable wear has 3 components: thermo comfort, sensory comfort and psychological comfort.

Thermo comfort is determined by the interaction between body- clothes- environment and is achieved when warm and humid exchange between the body and the environment, through clothing structure, takes place under optimum conditions. Optimal conditions involve ensuring equilibrium of the body energy balance, while the temperature, humidity and air velocity must be within certain limits, considered comfortable for the body.

Sensory comfort defines the sensations perceived when wearing apparel (soft, velvety, silky, rough, scratchy, stings, etc.).

Psychological comfort defines the mental state of the wearer, dressed in a certain manner, style, and purpose, that fits his conformation and destination and which is consistent with the terms of the wearer, regarding the social and economic status, his work colleagues, friends, associates or other acquaintances. [4]

From the many requirements a garment for pregnant women must respond, the ensuring of dimensional correspondence with the body occupies an important place. It is also necessary the comfort in dressing and undressing, and the use of appropriate materials and systems for fitting and adjustment according to changes in conformation.[5]

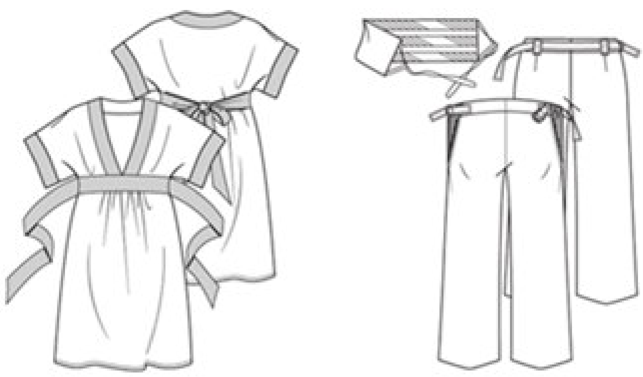

***Fig.7:** Articles for pregnant with elements of the waist adjustment*

4.2. The development of specific models fpr women during pregnancy

For clothing products adressed to pregnant women it is necessary to be given special attention to psychosensorial and social characteristics, which refers to the hue and harmony of colors, design, elegant tailoring, applying decorative elements (stitches, applications).

Optical illusion known in the art with the term "trompe l'oeil" technique constitutes a misleading visual perception by providing spatiality within a plane surface. Within a composition, the optical illusion may distort the perception of existing dimensions, emphasizing certain elements and features. On this principle is based the creation of a whole dress to attract attention from the deformation of the body, focusing on other areas such as the neck.[6]

Following the principles specific to the product group studied regarding the comfort and style, INCDTP specialists have developed and produced a collection of clothing products for women of during pregnancy. (Figure 8) [2]

Fig.8: *INCDTP collection for women during pregnancy*

5. CONCLUSIONS

In this paper were presented general aspects regarding the conformational changes that a pregnant woman body suffers, the need for physical comfort influenced by the need to redesign clothing and the necessity to make clothing patterns adapted to them.

It was presented an analysis of the morphological indicators necessary to design patterns: body size, proportions, posture and conformation. Also, it was shown the ways of taking body measurements and the main anthropometric dimensions required in pattern design.

It was presented a study regarding the female body changes during pregnancy. It was noticed 4 types of changes that influence the pattern design and the change of shape, dimensions, weight and body posture.

Specific algorithms were established to design patterns for body conformations during pregnancy. The principle of designing clothes for pregnant women refers to the introduction of pregnancy-related size changes in the standard method of pattern design. According with the typology and body measurements taken, circumference changes are due to pregnancy. Additions of pregnancy allowance are included in the calculation of pattern design and they are added to each measurement of the body except waist circumference. Changes due to pregnancy are not symmetrical in the waistline. The solution to this problem is to split the addition into several parts, front and back.

It was presented specific design algorithms for body conformations during pregnancy after establishing a connection between weight gain, size before pregnancy and during the last month of pregnancy. These algorithms are applicable for the type of clothing designed regardless of the size and conformation of the pregnant woman.

The research was conducted by INCDTP during the initial stage of a project, financed through national founds, consisting in a documentary study on morphologic indicators of women during the pregnancy period, the changes observe and their application in pattern design. The patterns were redesigned using automatic software design patterns Gemini Cad, Made-to-Measure module for the following clothing products: blouse, trousers and skirt.

Based on the specific algorithms for designing patterns and taking into account the principles of comfort and style specific to the product group studied, INCDTP specialists have developed and produced a collection of clothing products for women during pregnancy.

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A STEP TO A PERFECT GARMENTS FACTORY [REVIEW]

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Abstract: *In this paper was exposed the tendences of the most important designers and producers of integrated transportation sistemsThe transportation system is one of the most important problem in the garments fabrication economy. Begining from unprocessed goods,cutting area,process management,finishing area,quality check to the warehouse, distribution and dispatch zone the basic idea was the same: unlimited railing from centrally-suspended rail servicing all kinds of work stations with application specific trolleys. Ergonomic work station design, linking work stations and areas, manual, semi-automatic and automatic, modular set ups lead to intralogistic systems for the entire factory.The articles are transportated from a post to another post by a suspended trolley. The system for apparel industries is a flexible material handling system designed to eliminate manual transportation and minimise handling. It increases productivity radically, ensures an optimal working flow and provides time for adding value to your products. Technically the system consists of overhead conveyors with individually addressable product carriers, automatically finding its way to the correct operation. It is monitored by a computer providing all necessary data for measuring and managing the process optimally. Furthermore, the system is highly flexible and can rapidly be modified to changes in the production line or the need for expansion.In the same time introduce foreign technology, research and develop independently from hardware to software,. customize the special need of the customers and upgrade and expand the function easily,*

Key words*:automated transportation,hanged transportation, clothing hanging production system*

1. INTRODUCTION

Garments producers all over the world are confronted with reducing costs for labor. That's why the automated hanging transport in apparel is one of the most important ways to obtain major results. We realize that any successful production or manufacturing process relies heavily on ergonomics and usability. The Eton system transports all the pieces of one complete product through the manufacturing process. An addressable product carrier takes all the pieces of one entire unit (i.e. for trousers – backs, fronts, pockets etc.) through the different steps of production. Operations are performed at individual workstations. The end result is a cost-efficient product, processed from pieces to completion.

2. CLOTHING HANGING TRANSPORTATION

2.1. Storage for materials

Orderliness and cleanliness are the main principles here where a variety of unprocessed materials is stored: from fabric rolls, yarns and cones to cardboard cores and boxes. The advantage: no need to put your hands on or piling of materials. Every item is handled with care and stays clean. The storage is airy and easy to keep clean.[1]

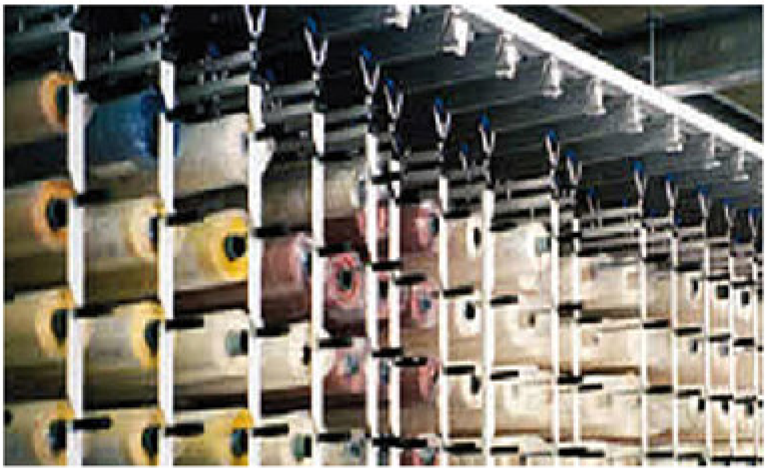

Fig. 1: *Unprocessed materials [1]*

2.2. Cutting room

Fig. 2: *Smart work flow [2]*

The fabric rolls are taken in hanging mode on special gondolas from storage to the spreading machines. The cut pieces are spread onto tray carriers and taken to assembly - quick and easy with minimal effort. The tray carriers' support ergonomically working, they can be turned easily for quick loading and unloading. Markings on the carriers help to survey the entire cutting area. A scrap trolley takes the leftovers from cutting directly to a waste container and - to save space - empty carriers can be fold when not being in use.

2.3. Assembly-sewing

Fig. 3*: Sewing flow*[2]

In pre-assembly and assembly the right bundle size matters a lot. Bundles can for example be arranged by colour. Customized and single orders are also easy to arrange. For every product (jacket, trousers long or short, elegant gowns) and any workstep there are specific trolleys for transport and ergonomic hanging assembly, thus supporting desired quality. Another plus factor: bottlenecks are detected on the spot and can be countersteered. A reduction of up to 40% in handling time can be achieved. Up on completion the product arrives to an unloading station. The empty product carrier returns to the loading station.Decreased work in process (WIP), improved space utilization, and increased productivity are but a few of the systems benefits.[4]

2.4. Finishing-Quality control

***Fig. 4**: Ironning* [2]

Trolleys allow spacing; garments can be transported on single or trained trolleys. Trapeze bars for lower hanging facilitate handling and provide clear view over the finishing area.[5]

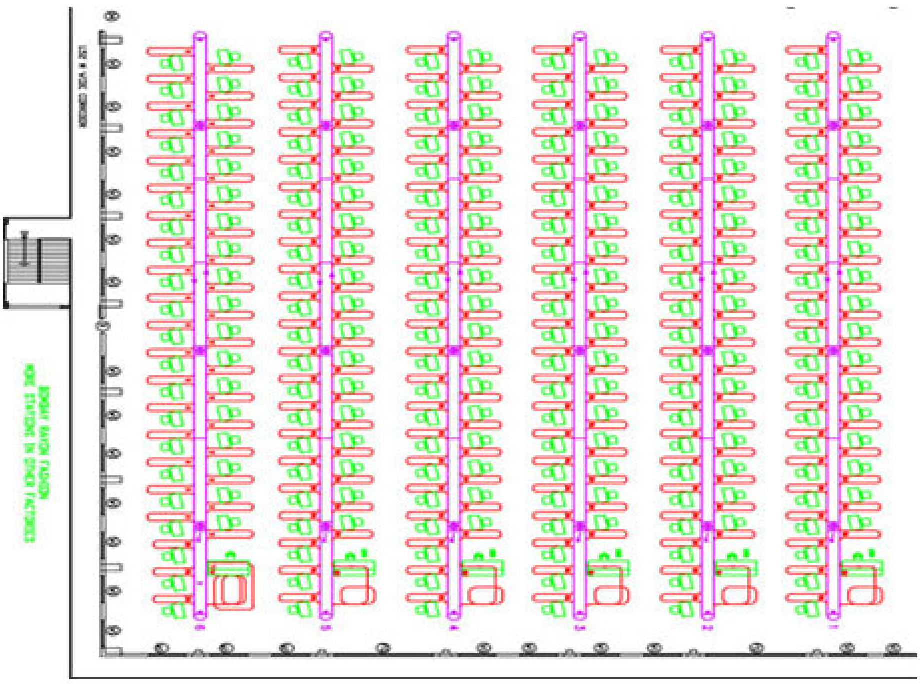

***Fig. 5:** Stations overview [1]*

2.5 Warehouse and dispatch

During the short rest in the finished goods wearhouse - while waiting for their "take off" to the shops -the garments get another number of handling operations: From unpacking, putting garments on and off hangers, finishing and ticketing and/or bagging until in- and outputthe motto is: optimize workflow and save time .Think and plan 3-dimensional! Multi level warehouses.[2],[3]

This is response to demands for maximum storage capacity. The usual but awkward situation: garments are taken to the truck on roller trolleys. To load a truck like this is rather tiring and it takes about 6 men to do this job. Time consuming and labor intensive.Moreover, the quality of the garments is affected as they get squeezed and can fall down during this process.Loading loops - manual and automatic, rigid and extendable - provide a seamless transit from the warehouse onto the truck.Trolley trains go directly up to the truck - on the shortest possible track and with minimum personnel effort.2-3 people can load or unload a truck within 2 hours.

Fig. 6: *Warehouse system [2]*

Fig. 7: *Loading truck [2]*

3.CONCLUSIONS

Reduced work in process, fewer soiled garments, better quality control, larger customer base due to shorter lead times on orders, garments are better handled with the system and handling time reduces to 25% of bundle handlings. To reduce direct labor costs and reduce work-inprocess times. Better visibility. Quick Changeover.The warehouse capacity shall be optimized with an unchanged number of operators.Today we transport everything hanging and have a thorough overview.

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WEARABLE ELECTRONICS IN THE NEXT YEARS

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Abstract: *The term 'Wearable Technologies', 'Wearable Electronics', or 'Smart Garments', is associated to those clothing and soft or hard accessories which integrate electronic components, or which are made of smart textiles. Smart textiles research represents a new model for generating creative and novel solutions for integrating electronics into unusual environments and will result in new discoveries that push the boundaries of science forward. Last few years there are several hundreds or maybe thousands of research teams that works and develop such materials and products. But the key driver of the success of the wearable electronics is the acceptance from the end user. It is estimates that only for the next three years the sales in the wearables will be almost multiply by ten times. The flexible wearable computer industry's patent applications arrived at 429 in the second quarter of 2014, up 27.7% year on year, and witnessed a record high in the report's tracking period starting from the first quarter of 2012. The market has already in the shelf commercial products as wristbands (Fitness/wellbeing/sports devices), smart jewels, smart watches, mobile health devices, tech clothing, and augmented reality glasses.*

The recently developed enabling technologies eliminates the barriers and help the scientists and developers to launch new types of "wearables". The life style of a large share of population, the low cost of 3D printing for rapid prototyping locally, the large available platforms, the lower cost of sensors and components give a an impetus for large scale of products.

In the same time the direct ordering channels to manufacturers of components facilitates the small producers and the scientists for prototype development.

In this article we identify key challenges for the success of the wearables and we provide an outlook over the field and a prediction for the near future.

Key words: *Wearable Electronics, Smart Textiles, Flexible membranes, Conductive textile Materials*

1. INTRODUCTION

The term 'Wearable Technologies', 'Wearable Electronics', or 'Smart Garments', is associated to those clothing and soft or hard accessories which integrate electronic components, or which are made of smart textiles [1].

Smart textiles research represents a new model for generating creative and novel solutions for integrating electronics into unusual environments and will result in new discoveries that push the boundaries of science forward [2]. A key driver for smart textiles research is the fact that both textile and electronics fabrication processes are capable of functionalizing large-area surfaces at very high speeds. In this article we are presented the progress of the last years and the estimation for the next years based in various researches.

The «Wearables» Market moves fast. Many developers and manufacturers emerge in the sector. The flexible wearable computer industry report finds that the industry's patent applications arrived at 429 in the second quarter of 2014, up 27.7% year on year, and witnessed a record high in the report's tracking period starting from the first quarter of 2012.

2. WEARABLE TECHNOLOGY

The last 50 years many things has been changed. From the personal computer of 1980s, we went to the desktop internet computer of 1990s and the mobile internet computer for the early 2000s. But the last 10 years the computers are become more tiny and wearabled. The reason is obvious and the occasion was the progress on the microprossesors and microcomputers. Tiny obgects that can be embeeded to any structure especially textile structure [3].

Fig. 1: *Source: KPCB, Internet trends report, May 2013*

3. TYPES AND PROPERTIES OF WEARABLE TECHNOLOGY

Imagine a world in which electronics are freed from their rigid, confining encapsulation, are intimately integrated into the fiber of our daily lives, and distributed throughout our ambient environment. This is impossible to do using conventional electronic circuits, which are limited by the maximum substrate size available for processing, substrate rigidity, and fragility. Textiles represent an attractive medium for electronic integration as they have been a fundamental and transformational component of our everyday lives for hundreds of years. Smart textiles represent the drive to integrate new sensing functionalities into hitherto inaccessible surfaces and are a new step in the continuing evolution of textiles.

Wearable technology mainly concerns two types of wearables:

- Devices
- Apparel and textiles

Few examples that are arready in the market and the most of them belogns to the first category. These are the glasses, jewellery, headgear, belts, armwear, wristwear, legwear, footwear, skin patches, and exoskeletons. Everything is "wearable".

Sometimes smart textiles are also classified according to the design paradigm chosen to integrate electronic functions into the textile architecture. At the one extreme, one finds smart textiles in which the textile simply acts as a substrate for attachment of sensors, output devices, and printed circuit boards (garment and fabric level integration). Such textiles are similar to wearable computers (i.e., electronic systems including sensors and computational components that is built with standard off-the-shelf components that can be strapped to the body), and there is very little integration of devices into the textile. Subsequent development in this field has seen a drive to integrate the desired functionalities “disappearingly” inside the textile architecture. This implies creating smart textiles in which the electronic/optical sensors and output devices are introduced at the fiber level (fiber level integration). Separating these two extremes are various “hybrid” smart textile efforts that combine various functional fibers (with differing degrees of complexity) with attached integrated circuit components and off-the-shelf sensors. Here the textile may often form a part of the textile devices, e.g., forming electrodes in foam capacitors [4].

4. CHALLENGES FACING SMART TEXTILE DEVELOPMENT

To understand the challenges facing facing smart textile designers and researchers who want to develop smart textiles, consider some of the requirements textile circuits need to fulfill. Circuits need to be extremely rugged as they will be exposed to mechanically demanding environments during fabrication and use of smart textile in daily life (for example wearing the textiles in clothing). The comfort and washability of the smart textile should not be affected by the presence of the circuits, i.e., it should be rugged enough to survive being used in daily life. Circuits require power supplies that are light-weight and have a high capacity to ensure autonomous operation for several hours (or more depending on the targeted end-user application). Commercial smart textiles need to comply with requirements from both the textile and electronics field. These specifications can often be very stringent and may be contradictory. Here are some of the critical challenges facing smart textile development:

• Mechanical environment: In comparison to flexible display applications that are intended to be rolled around cylinders with diameters of a few cm, smart textile fibers may be exposed to bending radii much smaller than 1mm and large tensile strains. Textile fibers within shirts and jackets experience the highest stress levels near the upper back. Simulations of textiles have shown that the strain in a shirt can be up to 20% at the shoulder blades.

• Washability: There are two major cetegories. The smart textiles required the wearer to remove all electronic components (including wiring) prior to washing, and the smart textiles rely on waterproof packaging to protect sensitive electronics from damage during washing.

• Power supplies: Most smart textiles are powered by traditional rechargeable batteries, but these are large and bulky and impossible to integrate fully with the textile architecture. There is a strong drive to develop alternative conformal and lightweight power generation and storage devices as elastic batteries, supercapacitors, and solar cells.

• Product development and commercialization: Successful design and development requires a multidisciplinary team of professionals including textile scientists, polymer chemists, physicists, bioengineers, software engineers, consumer specialists, and fashion designers. Finding a common meeting and sorting out the jargon associated with each field can be challenging. Furthermore, there is a lack of a coherent vision for smart textile development between different research laboratories and universities.

5. FORECAST ON WEARABLES FUNCTION

The forecast for the wearables market it is very promising [5]. According to several research there will be a boom in the market in the next years. Hereby we see the forcast according to the 5 categories of wearables (wristband, jewelry , glasses, clothing, embeeded) fig 2 and the prediction of the wearables electronic market sales fig 3 from the IDTechEX, Wearable Technology 2014-2024 Technologies Markets Forecasts[6] .

The research separates the market to five product categories, from the simplest to more complex. The wristband is the simplest category of wearables and from the 2014 it is really emerged to the market. Several companies have offered various products. Some of them has their own processor, and some they only communicate with the mobile phone of the tablet that should be in the acceptance range according to the protocol connection. They offer data streamed care manage personal health (support), record weaver experience and data to a cloud memory (record), and responsive coaching for better behaviour (nudge).

The second category of wearable is that of the jewerly, which are relatively smaller. Only few are already in the market. They are designed for communication, i.e. connected experiences promote long distance together (communicate), interact with the world through an onboard interface (control), for verification i.e. password provided by one's authentificated self (verify), and reflect one's wellbeing through an emotional mirror (Mirror).

It is forseen that the 2016 the wearable jewerly will be able to do responsive coaching for better behaviour (nudge), and enhance natural ability through augmented sensory perception (augment).

The third category is the glasses. There are few in the market as commercial products but for the time being they only enhance natural ability through augmented sensory perception (augment). It is forseen that from next year companies will lanch to the market glasses that nurse, communicate and interact with the world through an onboard interface (control).

Nevertheless the big boom will come with the clothing. The first commercial products are expected in 2015. The first generation will be able to do responsive coaching for better behaviour (nudge), and offer data streamed care manage personal health (support). In 2016 it is expected to be able to offer record weaver experience and data to a cloud memory (record), and communicate, i.e. connected experiences promote long distance together (communicate). According to the estimations only in 2017 the smart clothing will have features in order to regain movement with the aid of bespoke biotech (restore), reflect one's wellbeing through an emotional mirror (Mirror), and allign i.e. biometrically attuned systems personalised one's surroundings (allign).

The last category is this of embeeded. Embeeded wearables can be printed in the skin og the user or made by 3D printer as printed clothing. Only after three years can be expected to arise as commercial products and gradually can give all features as support, nudge, augment, record, control, verify, restore ans align.

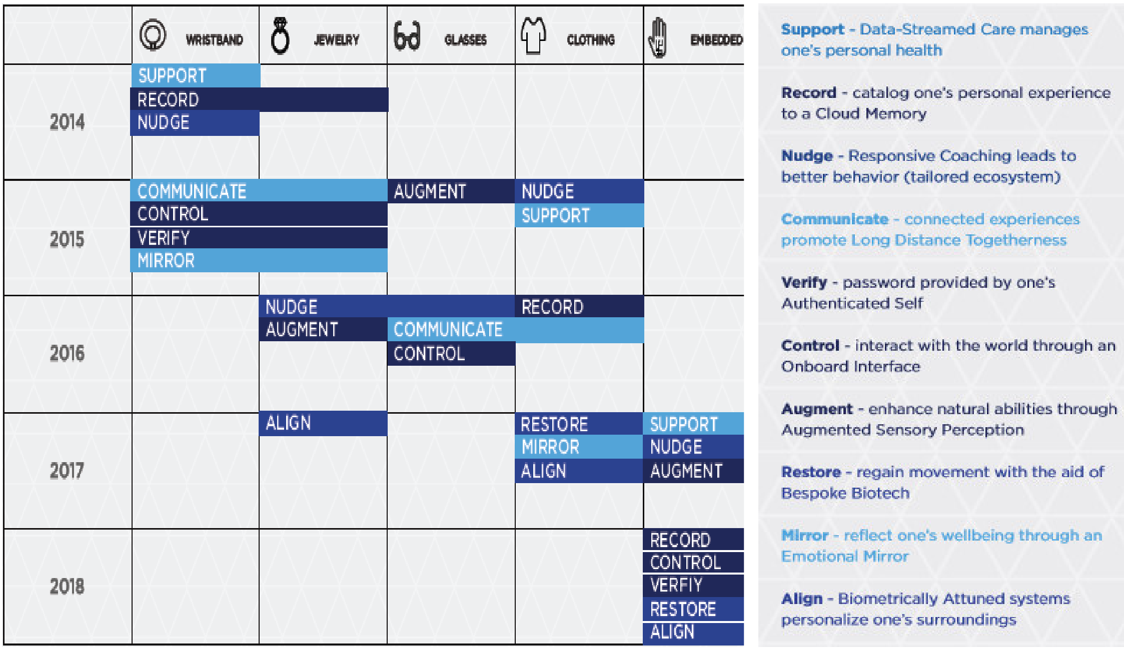

Fig. 2: *Categories of Wearables and forecast of the new products categories for the next 3 years*

6. PREDICTION ON WEARABLE ELECTRONICS MARKET SALES

The IDTechEX did a huge research in 2014 for the market of Wearable Technologies for the next 10 years. The "Wearable Technology 2014-2024 Technologies" report shows remarkable results. In the following table (fig 3) shows the estimate Markets Forecasts Sales in $ BN.

There we can see a extremely increase of sales from 0,75BN in 2012 to 70 BN.

There are several Big and small manufacturers in the area. To name some of these, Nike, Samsung, Adidas, Sony, Motorola, Apple, Garmin, Google, Weartech, Fitbug, Jawbone, Pebble, Fitbit, TomTom Misfit, Withings, Polar, Suunto, etc.

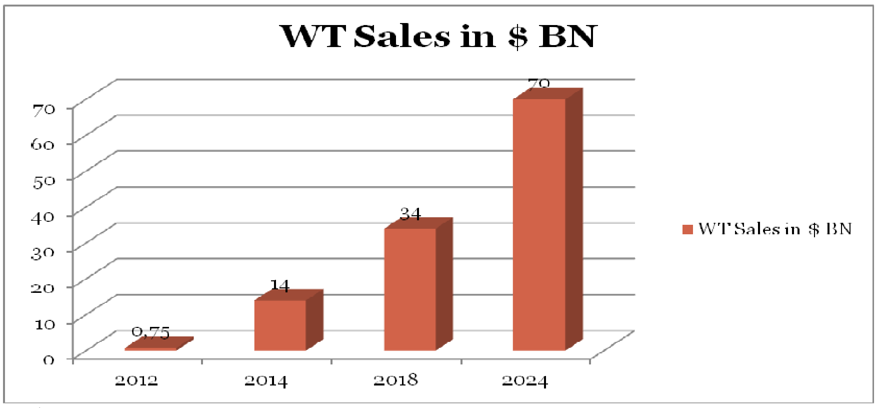

Fig. 3: *Sales in $ BN. Source: IDTechEX, Wearable Technology 2014-2024 Technologies Markets Forecasts*

[6]

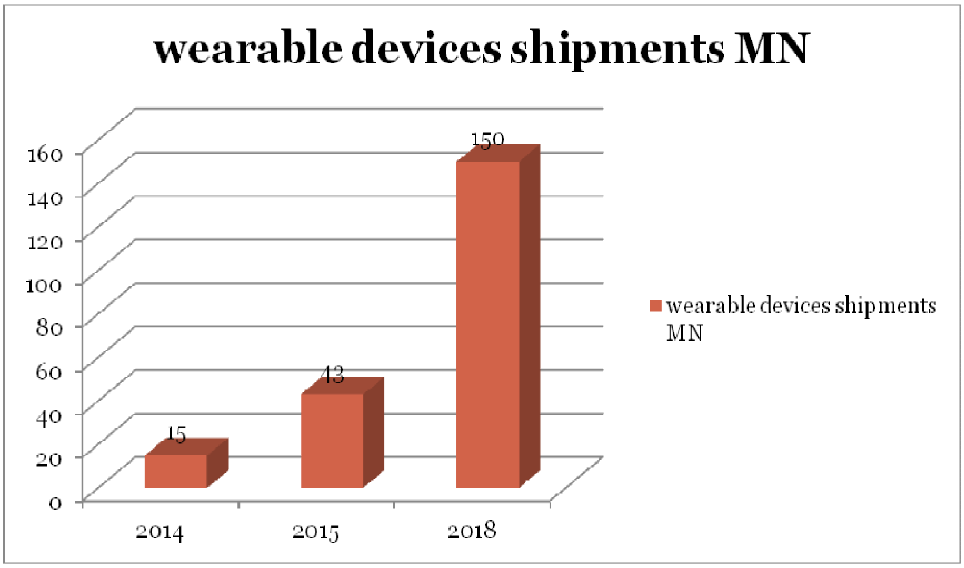

Fig. 4: *Wearables devices shipments in MN. Source: Juniper Research, 2014*

According to the research (Source: Nielsen, Connected life report, March 2014) the 70% of consumers are aware of wearable tech. 15% of them are already using wearable tech [7]. Wearable tech owners today are:

- Young ages (18 – 34 years)
- Male and Female (48%/52%)

The 75% consider themselves an early adopter and 29% household income greater than $100K

Fitness bands the most popular (61%), Smart watches (45%), mobile Health devices (17%) [8], [9].

What it is important according to the end users:

- Performance and perceived benefits when device applied to daily life
- Convenience, extend user's Smartphone addiction
- Design (62% desire other form factors)
- Energy efficiency, Sustainability
- Cost (72% wish wearables were less expensive)
- Fashion (53% want products be more fashionable)
- Benefits
- Daily usability
- Cost
- Functionality
- Accuracy
- Reliability
- Comfort
- Appearance

7. CONCLUSIONS

The forecast for the wearables market it is very promising. Thousands of companies invest in the area. Analysts of the companies and individual specialists are predicting that wearable technology markets will be experiencing a significant growth during the next coming years.

Several factors will boost the efforts next years. These are:

- More enabling technologies
- Low cost 3D printing for rapid prototyping locally
- Funding platforms available
- Lower cost of sensors and components
- Direct ordering channels to manufacturers of components

- More sensors kits available to developers
- Flexible displays
- More uses
- Ability to transform
- Personalization
- Link to apps
- Users are eager for bulks of personal data
- Consumer demand is growing

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NANOTECHNOLOGY IN TEXTILE INDUSTRY [REVIEW]

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Abstract: *Nanoscience and nanotechnology are the study and application of extremely small things and can be used across all the other science fields, such as chemistry, biology, physics, materials science, and engineering. Nanotechnology overcomes the limitation of applying conventional methods to impart certain properties to textile materials. There is no doubt that in the next few years nanotechnology will penetrate into every area of the textile industry. Nanotextiles are nanoscale fibrous materials that can be functionalized with a vast array of novel properties, including antibiotic activity, self-cleaning and the ability to increase reaction rates by providing large surface areas to potential reactants. These materials are used not only as cloth fabric, but as filter materials, wound-healing gauzes and antibacterial food packaging agents in food industry. World demand for nanomaterials will rise more than two-and-a-half times to $5.5 billion in 2016 driven by a combination of increased market penetration of existing materials, and ongoing development of new materials and applications. In recent years was demonstrated that nanotechnology can be used to enhance textile attributes, such as fabric softness, durability and breathability, water repellency, fire retardancy, antimicrobial properties in fibers, yarns and fabrics. The development of smart nanotextiles has the potential to revolutionize the production of fibers, fabrics or nonwovens and functionality of our clothing and all types of textile products and applications. Nanotechnology is considered one of the most promising technologies for the 21st century. Today is said that if the IT is the wave of the present, the nanotechnology is the wave of the future.*

Key words*: nanotechnology, nanomaterials, nanotextiles, smart textiles*

1. INTODUCTION

The term “nano” comes from the Greek word “nanos” meaning “dwarf” and is used in the measuring system as a prefix to denote one billionth. A particle with a diameter of one nanometer is therefore 1 billionth of a meter in size (10^{-9} m = 10^{-6} mm).

The history of nanotechnology is generally understood to have begun in December 1959 when physicist Richard Feynman gave a speech, “There's Plenty of Room at the Bottom”, at an American Physical Society meeting at the California Institute of Technology in which he identified the potential of nanotechnology. Feynman aid it should be possible machines small enough to manufacture objects with atomic precision.

In 1974, Norio Taniguchi first used the word “nanotechnology, in regard to an ion sputter machine, to refer to “production technology to get the extra-high accuracy and ultra-fine dimensions, i.e. the preciseness and fineness on the order of one nanometer.”

In the 1980s, Eric Drexler authored the landmark book on nanotechnology, “Engines of Creation”, in which the concept of molecular manufacturing was introduced to the public at large. By the 1990s, nanotechnology was advancing rapidly. [1]

Today there are many who think that the next Industrial Revolution is right around the corner – because of nanotechnology. They think that nanotechnology will radically transform the world, and the people, of the early 21st century. It has the capacity to change the nature of almost every human-made object.

Nanotechnology has a huge influence on the chemical sciences, physical and medical sciences as well as on the world of informatics and materials.

Nanotechnology overcomes the limitation of applying conventional methods to impart certain properties to textile materials. There is no doubt that in the next few years nanotechnology will penetrate into every area of the textile industry. [2]

2. DEFINITIONS

There are several definitions of nanotechnology and of the products of nanotechnology, often these been generated for specific purposes. Nanotechnology is the term given to those areas of science and engineering where phenomena that take place at dimensions in the nanometre scale are utilised in the design, characterisation, production and application of materials, structures, devices and systems.[3]

In the Vocabulary for Nanoparticles of the British Standards Institution (BSI 2005) the following definitions are proposed:

"Nanotechnology: the design, characterization, production and application of structures, devices and systems by controlling shape and size at the nanoscale."

"Nanomaterial: material with one or more external dimensions, or an internal structure, which could exhibit novel characteristics compared to the same material without nanoscale features.

The U.S. National Nanotechnology Initiatve (NNI) provides the following definition:

"Nanotechnology is science, engineering and technology conducted at the nanoscale, which is about 1 to 100 nanometers."

"Nanoscience and nanotechnology are the study and application of extremely small things and can be used across all the other science fields, such as chemistry, biology, physics, materials science, and engineering." [4]

Nanotechnology is the understanding and control of matter at dimensions between approximately 1 and 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering, and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale.

A nanometer is one-billionth of a meter. A sheet of paper is about 100,000 nanometers thick; a single gold atom is about a third of a nanometer in diameter. Dimensions between approximately 1 and 100 nanometers are known as the nanoscale.

Scientists have not unanimously settled on a precise definition of nanomaterials, but agree that they are partially characterized by their tiny size, measured in nanometers. A nanometer is one millionth of a millimeter - approximately 100,000 times smaller than the diameter of a human hair.

Materials engineered to such a small scale are often referred to as engineered nanomaterials, which can take on unique optical, magnetic, electrical, and other properties. These emergent properties have the potential for great impacts in electronics, medicine, and other fields. [5]

Nanotextiles are nanoscale fibrous materials that can be functionalized with a vast array of novel properties, including antibiotic activity, self-cleaning and the ability to increase reaction rates by providing large surface areas to potential reactants. These materials are used not only as cloth fabric, but as filter materials, wound-healing gauzes and antibacterial food packaging agents in food industry.[6]

3. NANOMATERIALS

Originally, nanomaterials filled requirements such as equipment used in the space program or in imaging devices. Now, they are prevalent as a necessity in many uses, such as in high-speed microprocessors. Silica, titanium dioxide, alumina, iron oxide, zinc oxide, clays and metals such as gold and silver and other nanoscale versions of conventional materials are now finding use in cosmetics, paint and coating products, construction materials, electronic equipment, motor vehicle components, pharmaceuticals and health care applications. Significant opportunities for market expansion will also exist in many smaller markets such as aerospace and defense, packaging, personal care products and sports equipment.

"World nanomaterials demand, $1 bilion, 2006."

"World demand for nanomaterials is expected to grow, from $3,7 bilion in 2008 to $90 billion in 2020." (**Fig. 1**)

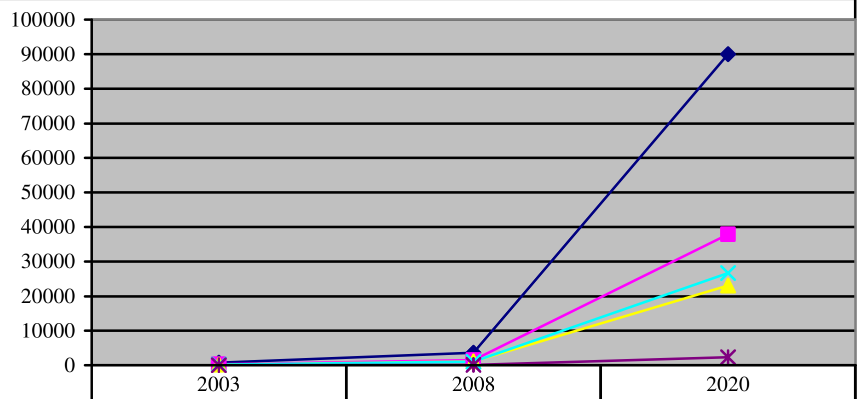
"By 2011, world demand for nanomaterials is forecast to reach $4.2 billion. In the longer term, the global market is projected to swell to $100 billion in 2025."

"Global nanomaterial demand will continue to rise, posting robust 21 percent annual gains to $3.6 billion in 2013. By 2025, nanomaterials are expected to reach over $34 billion in sales, having still only scratched the surface of their immense market potential."

"World demand for nanomaterials will rise more than two-and-a-half times to $5.5 billion in 2016 driven by a combination of increased market penetration of existing materials, and ongoing development of new materials and applications."

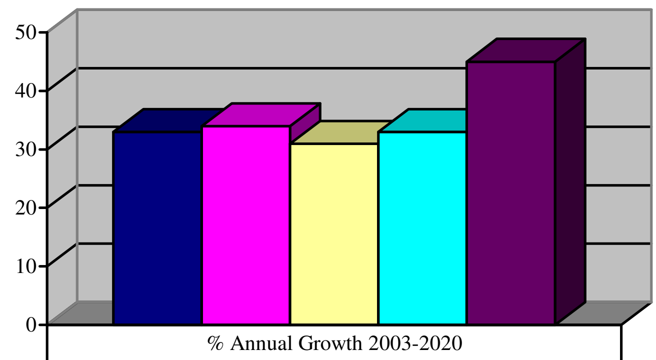
This afirmations are presented in the studies, "World Nanomaterials", editions 2007, 2010, 2012, from the industrial market research firm, The Freedonia Group, from Cleveland, Ohio, United States of America. [7]

In 2025 over $25 billion will be spent on formulations and intermediate materials for wearable technology, according to analyst Dr. Peter Harrop of IdTechEx. [8]



	2003	2008	2020
World Nanomaterial Demand	720	3650	90000
Americas	276	1490	37900
Western Europe	225	1067	23100
Asia Pacific	215	1035	26700
Other Regions	4	58	2300

Fig. 1: *World Nanomaterial Demand (million US dollars)*



	% Annual Growth 2003-2020
World Nanomaterial Demand	33
Americas	34
Western Europe	31
Asia Pacific	33
Other Regions	45

Fig. 2: *World Nanomaterial Annual Growth*

The US is and will remain the largest market for nanomaterials. Japan is a smaller nanomaterial market than the US, but is significantly larger than any other nation. From EU, Germany, France and the UK are the largest national markets in the region. The developing countries, in special China and India, will become increasingly important nanomaterial markets. (**Fig. 2**) By 2025, it is expected that China will rise to overtake Japan as the second largest market for nanomaterials in the world behind the United States, accounting for twelve percent of global demand.

The Freedonia studies suggest that the cost will be a significant restraint on growth for nanomaterials, particularly in less developed regions.

A potential other restraining factor in many markets will be growing concern about the environmental impact and toxicity of nanomaterials.

4. NANOTECHNOLOGY IN THE TEXTILE-INDUSTRY

Nanotechnology has been discovered by the textile industry – in fact, a new area has developed in the area of textile finishing called “Nanofinishing”. Making fabric with nano-sized particles creates many desirable properties in the fabrics without a significant increase in weight, thickness or stiffness, as was the case with previously used techniques. Nanofinishing techniques include: UV blocking, anti-microbial, bacterial and fungal, flame retardant, wrinkle resistant, anti-static, insect and/or water repellant and self-cleaning properties. [9]

Finishing of fabrics made of natural and synthetic fibers to achieve desirable hand, surface texture, color, and other special aesthetic and functional properties, has been a pri mary focus in textile manufacturing. In the last decade, the advent of nanotechnology has spurred significant developments and innovations in this field of textile technology. Fabric finishing has taken new routes and demonstrated a great potential for significant improvements by applications of nanotechnology. There are many ways in which the surface properties of a fabric can be manipulated and enhanced, by implementing appropriate surface finishing, coating, and/or altering techniques, using nanotechnology.[10]

Today, the main applications of nanotechnology in textiles (**Fig. 3**) refer to: nanofinishing in textiles, nano chemicals for textiles, nanocoating for textile materials, nano/smart silver for textile.

In recent years was demonstrated that nanotechnology can be used to enhance textile attributes, such as fabric softness, durability and breathability, water repellency, fire retardancy, antimicrobial properties in fibers, yarns and fabrics.

One of the most common ways to use nanotechnology in the textile industry is to create stain and water resistance. To do this, the fabrics are embedded with billions of tiny fibers, called “nanowhiskers” (think of the fuzz on a peach), which are waterproof and increase the density of the fabric. The Nanowhiskers can repel stains because they form a cushion of air around each fiber.

Nanotechnology can also be used in the opposite manner to increase the ability of textiles, particularly synthetics, to absorb dyes. Until now most polypropylenes have resisted dyeing, so they were deemed unsuitable for consumer goods like clothing, table cloths, or floor and window coverings. A new technique being developed is to add nanosized particles of dye friendly clay to raw polypropylene stock before it is extruded into fibres. The resultant composite material can absorb dyes without weakening the fabric. [9]

Nanotex is a leading fabric innovation company which provides nanotechnology-based textile enhancements to the apparel, home and commercial/residential interiors markets. For example, its product, Aquapel, is the next generation in water repellent, eco-friendly performance, providing advanced protection against rain, sleet, snow and spills. Using a proprietary hydrocarbon technology, Aquapel modifies fabric at the molecular level by permanently attaching hydrophobic ‘whiskers’ to individual fibers, without altering the fabric’s natural breathability or feel. Plus, Aquapel is fluorocarbon free and PFOA free, making it the right choice for you and the earth. [11]

The other main use of nanoparticles in textiles is that of using silver nanoparticles for antimicrobial, antibacterial effects, thereby eliminating odors in fabrics. Nanoparticles of silver are the most widely used form of nanotechnology in use today, says Todd Kuiken, PhD, research associate at the Project on Emerging Nanotechnologies. [12]

The silver is made smarter through nanotechnology:

- lasts the expected life of the product
- uses the natural antimicrobial action of silver in controlling the growth of odor-causing bacteria, fungus, and mold
- is easily integrated into natural and synthetic fibers, foams, plastics, and coatings
- has been thoroughly tested and is eco-friendly
- meets regulatory requirements
- has a track record with products in the health care, textile, and industrial markets. [13]

Fig.3: *Some representative applications of nanotechnology in textiles []*

The future for textile applications using nanotechnology is exploding due to various end uses like protective textiles for soldiers, medical textiles and smart textiles.

For example, consider the T-shirt. Research is being done that will use nanotechnology-enhanced fabric so the T-shirt can monitor your heart rate and breathing, analyze your sweat and even cool you off on a hot summer's day. What about a pillow that monitors your brain waves, or a solar-powered dress that can charge your ipod or MP4 player? [9]

Nanotechnology has the potential to being revolution in the field of technical textiles for the benefit of humanity. [14]

5. QUALITY LABEL FOR NANOTECHNOLOGY

The Hohenstein Institutes, an accredited test laboratory and research institute, which was founded in Bönnigheim (Germany) in 1946, was launched in October 2005 its Quality Label for Nanotechnology, a litmus test as to whether is product is Nano or not. The certification of the textiles is based on their adherence to a strict definition of nanotechnology which can be applied to the textile sector, developed in conjunction with NanoMat [15], a Germany-based nanomaterials network: "Nanotechnology refers to the systematically arranged functional structures which consist of particles with size-dependent properties".

The program and quality label was instituted to help retailers and other textile and users determine if a textile product really incorporates nanotechnology or whether the name, as applied to a particular product, is merely an advertising message. The label offers retailers and consumers guidance in the maze of confusing advertising messages and forms the basis for reliable product comparison.

Testing of nanotechnology includes:

- determination of the type of nanotechnological finishing
- visual inspection of nanotechnological finishing using a scanning electron micro-scope
- quantification of the effect of the finishing (e.g. dirt repellence by measurements of contact angle on characteristic fluids, antimicrobial effects of Nano-Ag, UV protection of Nano-Ti/Nano-ZnO)
- determination of mechanical suitability for use
- laundering permanence
- determination of breathability and
- determination of biocompatibility. [16]

Fig. 4: *Hohenstein Quality Label "Nanotechnology"*

The testing program is tailored to the textile material and its areas of application. Testing is carried out on new textiles and after simulated conditions of use.

The requirements defined for the award of the label are product-specific. For example, for a pair of trousers with a soil-repellent finish, the breathability must not be significantly affected and the skin compatibility must be proven by tests for tissue compatibility. The resistance of the nano-finish to the effects of wear (abrasion resistance) and care are also tested. For care treatments, the stated function is guaranteed for a defined minimum number of washing and drying cycles. The additional parameters are also stated and explained on the Hohenstein Quality Label. [17]

6. CONCLUSIONS

Nanotechnology is considered one of the most promising technologies for the 21st century. Today is said that if the IT is the wave of the present, the nanotechnology is the wave of the future. After the quikly development from the last decade, in present nanotechnology has numerous applications in almost every industry, including textile industry. The development of smart nanotextiles has the potential to revolutionize the production of fibers, fabrics or nonwovens and functionality of our clothing and all types of textile products and applications.

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KLIMT, FROM PAINTING TO FASHION

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Abstract: *Fashion has been a subject for most fields of art, starting from visual arts to cinema and literature. The metamorphoses of fashion, an art in itself, are under the sign of history that marked the social during the evolution of humanity. The present paper makes a reference to the links between fashion and Klimt's work. Klimt proved to be a visionary by means of his visual, unique and unmistakable signature concerning the way he treated the clothed woman. As he worshipped the female body, he portrayed it, reflecting the fashion style of an era that was meant to be renewed. His work, strongly influenced by feminine values, became conspicuous as a manifesto against the rigidity of the Viennese society in the late nineteenth century and early twentieth century. The modernity of Klimt's vision generated the metamorphosis of the woman model, from the corseted woman until that time, and not only in terms of fashion, to the freed woman, using the metaphorical instruments of his art. The artist's complex creativity helps us find him in four different situations, all in close connection with fashion art: the painter Klimt, who portrays woman who shows herself by showing her garment; the fashion designer Klimt who suggests outfits for his collaborator, Emilie Flöge, remoulding the dress as a clothing item; the fashion photographer from the photographs of Emilie Flöge wearing his creations; and, indirectly, by his paintings from the cycle Women, which had a powerful impact on contemporary fashion. Such a complex, visionary creator, whose painting and fashion interfere, is worth mentioning for his contribution to the fashion art avatars.*

Key words: *Golden Phase,The Kiss, Emilie Flöge, Adele Bloch-Bauer, Schwestern Flöge*

1. INTRODUCTION

In social history, as well as in art history, the human body was established as a provocative space to explore, a material for various kinds of cultural interventions. In art history, the manner of artistic representation of the body related to everyday life, the body becoming an experimental space, especially in fine arts. When clothed, the human body gets multiple artistic and communicative valences, the garment itself becoming an art object that artistically shapes the body, giving it the attribute of an appearance generating performance. By giving the body a certain image, the garment itself can generate aesthetic satisfaction, in an obvious visual statement. The clothing habits of an era can outline "the characteristics of morals and of dominant sensitivity" [1], the fashion history thus becoming "a way of penetrating the heart of social history" [2]. Since "each form of art has its own power according to its specific means" [3], in the same way the garment becomes a force of expression through the agreement between form and materiality, emphasized when they are in the same matrix with the pictorial art. Like any other form of art, fashion art "is an attempt towards uniqueness, it becomes known as a whole, as an absolute and, at the same time, it belongs to a system of complex relationships... it is matter and spirit, form and content" [4].

2. KLIMT IN THE ARTISTIC CONTEXT OF THE ERA

In this context of form and content, Klimt, a Symbolist painter, an outstanding member of the Viennese secessionist movement, exploited in his canvases not only the female body but also femininity in its entire splendour. Women portraits, which reconstructed the rise of Viennese bourgeoisie at the border of the 19th and 20th centuries, represented the core of Klimt's canvases.

Faithful to the representation of this bourgeoisie, through its female exhibits, Klimt discovered his original creative energy, unique and unmistakable when exploring and depicting the female body, more or less clothed, full of sensual symbols.

"Under the influence of sinuous and sensual contours typical to Art Nouveau artists such as Munch, Klimt also creates dense images of symbolic meanings that are directly inspired from the imaginative and have little contact with the real world". [5] A primary topic in Klimt's works, the woman protagonist appears at her superlative beauty. The women depicted by him are charming by their bodies that are more or less emphasized by garment. He was the painter who probably endowed the woman at the beginning of the 20th century, whether fatal or mythical, with the most beautiful expression.

2.1 Fashion design, a source of artistic expression

In the history of painting as a major art, the garment of the person portrayed has often been a form of expression and artistic message, a tool to communicate the meaning of the visual work of art. As for Klimt, we identify an emphasized communion between the female body and the garment that accentuates her sensuality up to her eroticism. The effects are sumptuous, sensual, and slightly abstract. Fashion becomes the source theme for many of Klimt's works. We find in his works a semantic communion between the two languages – fashion and painting – between which there is a trans-coding operation, a structural dialogue in which the energy of decorativism and chromatics become fundamental elements of their aesthetics.

Klimt's interest in women's fashion, expressive in his paintings, seems to be due to his relationship with Emilie Flöge, an Austrian fashion designer and businesswoman, the life companion of the painter.

2.2 Clothing representations in Klimt's paintings

Exploring the feminine corporeality, Klimt associates it to his concern for fashion, in a way that makes him unique by his most representative works. Familiar with the latest fashion in haute-couture due to his collaboration with Emily Flöge's salon, Klimt accentuates the hairstyles, make-up and accessories. He transforms the woman, makes her less dangerous by alleviating her fatalism through attitude and clothing subtlety.

A representative painting in terms of the suggestive value of clothing is *The Portrait of Gertrude Loew*, exhibited in 1903. The gentle, almost ethereal garment worn by the daughter of a Viennese intellectual, a friend of Klimt, suggests the youth virginity of the depicted person, a delicate texture for the body that hides a chaste soul. The painting belongs to Klimt Foundation today.

At the end of the nineteenth century and the beginning of the twentieth century, La Belle Epoque flourished in Europe, a period in which fashion, targeting women's emancipation, represented something else than what Klimt was painting. Klimt's dresses were unlike anything else, they were a disavowal of his contemporary fashion and, at the same time, a search of the primary dress. [6] The dresses worn by his women had an oriental allure by their chromatic and decorative register, most of them being image-dresses for the woman portrayed.

Like other great painters, Klimt knew several distinct periods in his work, the most appreciated being the "Golden phase". It is during this creative period that he began to give lustre to his works full of sensuality, with gold leaves used in religious art to symbolize divinity, Klimt, in turn, deifying the woman.

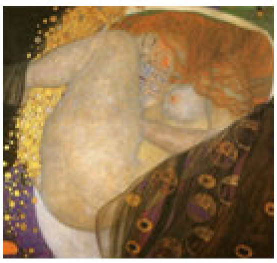


Fig. 1: Danae, 1907
Source:
http://www.klimt.com/

Danae, mythical symbol of divine love, appears in Klimt's painting wrapped in a purple, sumptuous veil denoting imperial descent. The translucence of the veil that only symbolically covers the body emphasizes the fragility of the female body.

The decorative register of the veil texture reveals the painter's interest in the design of the textile surface.

The most representative works for Klimt's Golden phase period are *The Portrait of Adele Bloch-Bauer I* and *The Kiss*. The commissioner of the first painting was Ferdinand Bloch-Bauer, Adele's husband, a Viennese salon lady. The ornamental complexity of the painting is typical for the

Austrian Jugendstil. The woman's attitude, the body suggested in an emphasized decorative of the dress that overlaps the decorative of the seat and of the painting frame, the geometric elements of dress, all remind us of elements of Egyptian art. In this painting one can find a depth of the decorative motifs and of the garment chromatics focused on repetition, alternation, symmetry, conjugation and overlapping. This creates a garment in a complex compositional form in which it harmonizes with the woman's body. The binomial woman-garment is in a metaphorical, synchronic relationship. The woman is glorified by juxtaposition, the quasi fusion between decor-garment/ decor-background. Her clothing is here a glorification of woman, with the typical sumptuousness of the Byzantine garments richness, outlined by the use of gold and silver leaves in the work composition.

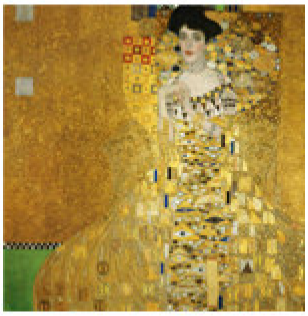


Fig.2: Portrait of Adele Bloch Bauer I, 1907
Source: *http://www.klimt.com/*

Fig. 3: The Kiss,1907
Source: *http://www.klimt.com/*

The Kiss is an allegorical representation of the couple caught in a tender hug. The man's garment, juxtaposed against the background, surrounds the bodies of the couple in love, becoming itself a symbol of love. The garments, meticulously painted, are distinguished by various and complex composed decorative elements, by chromatic contrasts representative for Klimt's work. Their brightness is given by the gold leaf used by the artist, especially during the Golden phase period.

Both garments of the couple are distinguished by a composition of linear decorative structures typical to Art Nouveau combined with organic elements that refer to the Arts and Crafts Movement. There is an ornamental dialogue between the two lovers' garments. The man wears a garment with black and white rectangular motifs randomly placed on gold leaf decorated with spirals, while the woman wears a tight-fitted dress, which follows the contour of her body, decorated with floral motifs on round or oval background elements, all on a background of parallel wavy lines.

Fig. 4: The Hope II, 1907

Fig. 5: Portrait of Emilie Flöge, 1902
Source: http://www.klimt.com/

Fig. 6: The dancer -postum portrait of Ria Munk, 1912

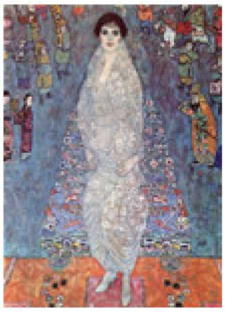
The late nineteenth century witnesses an artists' trend towards the non-western element in fashion, towards exotic and oriental, towards primitivism, as an escape from the rapid changes of the complexity of urban fashion. "One of the clearest examples of such primitivism of the Artistic Dress is the work of Gustav Klimt. Like many artists of the period Klimt revealed his interest in non-western styles in his personal collection, which included a caftan from North Africa. The basic line of many garments Klimt designed echo those of the North African garments."[7] The Artistic Dress proposed by Klimt, stood out of the ordinary, seemed out of place in the Viennese society, and so Emilie's appearance in a dress created by Klimt in 1908 was interpreted at the Kunstschau art exhibition opening. [8]

The feminine outfits in Klimt's works from the cycle Women are interpreted by some critics as an anti-fashion manifestation, and, in terms of the Artistic Dress, it has a very limited clientele. The fashion coordinates to which the artist relates to are full of meanings. As for Klimt, fashion was the theme source for his painting and vice versa. The decorative register of his fabrics has a special place in his works. The rich chromatic contrast of the garments, the geometry sweetened with organic elements, the emphasized, luxuriant decorativeness, a reminiscent of Byzantine mosaics or oriental textiles, all are put in the service of woman as the centre of his representations. The gold of the Byzantine style completed by the magnificent scenery makes the human figure become insignificant. The woman shows her attire and herself, and it is the woman's attitude, always placed centrally, that is of highest interest.

Similar to other genres of paintings, I can say that in the painting of Klimt, "from a morphological point of view, the dressing signs are articulated by juxtaposing or overlapping some elements, by the association of colours and lines, by adding decorative elements in a three-dimensional concert"[9].

Wedding dress in which, unlike the other creations signed by Klimt, the geometrical motifs are missing.

Fig. 7: Portrait of Margaret Stonborough-Wittgenstein, 1905
Source: http://www.klimt.com/en/gallery/



A dress from the late period of Klimt's creation, with Chinese decorative motifs, which, by means of drapery, give another clothing line than in previous creations

Fig. 8: Portrait of Elisabeth Baroness Bachofen-Echt, 1914
Source: http://www.klimt.com/en/gallery/

2.3 Klimt's relation with fashion design

Too little is known in the artistic milieus about how involved Klimt was in the real world of fashion. The close relationship he had with Emilie Flöge, who owned the Viennese fashion house "Schwestern Flöge", most likely caused his interest in this field. Klimt himself drew outfits as well as jewellery and textiles for Emilie's fashion house. [10]

Fig. 9: Emilie Flöge and Gustav Klimt, 1905 [11]

Fig. 10: Portrait of Emilie Flöge [12]

Fig. 11: Fig. 12: Emilie Flöge with Klimt creations
Source: http://www.klimt.com/

„At the beggining of the twentieth century it was non unusual for visual artists also to design clothes. In 1906, for exemple, Gustav Klimt photographed his close friend Emilie Flöge, the fashion designer, modelling ten dresses that he had created."[13] The dresses designed by Klimt and created in the salon owned by Emilie, are dresses that lack girdle, they fall freely from the shoulder line, with wide sleeves, a cut that makes the wearer comfortable. The design of the dresses suggested by Klimt attracted Paul Poiret's attention, the creator who freed the woman's body after centuries of corseting.

"Poiret meanwhile has made his own radical experiments in the aesthetic of women's fashions. When he saw the Klimt room at the World Exposition in Rome he sensed a remarkable harmony between Parisian and Viennese design."[14]

3. KLIMT, A LANDMARK IN CONTEMPORARY FASHION

There are a few contemporary designers who have been influenced in their creations by Klimt's artistic proposals. Dior's spring collection 2008 introduced opulent outfits in vibrant magenta, red and yellow, with geometric motifs that seem to be made by the artist's brush itself. Aquilano Rimoldi, presented a spring collection in 2011 in which he took over the decorative elements of *The Kiss* and *The Portrait of Adele Bloch-Bauer*. The rectangular geometric patterns in the portrait of the same Adele and the work *The Tree of Life* inspired the collection with the title *Resort* 2013 signed by Sarah Burton for Alexander Mc Queen. And the examples can continue because even now what Klimt proposed more than a century ago in the field of textile design proves to be modern and abreast with the time.

Fig. 13: Dior, 2008
http://www.style.com/slideshows/fashion-shows/spring-2008-couture/christian-dior/collection/37

Fig. 14: Rimoldi, 2011
http://www.dulciedulcie.com/2013/10/art-as-fashion-lwren-scott-aquilano.html

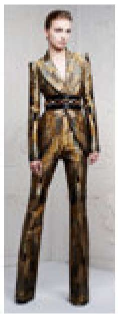


Fig. 15: Sarah Burton, 2013
http://www.chaos-mag.com/alexander-mcqueen-resort-2013-stuns/

4. CONCLUSIONS

During the time he created, Klimt explored new possibilities of rendering the female body. Using colour, which gave him the possibility to move colours and decorative elements, Klimt brought the clothed woman in the spotlight of his works. The fashion language outperforms body language and sometimes completes it. (like in *The Kiss* and *The Three Ages of Woman*). The richly decorated garment, geometric and / or organic, in vivid, energetic colours, accentuates the woman's sensuality, his works being today guiding marks for textile design meant for fashion.

On the other hand, the clothes proposed by Klimt, worn by Emilie, are adapted to the time when the feminist movement began; as the woman wanted to be socially liberated, Klimt frees her from the body corseting. And by the preserved images with Emilie wearing his creations, Klimt can be considered a forerunner of fashion photography.

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CONTRIBUTIONS TO THE DIVERSIFICATION OF MODULAR CAVITY MOULDS FOR FOOTWEAR SHOES

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Abstract: *Usually, the prefabricated footwear soles are formed in moulds with unique cavities. Each sole model requires one set of moulds and the set must contain at least one mould for each size number. Considering the great number of sole models, sentiments and size series, whatever the production size, the cost for moulds production and soles production is significant. In this paper are presented solutions that lead to possibilities of using the same set of moulds to obtain various models of soles. There are presented solutions for sole model diversification by modifying the cavities of existing moulds as well as solutions for designing moulds with modular cavities which are different from the classical ones. Through the development of this solutions was aimed the increasing of the exploitation efficiency of the available moulds and decreasing of the time needed and costs of production for new sole models. Experiments have shown that the moulds with modular cavities can be manufactured faster and with smaller costs then the moulds with unique cavities. This has as an immediate effect the faster launching into production and on the market of mew sole models and with smaller prices. Introducing in the sole fabrication process of moulds with modular cavities, as the only solution or in conjunction with the classic moods, opens new perspective in this domain.*

Key words: : *shoes soles, designing soles, manufacture soles*

1. INTRODUCTION

The prefabricated footwear soles, excepting the leather soles, are obtained in moulds through thermo-chemical processes using polymeric blends [1]. The market demands a great variety of sole models and that implies a great number of moulds. The classic moulds used for sole forming have unique cavities that don't allow the production of multiple spatial shapes of the cavities in the same mould. For each new sole model are needed individual sets of moulds. Considering that the soles role in footwear diversification is increasing, it is necessary to produce a great variety of mould sets. Each set of moulds hast to contain the entire size series. Consequently, the set has to contain at least one mould for each size number for one sole model [2].

Because of the complexity of the cavities, the time and cost of the production are high. This justifies the use of the mould on their entire production capacity. A smaller use of the mould is not efficient. A mould in which are formed soles, whatever the thermo chemical process is used, will be physically outworn after about 200000 working cycles. Usually the moulds are used a number of cycles, then are stored till new orders, and after a time the moulds are sent for recycling or melting, depending on the material used for their fabrication. The exploitation of the moulds till the outworn is seen in high sole production, at major manufacturers. In the case of the smaller manufacturers, the moulds are morally outworn long before they are physical outworn. Often, because of the lack of new orders, entire sets of moulds are recycled. Obviously, manufacturing such sets of moulds is not profitable.

In this paper are presented solutions to obtain more cavity shapes in the same mould. There are presented two variants: obtaining modulation cavities in classical moulds, with unique cavities; realizing modulation cavities in moulds designed different from the classical ones.

2. EXPOSITION

2.1 Solutions for manufacturing modular cavities in moulds with unique cavities

The cavities in which the soles are formed have unique design and are contained in the base board. In the cover board are mounted the pieces which will close the cavities and will form the weight removal cavities.

We'll consider a mould which closes a cavity in which is formed a specific model of footwear sole, as in Figure 1.

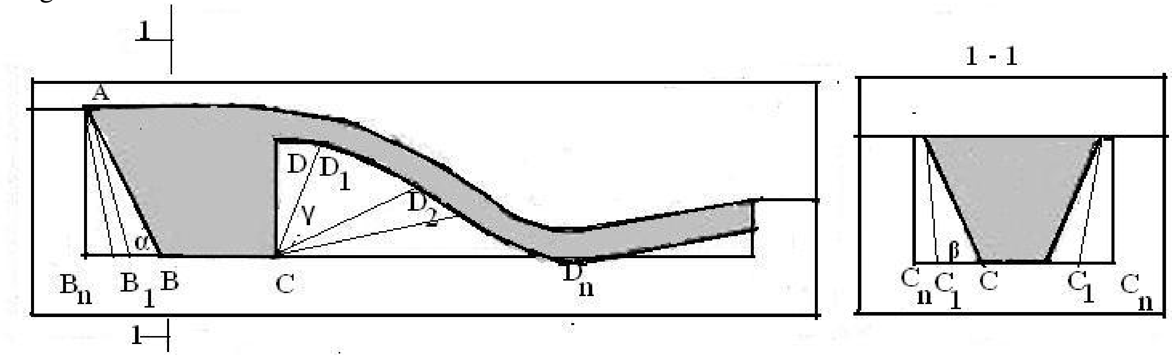

Fig. 1: *Diversification variants of the cavities by successive milling*

The question is if this mould can be used to obtain other sole models. Analyzing the possibilities, a set of solution has emerged. Multiple modification of the initial sole model can be obtained by modifying the heel shape. [3]. To obtain this, starting with a heel which forms at the back an angle α with the horizontal plane and an angle β to the sides, the mould can be modified by successive milling so that the points B and C will successively move to B_1, B_2,…, B_n respectively C_1, C_2,…, C_n. At the inside, which forms the angle γ with the horizontal, the point D can be successively moved to D_1, D_2,…,D_n. The edges that form the spatial shape of the heel can be straight or curved, obtaining multiple heel shapes with a straight or inclined front, up to orthopedic heel. A grate number of diversifications can be obtained by modifying the antiskid relief [4]. Also, by deepening successively the cavity of the mould, are obtained different thicknesses of the sole.

On the other hand, by modifying successively the mould, at some point, the cavity becomes cylindrical orthopedic. Returning to the conical shape of the heel is obtained by adding in the mould cavity of some metallic parts [5].

2.2. Solutions for obtaining moulds with modular cavities

In Figure 2, is presented a solution for manufacturing moulds which, by interchanging a set of modules, permits obtaining versatile cavities [6].

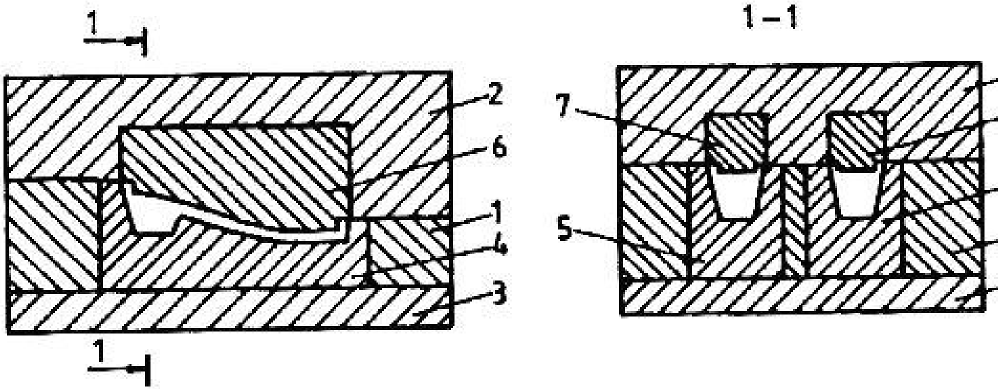

Fig. 2: *Mould with modular cavity*

1- base board; 2- cover board; 3- mount board; 4, 5- cavity forming modules; 6, 7 – weight removal cavities forming modules

It is noted that the mould is made of parts with dimensions that are not modified when changing the sole model and the replacing parts. The fixed pieces are on the base board and on the cover board, the cover board and the mount board. The parts that modify are the modules 4, 5, 6 and

7. In the base board are mounted the modules 4 and 5 that contain the cavities in which the soles are formed. The mount board is used for mounting the modules in the base boards and the entire assembly on the machine on which the mould is mounted. The cover board is similar to the ones used in classical moulds. In this board are mounted the modules 6 and 7 which form the weight removal cavities. This type of modular moulds is used in the case the soles have completely different models. There are situations in which it is not necessary to rebuild all the modules. If the weight removal cavities are not modified, the modules 6 and 7 are reused. If the sole shape is kept and only the antiskid relief or the side surface is modified, the modules 5 and 6 will be designed to allow the attachment of removable parts which will define the sole model [7].

3. EXPERIMENTAL

3.1. Producing modular cavities in existing moulds with unique cavities

The moulds with unique cavities, used for the manufacturing of the prefabricated soles, usually have a moulding board a sole plate and a cover plate. Closing the moulding board and the cover plate, the unique cavities will be generated.
A solution to obtain other models in this mould is to modify the cavity by successive mechanical processing by milling. In the obtained cavity are mounted the parts that will define the shape of the sole, the antiskid relief pattern and the side surface.

Through successive milling, at some point, the cavity becomes cylindrical-orthopedic. Producing some sole models in this type of cavity is possible by producing and mounting modules which have the cavity of the newly created sole model and parts for closing the remaining open cavity. The antiskid relief represents one of the main diversification criteria for the sole model. For this reason, it is recommended that the antiskid relief to be engraved on parts that will be mounted in this module. By using this kind of modules, in some conditions, can be obtained even soles with size numbers smaller than the size number for which the mould was initially manufactured. This kind of solutions is presented in Figure 3.

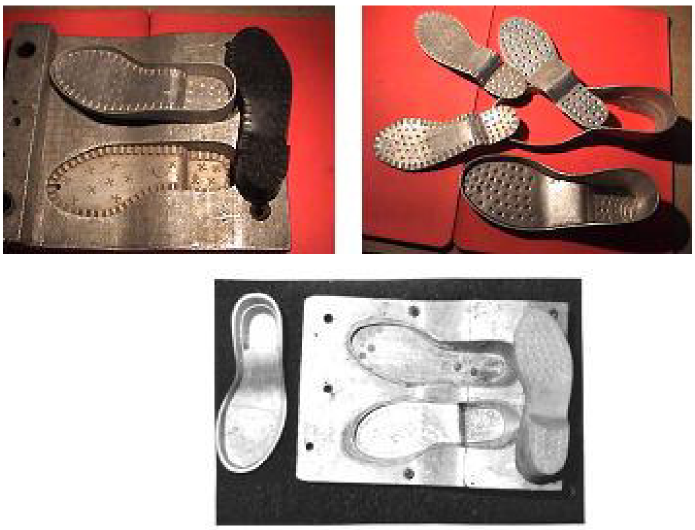

Fig. 3: *Modules for cavity forming in moulds with unique cavities*

3.2. Manufacturing moulds with modular cavities

The structure of the mould in which can be formed multiple sole models, is different than the moulds with unique cavities. A versatile mould [8], modular cavities is represented in Figure 4.

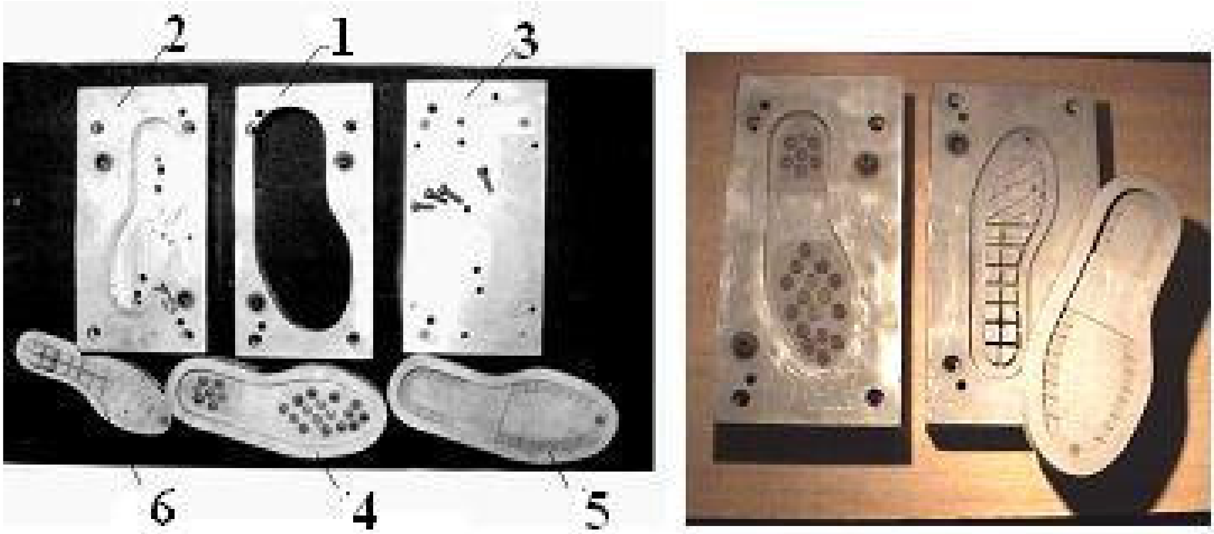

Fig. 4: *Parts of the mould with modular cavity*
1 - base board; 2- cover board; 3- mounting board; 4, 5 – cavity forming modules; 6 – cavity forming module

The mould is formed by a base board, a cover board, a mounting board and a set for modules. To simplify the manufacturing, the mould has only one cavity. In the base board is mounted the module that forms the cavity. The assembly of base board and cavity module is fixed on the mounting board which will serve for mounting the machine too. In the cover board is fixed the module that will close the cavity and that will form the weight removal cavities [9]. In Figure 4 is presented the mould and after mounting the main pieces and the modules. It is noted that the modules that form the cavity and the weight removal cavities are interchangeable [10]. In the Figure 5 are presented the modules and the soles resulted by injection.

Fig. 4: *Mould with assembled modular cavity*

Another mould with modular cavity in which are obtained pairs of soles, is presented in Figure 5.

Fig. 5. *Mould with two modular cavities*

4. RESULTS AND DISCUSSIONS

Obtaining modular cavities by successive modifications of a cavity with unique shape have highlighted a series of aspects like:

- The shape diversification of the soles by gradually modifying a cavity is limited. Depending on the initial shape of the cavity and the sole models that are requested, it is possible to rapidly achieve the limit situation when the heel has a cylindrical orthopedic shape.
- A larger diversification of the sole models in a mould with a given cavity can be obtained by the antiskid relief characteristic and the side surface. In this case the shape and volume modifications should be avoided.
- The reversed operation, of obtaining modular cavities by mounting pieces in the cylindrical orthopedic cavity, has advantages in the cases of diversification by antiskid relief and side surface model too.
- Including this kind of moulds in the current production activity implies the often rebuild of the pieces and modules that define the cavities. Therefore, this kind of moulds is efficient in the case of small sole production like: producing the collection for market analysis; producing unique sole models; obtaining model diversification by antiskid relief, keeping the main shape and the volume of the sole.

The manufacturing and experimentation of some moulds with versatile cavities lead to the following findings:

- These moulds allow, by the interchangeability of some modules, the forming in the same mould of cavities in which can be obtained a great diversification of the sole models.
- By their structure mode, the moulds are made of parts with fixed shapes and dimensions, whatever the modifications made on the cavity.
- The mounting and dismounting the parts of the mould to achieve the cavity modification can be easily made without risking the modification of their quality.
- Preserving the initial shape and volume of the soles, a great number of model diversification can be achieved with low costs only by modifying the antiskid relief. In this case, the modules that form the cavity are preserved and only the pieces that define the antiskid relief are rebuild.
- The weight removal cavities of the soles have the role of making the soles lighter and are not diversification criteria for the models. The same modules used for weight removal cavities can be used on a large number of sole models.
- The soles obtained in this type of moulds are similar from the quality point of view, to the soles formed in moulds with unique cavities.
- The moulds with versatile cavities are obtained by the same technologies as the moulds with unique cavities. The same technological parameters apply and are mounted on the same type of machines. These moulds and the classic moulds can be used simultaneously.

5. CONCLUSIONS

- The moulds with modular cavities can be manufactured faster and with smaller costs then the moulds with unique cavities. This has as an immediate effect the faster launching into production and on the market of mew sole models and with smaller prices.
- The production of moulds with versatile cavities for obtaining new soles, highlighted the decreasing of the production time and costs with 20% up to 80% in relation with the manufacturing of new moulds with unique cavities having the same destination. This fact is possible because a part of the mould pieces are reusable. The economy is much more visible when producing an entire new set of moulds for a new model of sole.
- The efficiency of using moulds with versatile cavities can be emphasized also by other factors of which we can enumerate: reducing the costs of the materials; reducing the costs of the energy; reducing the necessary of work force; reducing the salary direct costs; increasing the profit, etc.
- By producing a smaller number of moulds with versatile cavities, even one single piece, soles with different models and of different polymeric blends can be obtained, to experiment new polymeric blends or for marketing studies.
- The moulds with versatile cavities can be used to obtain multiple sole models till the physical outworn, minimizing the lost caused by the moral outworn.
- Introducing in the sole fabrication process of moulds with versatile cavities, as the only solution or in conjunction with the classic moods, opens new perspective in this domain.

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ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

THE FOOTWEAR DESIGNING SESSIONS USING CRISPIN DYNAMICS ENGINEER
1 ST PART: - Develop into a full shell

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Abstract: *The diversification and customization of products are important characteristic of the modern economy and especially of the fashion industry. Because of this, the lifetime of the footwear product is very short and result the necessity to cut the design and production time. 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 a lot of the producer's time.*
With CRISPIN Dynamics, one can visualize a range of designs on-screen; work out the costs of a new style and even cut out sample shoe components. Reliance on manual skills is largely eliminated, so the staff can work creatively, but with increased accuracy and productivity. One can even send designs to a distant office or manufacturing centre in a matter of minutes.
This paper presents the basic function of CRISPIN Dynamics CAD Suite Engineer for footwear design. The process of new product development has six stapes: digitized form of the medium copy, last flatting, model drawing, creation and management of individual parts, estimation of material consumption, multiplying the designed footwear product's pattern.
This product has been developed for shoemakers who wish to ensure that their business remains competitive by increasing the efficiency, speed and accuracy of pattern development and grading.

Key words: *footwear, design, computer, part, pattern.*

1. INTRODUCTION

By classic methodology, designing of the footwear is a very complex and laborious activity. This is because classic methodology requires many manual graphic executions, which consume a 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. The decisive step in this way has been made some time ago, with the powerful technical development and massive implementation of electronically calculus systems and informatics, CAD (Computer Assisted Design).

With **CRISPIN Dynamics,** one can visualized a range of designs on-screen, work out the costs of a new style and even cut out sample shoe components. Reliance on manual skills is largely eliminated, so the staff can work creatively, but with increased accuracy and productivity. One can even send designs to a distant office or manufacturing centre in a matter of minutes.

2. THE FOOTWEAR DESIGNING SESSION

This paper presents the basic functions of **CRISPIN *Dynamics* CAD Suite Engineer** for footwear design**.** The software is a 2D application of the **CRISPIN Dynamics CAD Suite**. The **Engineer** program is broken into a series of 'tasks' [1]. Each 'task' has a 'tool tray' that contains a number of separate functions to achieve the task. This are:

- **Drawing**
- **Grade**

❑ **Assess**

When the Engineering program first starts the Draw task is active and the tool tray is displayed, as shown in the above partial image.
For start of the base model on obtained using functions: digitize or flattening.
The first step in the footwear designing session is:

- **digitized form of the medium copy**
- **last flattening**

2.1. Digitize the flattened half shell or standard

The first step in a footwear design session is to save in the computer's memory the digitized form of '"half shell', or standard [2]. Afterwards, the steps of digitizing are as follows:

– Prepare the flattened half shell or standard for digitizing by lightly marking where the key points to record are on the edges and internal lines.
– Align the shell on the digitizer, fix in place with a little low tack tape and digitize all the lines.

The process continues with the input of base line data from a 2D digitizing tablet. You can use any 2D digitizer supported by the 'Wintab' standard and as only 3 buttons (and delete) are needed it is easy to learn, quick and accurate.

To begin we will assume that the digitizing tablet has been correctly configured and calibrated if necessary. So the first step is to click on the digitize icon, shown above. There is a variation in the process if there is already data on the screen but for the moment let us assume this a new pattern. Align the shell on the digitizer, fix in place with a little low tack tape and digitize all the lines.

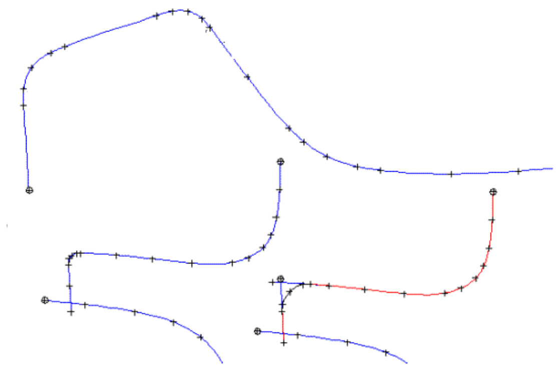

Fig. 1: *Digitize the flattened half shell*

For that prepare and mark the shell with a pencil, the points to digitize along the lines. In the process keep the number of data points to a minimum [3]. In figure 2 there is one example of a digested the lines of the pattern.

2.2. 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 [4].

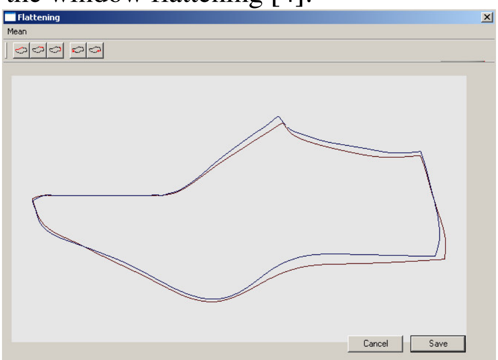

Fig. 2: *Flattening the part inside and outside of the last*

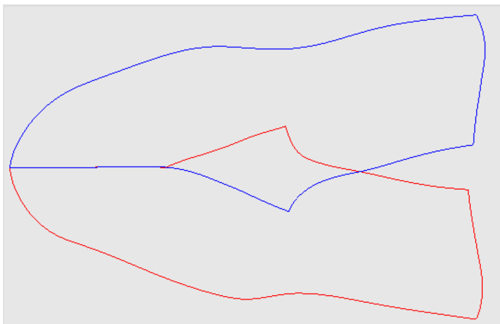

Fig. 3: *Flattening full*

The type for flattening is:

a) Half

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. 3).

b) Full

Open the inside and outside forms to a whole-cut shape (fig. 4).

3. RESULTS

In this paper is creating o base footwear using Crispin Dynamics CAD SUITE. For this is flattening the last and style line (fig. 4).

Draw the style on the last surface [6]. **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. Enhanced visualization is achieved by applying features such as stitching, eyelets and laces together with colors and textures. An interactive sole design facility is provided.

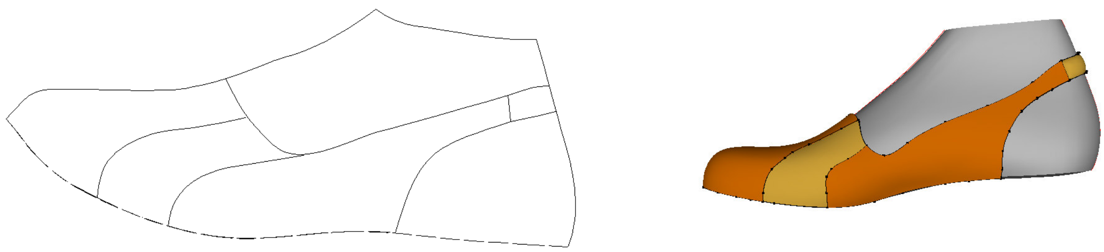

Fig. 4: *Flattening the last and style line*

3.1. Develop into a full shell

The system **CRISPIN *Dynamics* CAD Suite Engineer** offers many functions for the drawing of the footwear pattern. Using the CRISPIN function once can develop into a full shell and create sundries effect for the footwear patterns.

The following layout summarizes **Crispin** drawing functions for develop into a full shell.

The layout of CRISPIN **Dynamics Engineer** follows a pattern established by many PC programs using the 'single document' model as the basis of operation (see Fig.5). This means that a single instance of Engineer can only have one pattern file open at a time.

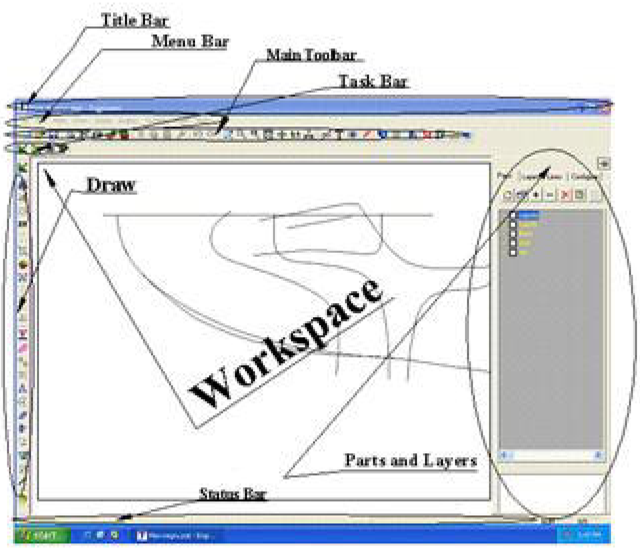

Fig. 5: *The window Engineer for develop into a full shell*

Engineer consists of these main areas:

- A title bar, that shows the program title with the name of the pattern currently loaded.
- A menu bar, at the top, following normal Windows convention.
- A main toolbar, underneath the menu bar (default location).
- A small 3 option task bar, underneath main tool bar.

A tool tray at the left of the screen, the Draw, tool tray is automatically active at startup (see fig. 5).

* The Parts and layers manager will 'slide out' from the right side of the screen when the mouse pointer 'hits' the side. There is an alternative 'icon browser' view of the parts not shown below.

A status bar at the base of the screen displays prompts and other information while the program is being used.

* Last but not least is the main workspace area. When a pattern is first loaded the program is in 'selection mode' waiting for a line type or function to be selected.

The system **CRISPIN *Dynamics* CAD Suite Engineer** offers many functions for the drawing of the footwear pattern. Using the CRISPIN function once can develop into a full shell and create sundries effect for the footwear patterns.

Figure 6 presents one example of developing full shell using this window and the graphics instruments.

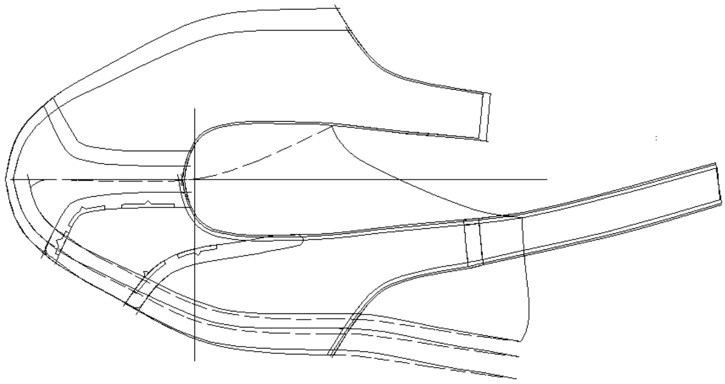

Fig. 6*: The result using Engineer for develop into a full shell*

4. CONCLUSIONS

The software produced by ***Crispin Dynamics*** has remarkable results in footwear design but it is working with an authorization of the company. A license 'authorizes' a computer to run specific **CRISPIN Dynamics** software. Licenses are often also used to specify which options within an application can be run.

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[2] M. Drişcu, ”*Modelarea formelor plane şi spaţiale ale încălţămintei”,* Ed. Pim, Iaşi, 2008.

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[6] ***, Crispin Dynamics CAD SUITE, 3D.

ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

THE FOOTWEAR DESIGNING SESSION USING CRISPIN DYNAMICS ENGINEER
2 ND PART: Creating the parts, Estimating the material consumption, Grading

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Abstract: *The diversification and customization of products are important characteristic of the modern economy and especially of the fashion industry. Because of this, the lifetime of the footwear product is very short and result the necessity to cut the design and production time. 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 a lot of the producer's time.*
With CRISPIN Dynamics, one can visualize a range of designs on-screen; work out the costs of a new style and even cut out sample shoe components. Reliance on manual skills is largely eliminated, so the staff can work creatively, but with increased accuracy and productivity. One can even send designs to a distant office or manufacturing centre in a matter of minutes.
This paper presents the basic function of CRISPIN Dynamics CAD Suite Engineer for footwear design. The process of new product development has six stapes: digitized form of the medium copy, last flatting, model drawing, creation and management of individual parts, estimation of material consumption, multiplying the designed footwear product's pattern.
This product has been developed for shoemakers who wish to ensure that their business remains competitive by increasing the efficiency, speed and accuracy of pattern development and grading.

Key words: *pattern, assess, consume, grade*

1. INTRODUCTION

This paper presents the basic functions of **CRISPIN *Dynamics* CAD Suite Engineer** for footwear design**.** The software is a 2D application of the **CRISPIN Dynamics CAD Suite**. The **Engineer** program is broken into a series of 'tasks'. Each 'task' has a 'tool tray' that contains a number of separate functions to achieve the task. This are:

- **Drawing**
- **Grade**
- **Assess**

When the Engineering program first starts the Draw task is active and the tool tray is displayed, as shown in the above partial image

After develop the base footwear on create the individual parts and the consume estimation.

2. CREATE THE INDIVIDUAL PARTS

The individual parts (see Fig. 1) are created using the menu **Parts Manager** [1].

The selection, creation and management of parts are on the first tab of the dialog that 'slides out' from the right side of the workspace, when the mouse cursor comes within 5 pixels of the edge.

In practice you simply 'bump' the mouse pointer to the edge of the screen and the dialog is displayed. This is easier when the program is 'maximized' as the pointer literally 'hits' the edge of the screen.

This does not happen in all circumstances, for example when 'dragging' an area with a mouse button held down. Also to minimize the accidental selection of this dialog there is a 500 millisecond delay before it activates. This delay can be changed by editing the registry.

The dialog can also be 'pinned' in the 'out' condition. In this mode the dialog will stay visible until a function is started at which point it will be hidden when the function is complete the dialog will re-appear (see Fig. 1).

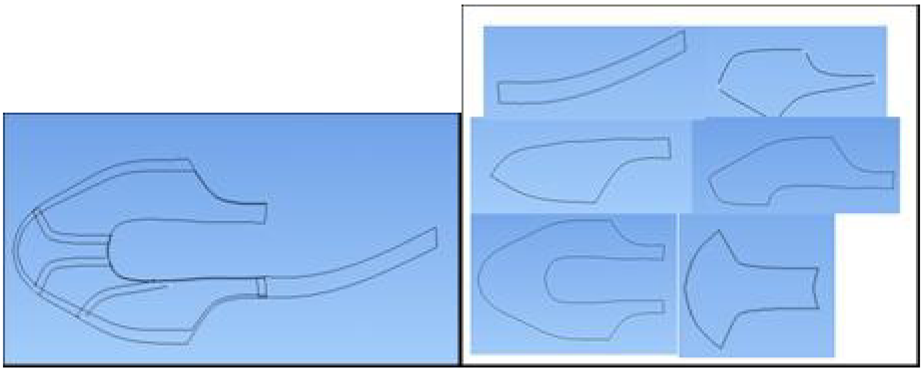

Fig. 1: *Creating the parts using function 'Parts Manager'.*
Using this function allows the operator to quickly view the part names developed in the pattern with the ability to view the parts as required

3. ESTIMATING THE MATERIAL CONSUMPTION

The user multiplies the pattern, which represents a working entity for Engineer, in order to find the economic arrangement for the reference points. In this purpose, the user must probe few arrangement variants, in the translation and rotate-translation system [2]. The same process is used in establishing the arrangement factor for the two points of reference of the designed footwear product.

3.1. Assessment

Assessment in **Engineer** is a quick and simple method of checking the efficiency of a part based on the 'parallelogram' process. Interlock efficiency is important to know at the pattern stage of the shoe's development, as it can have an impact on the total cost of the shoe.

Assessment in **Engineer** is NOT in itself a costing facility, though the area data generated can be used for costing purposes.

3.1.1. Process

The **Assessment** function interlocks a single part boundary with itself, either at the same angle to which the part was defined in the pattern or rotated 180 grades.
The two interlocked parts are then duplicated and the duplicates interlocked with the two original parts. These four parts are then duplicated and interlocked with the preceding four parts.
With these eight parts in place, the software will then determine a parallelogram between four of the eight parts. The parallelogram will be created on the same intersections for each of the four parts. This is to ensure that one pair of the parts are completely represented within the efficiency area.

Note:

Within **Engineer** assessment can only be carried out on 'real' boundaries. A mirrored or other dependant copy of a boundary will be ignored.

Calculation

Taking the whole area used within the parallelogram and subtracting the known area of the parts leaves the waste area. The difference between the actual area used and the waste area remaining, gives the efficiency percentage.

***Fig. 2**: Calculation the efficiency of a part based on the 'parallelogram' process*

4. RESULTS

In the follow figure are the results using the function assessment for base footwear and in the follow table is centralized the norm of the consume [3].

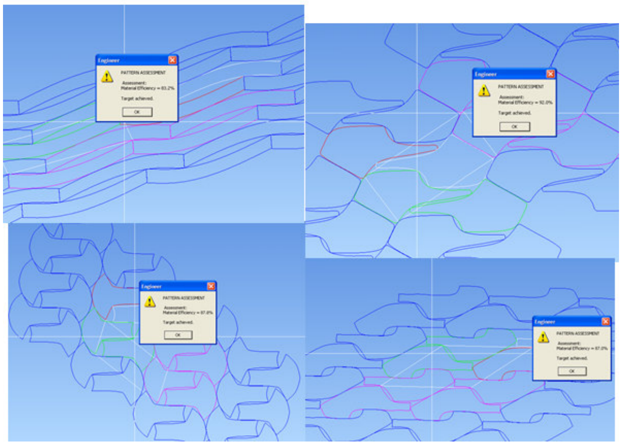

***Fig. 3**: For the pattern of the base footwear calculation the efficiency of a part based on the 'parallelogram' process*

***Table 1:** Calculation the material consumption*

Name part	Pieces number for 1 pair	Area (dm2)		Parallelogram area (dm2)		Perimeter (dm2)		Material utilization procent
		Of 1 pc.	For 1 pair	Of 1 pc.	For 1 pair	Of 1 pc.	For 1 pair	
Toe	2	0.4247	0.8494	0.557349	1.114698	3.16	6.32	76.2
Vamp	2	0.4274	0.8548	0.465577	0.931155	3.27	6.54	91.8
Outside quarter	2	0.8343	1.6686	0.929065	1.858129	4.44	8.88	89.8
Inside quarter	2	1.1751	2.3502	1.318855	2.63771	5.62	11.24	89.1
Back strap	2	0.314	0.628	0.33298	0.66596	3.26	6.52	94.3
Vamp lining	2	2.1675	4.335	3.065771	6.131542	9.91	19.82	70.7
Strap lining	2	0.2941	0.5882	0.301024	0.602047	3.09	6.18	97.7
TOTAL	14		11.2742		13.94124		65.5	80.86941

4.1. Multiplying the designed footwear product's pattern

Another indispensable stage of the process in designing footwear products is the multiplying the patterns in order to obtain the patterns for the superior and inferior number of the medium size number of the product [5].

The two reference points, the upper and the heel counter, were multiplied by following the arithmetic methods, also used in classical methods. The results of the two multiplied patterns are presented in figures number 5.

Using Crispin the grading a pattern and/or parts can be making using the **Grade Task Tool Tray** [6]. This task is many functions witch launches the dialogs providing all the facilities to set up a size range and grading parameters. In picture 5 presents one examples of grade pattern.

The major functions for the grade are:

- Choice of **Arithmetic** or **Geometric grade** and whether or not width fittings apply.

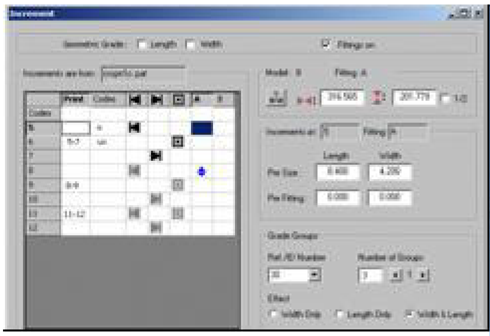

Fig. 4: The window function for grading

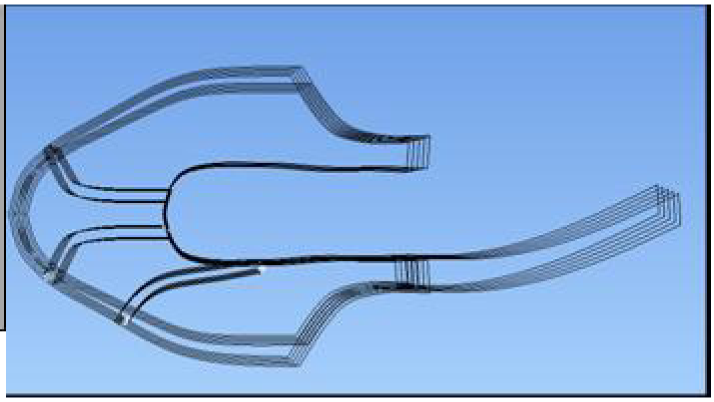

Fig. 5: The results after application function for grading

The shell-based grading system can be fully customized to suit the customer's requirements with both arithmetic and geometric calculations

5. CONCLUSIONS

The software produced by ***Crispin Dynamics*** has remarkable results in footwear design but it is working with an authorization of the company. A license 'authorizes' a computer to run specific **CRISPIN Dynamics** software. Licenses are often also used to specify which options within an application can be run.

The license for the Faculty of Leather and Textiles, ***Crisipin Dynamisc Engineer*** was installed thanks to the generosity of *Luca Caironi*, *Sales Manager* for **CRISPIN Systems Limited**. We would like to take this opportunity and express our gratitude to him. This product has been developed for shoemakers who wish to ensure that their business remains competitive by increasing the efficiency, speed and accuracy of pattern development and grading.

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[6] ***, Crispin Dynamics CAD SUITE, 3D

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CONTRIBUTIONS TO THE DETERMINATION OF A MOULDING MATERIALS OTHER THAN STIFFENERS AND SHOES INSOLES

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Abstract: *The footwear insoles and heel counter stiffeners are made using fibrous structure materials. The spatial forming of these parts is made in moulds. After forming, the parts must have the same spatial dimensions with those of the shoe lasts used in the footwear manufacturing. During the forming process, the fibrous structure materials have an elastic-plastic behavior. So, for the moulds dimensioning, it is important to know the percentage of plastic deformation from the total deformation of the stressed material; this means to know the value of these materials forming subscript. The paper presents some theoretical and experimental contributions in finding of the forming subscript of the materials used in the footwear industry, for the footwear insoles and heel counter stiffeners manufacturing. Experiments were made on installations and experimental moulds sphere, cylinder and central angle. Experimental results shows that the forming subscript depends on the mould shape and the sample humidity when the stress is cancel. So, the deformations have a high rate, the sphere surfaces having the, highest forming subscript. In the case of sample forming which use cylinder moulds the value of the forming subscript on these surfaces is the lowest. In the case of the center angle occurs a a high level of plastic deformation. The results will be applied at the designing of the insoles and heel counter stiffeners moulds used for the pre-moulding.*

Key words: *footwear, insoles mould, heel counter stiffeners mould*

1. INTRODUCTION

The footwear insoles and heel counter stiffeners are confectioned from the rigid leather for soles, artificial leather for soles, of the materials made from cellulose fibers, board, etc. manifest elastics-plastics deformations [1]. When the footwear parts made from the fibrous structure materials are manufactured, there are used moulds. So, after forming, the parts must have the same spatial dimensions with those of the shoe lasts used in the footwear manufacturing. This connecting parameter is the forming subscript which is a part of the plastic deformation from the total deformation. Wanting the dimensioning of the moulds used in spatial forming of the footwear insoles and heel counter stiffeners, it is imperious necessary to know the value of this subscript [2]. On the other side, the footwear shoe-lasts have complex designs. On their surfaces there are various curvatures which may be parts of cylinder, sphere and central angle surfaces. It is a problem to identify the designs which appear on different areas of the shoe-last and to follow the dependence between the shape of the shoe-last and the value of the forming subscript. The forming subscript depends, in the same time, on the proprieties of the material, but the technological conditions, too.

The manufacturers of the moulds used in pre-forming of the footwear insoles and heel counter stiffeners, provide moulds kits (which were conceived for each kind of material), to the manufacturers of the footwear.

In the real manufacturing processes, the researches are very useful for finding the technological conditions in using of moulds set for different materials. In an opposite case, the often renewing of the moulds set is expensive and non-productive.

As follows, there are presented an operative calculation method of the forming subscript and technological solutions for the using of the same moulds kits for different kind of materials.

2. EXPOSITION

When the footwear parts made from the fibrous structure materials are manufactured, there are used moulds with stresses in unlimited space and moulds with stresses in limited space. In the moulds with unlimited forming space, the parts are compressed between two concave-convex surfaces without lateral limits. As a result of the compression and bending stresses, the parts dimensions are modified on tangential directions at the mould curved surfaces, both on the longitudinal and on the cross directions [3]. These moulds are used in leather insoles and soles forming. In the moulds with limited forming space, the parts are compressed in a certain space. These moulds are used in heel counter stiffeners forming. The effect is forming and fixing of the heel counter stiffener structure at a precise form.

After the forming, the part must have the dimensions of the curved spatial surface of the shoe-last used for fitting. So, in the forming process, the part must compress between two concave-convex surfaces which must be dimensioned so that, after the canceling of the elastic deformations, the part must have the shoe-last [4] dimensions.

Whether: D_c – spatial dimension of the shoe-last; D_m – spatial dimension of the mould and, respectively of the concave-convex surfaces; D_r – dimension of the part. Considering $D_c=D_r$ and the canceling of the elastic deformations: $D_m<D_c$. For the connecting of these two dimensions, it will consider the cylinder surface having a radius R, Fig.1 (representing only the convex surface) [3, 4]. On this surface, a plane part is generated by compression. After the elastic deformations are canceled, the radius R of the plane part becomes the radius R'.

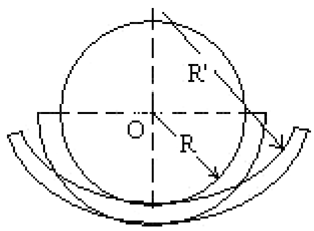

Fig. 1: *Rays of curvature of the cylindrical mould*

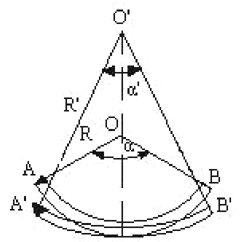

Fig.2: *The angles to the center of cylindrical mold*

Considering R-dimension of the mould and R'-dimension of the part after the elastic deformation canceling, it results the following two relations: $R'>R$, $D_r>D_m$. But the part dimension must be equal with the shoe-last one, so, $D_c>D_m$. Knowing that, in any forming process, the two kind of deformations (the elastic one, ε_e and the plastic one, ε_p) take place and knowing that the elastic deformation is canceled when the load is removed, it results that, between the spatial dimensions of the shoe-last and those of the mould, it must exist a bonding factor depending on the plastic deformation of the material which is formed, [3, 5]. Considering: $D_m/D_c=I_f$, where I_f is the forming subscript, the mould dimensions will be calculated using the relation (1).

$$D_m = D_c \cdot I_f \text{, [m]} \tag{1}$$

Considering that the material is only plastic deformed, the forming subscript will be equal to 1, so, $D_m=D_c$. But, as the relation (2) shows, the material is elastic deformed, too; this aspect must be considered when the material dimensions in plane will be changed with the shoe-last dimensions in space.

$$\varepsilon = \varepsilon_e + \varepsilon_p \text{ , [N]} \tag{2}$$

ε -total deformation; ε_e – elastic deformation;
ε_p -plastic deformation.

Considering relation (2) and the total deformation equal to 1, the plastic deformation is calculated using relation (3).

$$\varepsilon_p = 1 - \varepsilon_e \text{ , [N]} \tag{3}$$

Alter the elastic deformation cancels, the part dimensions will increase in comparison with the mould once, being equal with those of the shoe-last. This aspect is possible if the mould dimensions and the shoe-last once may be connected in a relation as relation (4).

$$D_m = D_r(1-\varepsilon_e), \text{[m]} \tag{4}$$

Replacing this value in relation (1), it will obtain relation (5).

$$I_f = \frac{D_c(1-\varepsilon_e)}{D_c} = 1-\varepsilon_e = \varepsilon_p \tag{5}$$

So, it results that the forming subscript has a value equal to the plastic deformation one, when the deformations sum is equal to 1. In figure 1, there were represented only the radius of the curvature of the mould and of the part which must be obtained using a forming process. Considering, for the same situation, the lengths of the circular arcs of the part before the forming (l), respectively, after the forming (l'), and the central angles before the forming (α) and after the forming ($\alpha^{'}$), Fig.2, between all these parameters is a relation as the relation (6) is:

$$l = R\cdot\alpha, \text{[m]} \tag{6}$$

α is expressed in radians.

The change from R radius spatial form to $R^{'}$ radius spatial form takes place without the change of the circular arc length, so, $l^{'}$=l. In these conditions, $R^{'}\alpha$=R α. So, the value of $\alpha^{'}$ angle may be calculated using the relation (7).

$$\alpha^{'} = \frac{R\alpha}{R^{'}} = \frac{R\alpha}{RI_f} = \frac{\alpha}{I_f}, [\text{rad}] \tag{7}$$

It results that the value of the central angle through the passing from the mould to the part may be obtained using the form subscript. The passing from the shoe-last dimensions to the mould dimensions is possible, in this case, using a theoretical method by calculation, considering the main parameter as the forming subscript.

It is a problem to identify the designs which appear on different areas of the shoe-last in the three planes, considering that the passing from the shoe-last to the mould is not possible using only one forming subscript.

In the longitudinal section of the shoe-last, there are some curve designs, which are components of the cylinder, having respectively R_1, R_2,...,R_k radius. Cylinder components, having respectively R_{k+1}, R_{k+2},..,R_n radius, are in the cross sections, too. The using of a forming subscript appropriate to the insole material would lead to some other cylinder components having $R_1^{'}$, $R_2^{'}$,..,$R_k^{'}$ radius for the longitudinal sections of the shoe-last and, respectively, $R^{'}_{k+1}$, $R^{'}_{k+2}$,…,$R^{'}_n$ radius for the cross sections.

In the case of the passing from the shoe-last to the mould used in heel counter stiffener forming, Fig. 3, there are observed cylinder components having R_1, R_2,..,R_n, radius and the central angles α and β.

Inside of the posterior area, there are a cylinder having a R_5 radius, Fig. 3, in projection on vertical plane, the cylinder components having R_6 and R_7 radius in projections on horizontal plane and the central angle γ. It results that, in the projections on the three directional planes, there are observed circular arcs generated from some cylinders crossing and central angles generated by tangential planes to the line between the lateral area and the inferior area of the shoe-last. On the posterior area of the shoe-last, the curvature is very pregnant, having a revolution ellipsoid design which, on limits, may be considered as a globe calotte.

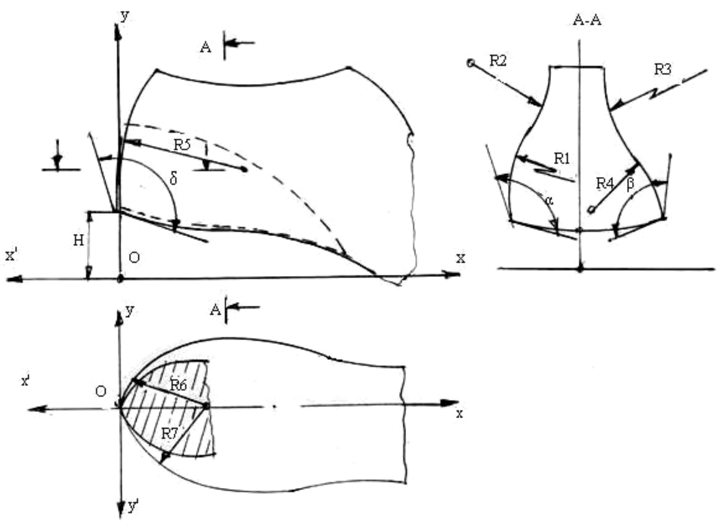

Fig. 3: *Circular arcs and central angles as components of the shoe-last used in heel counter stiffener manufacturing*

In conclusion, when the passing from the shoe-last design and dimensions to the mould design and dimensions takes place, it must use forming subscript respectively for the three kinds of shapes: cylinder, central angle and sphere.

3. EXPERIMENTAL

The values of the forming subscript were calculated for some materials used in footwear manufacturing For the experimental research [5], there were realized three kinds of moulds with the following shapes: cylinder, central angle and sphere; these shapes are on the shoe-last, as in Fig. 4.

For each kind of shape, there were realized moulds having more dimensions: hemispheric moulds having the diameters of the circle 49 mm and 66,4mm, cylinder moulds having the diameters of the circle 29mm, 38 mm and 48 mm and central angle moulds having angles 90^0, 100^0 and 110^0. This kind of dimensions has average values often used in the shoe-last manufacturing. The distance between the two surfaces concave-convex is, in all cases, 2mm which is the distance equal to the average thickness of the insoles and of the heel counter stiffeners.

The study has analyzed the behavior of the stiff leathers used for insoles, of the materials made from leather fibers and of the materials made from cellulose fibers, in the forming process.
The forming subscript depends on the proprieties of the material, but the technological conditions, too. This is the reason because, when the forming subscript was calculated, it counted the material humidity, the forming pressure, the time of pressure action and the rest time of the part.

The humidity of the material is an important technological parameter. Knowing the technological moisture ways, the conditioning regimes are: samples storage in air with humidity Φ= 65%, at temperature t=20-25^{0}C and time τ=24 hours; immersing in water with temperature t=25-30^{0}C and time τ=2 minutes; storage in saturate atmosphere with humidity Φ= 100%, at temperature t=20-25^{0}C and time τ=24 hours; immersing in water with temperature t=25-30^{0}C and time τ=2 hours; storage in saturate atmosphere with humidity Φ= 100%, at temperature t=20-25^{0}C and time τ=24 hours.

In forming process, the samples were compressed at 100daN/cm^2- the working pressure of the equipments used for insoles and heel counter stiffeners forming.

The adopted pressure time was 30 seconds; this time results knowing that the output of the equipments used in insoles and heel counter and stiffeners compressing is 800 pears/8 hours.

The researches was made using the three kinds of moulds in three conditioning regimes anterior mentioned.

After the forming process, when the samples are extracted out from the moulds, they are still wet. Depending on the conditioning regime, for the leather fibrous materials, the parameters values were: U=11,2% for regime Φ= 65%, t=20-25^{0}C and τ=24 hours; U=21,4% for regime 2 minutes moisture, Φ= 100%, t=20-25^{0}C and τ=24 hours and U=40,1% for regime 2 hours immersing and Φ= 100%, t=20-25^{0}C and τ=24 hours. The high humidity allows the cancel of the elastic mechanical work which was stored during the stress. After a 24 hours rest time, it were measured the radius of the samples which were formed using moulds with hemisphere and cylinder shape, respectively, moulds with central angles shape.

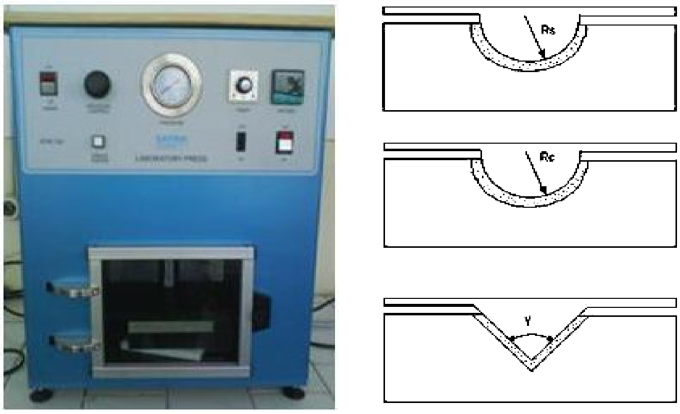

Fig. 4: *Installation and experimental moulds: sphere, cylinder and central angle*

4. RESULTS AND DISCUSSIONS

The statistics shows that the forming subscript depends on the mould shape and the sample humidity when the stress is cancel. Table 1 presents experimental results [5] obtained using an artificial sole (a kind of leather fibrous material).

Table 1: *I_f values of the artificial sole*

U, %	Mould shape	Average	Mean square deviation	Confidence interval
11,2	Sphere	0,930	0,0126	0,900-0,951
	Cylinder	0,600	0,0096	0,437-0,783
	Angle	0,797	0,0043	0,724-0,870
21,4	Sphere	0,980	0,0100	0,963-0,997
	Cylinder	0,800	0,0631	0,602-0,908
	Angle	0,870	0,0393	0,803-0,937
40,1	Sphere	0,966	0,0193	0,931-1,001
	Cylinder	0,672	0,0530	0,578-0,771
	Angle	0,818	0,0340	0,753-893

Table 1 goes to the next conclusions[5]:

- Average of the forming subscript for the three kinds of spatial shapes is the highest for intermediate regime of humidity 20 and 25%.
- For the 20-25% humidity, average has maximum value: when it used a sphere mould (0,980), next one being the center angle mould (0,870), the smallest being for the cylinder one (0,800).
- Confidence interval in the sphere case is over 1; when it is adopted this kind of forming subscript, the material would be over-forming stress, so, in real conditions, it will adopt an average subscript having the value 0,980.

The final conclusion is that, for the leather fibrous materials (known as artificial sole), the values of the forming subscript to be chosen for the mould dimensioning will be: the forming subscript for sphere: I_{fs}=0,95 in comparison with an average value 0,98; the forming subscript for cylinder: I_{fc}=0,80 in comparison with an average value 0,80 and the forming subscript for central angle:I_{fu}=0,85 in comparison with an average value 0,87. The differences between the three calculated subscript is because of different plastic deformation of the material structure when it stresses on different shape surfaces.

5. CONCLUSIONS

In the case of sample forming which use sphere moulds, the bend deformations don't take place in only one direction, but in infinite directions radial concentric of the hemisphere pole. In the same time, on the parallel concentric circles take place elongations. On these, the deformations because of the compression between the two concave-convex surfaces superpose. The release after deformation takes place in all directions including the tangential direction of the parallel circles. So, the deformations have a high rate, the sphere surfaces having the highest forming subscript.

In the case of sample forming which use cylinder moulds, after the cancel of the stress and after the drying, the sample will have a cylinder shape with R radius. The value of the forming subscript on these surfaces is the lowest. In the same time, the researches show that, the variation of the cylinder diameter does not increase the rate of plastic deformation in the total one.

In the case of the center angle, a bending stress is only in the peak. In the areas of the center angle, the single stress is compression. The bending nearby the peak of the center angle may be considered similarly with a stress applied on a cylinder having a curvature radius tending to zero. This aspect determines an increasing to infinite of the stress and a high level of plastic deformation.

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EXPERIMENTAL RESEARCH REGARDING LEATHER APPLICATIONS IN PRODUCT DESIGN

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Abstract: *This paper presents the role and importance of experimental research in design activity. The designer, as a researcher and a project manager, proposes to establish a relationship between functional-aesthetic-constructive-technological-economic,based on the aesthetic possibilities of the materials used for the experiments. With the aim to identify areas for the application of leather waste resulted from the production process, the paper presents experiments conducted with this material in combination with wood, by using different techniques that lead to different aesthetic effects. Identifying the areas to use and creating products from leather and/or wood waste, is based on the properties of these materials. Leather, the subject of these experiments, has the advantage that it can be used on both sides. Tactile differences of the two sides of this material has both aesthetical and functional advantages, which makes it suitable for applications on products that meet the requirements of "design for all". With differentiated tactile characteristics, in combination with other materials, for these experiments wood, easily "read touch" products can be generated to help people with certain disabilities. Thus, experiments presented in this paper allows the establishment of aesthetic schemes applicable to products that are friendly both with the environment (based on the reuse of wood and leather waste) and with the users (can be used as applications, accessories and concepts of products for people with certain disabilities). The designer's choices or decisions can be based on the results of this experiment. The experiment enables the designer to develop creative, innovative and environmentally friendly products.*

Key words: *leather, wood, eco design, experiment, aesthetic.*

1. INTRODUCTION

Experimental research in design is aimed at increasing customer satisfaction based on the designer's well argumented choices in his capacity as project designer. Experimental research is a scientific approach to reality in order to establish a cause-effect relationship between two observable and measurable phenomens [1]. From the designer's point of view the experimental research, involves assessing situations that present potential ways to develop a project [2]. Out of respect for the environment and for disadvantaged groups, the designer approches the areas regarding the use of ecological matherials with both functional and aesthetic potential. This proposed experiment, highlights the attributes of two materials, leather and wood, that were subjected to various forms of processing, in order to obtain aesthetic effects with the potential to be used in ecodesign and to meet the principels of the new trend "design for all" [3]. Universal design or design for all with increasingly broad applications in design, refers to ideas for products, buildings and environments that must be accessible to more categories of people: the elderly, people with and without disabilities. The term "universal design" was invented by architect Ronald L. Mace to describe the design concept applicable to all products and built environment for aesthetic and easy to use, to the most possible extent, by everyone, regardless of age, ability or status in life [4]. Universal design or design for all must propose concepts with a broad accessibility, adaptive technologies and support, in which the aesthetics is a basic element. To apply the principles of Universal design is necessary to understand the phenomenon of product design that responds to varied categories of users.

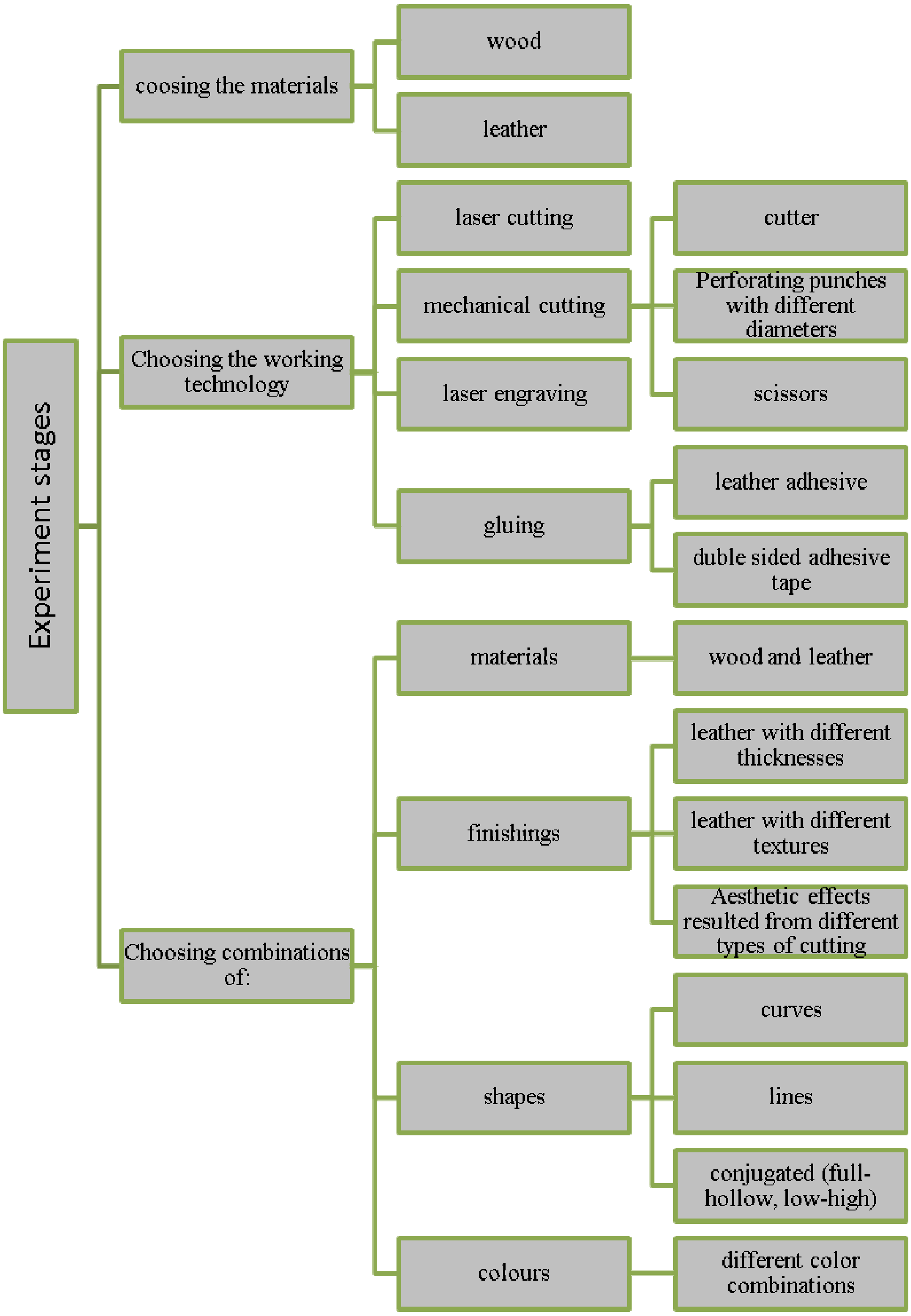


Fig. 1: *Scheme of the experiment stages*

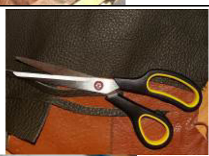
2. GENERAL INFORMATION

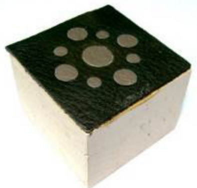
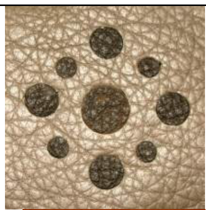
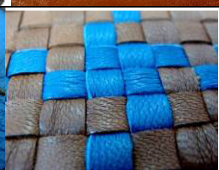
2.1 Establishing the work plan of the experiment

Respecting the specific stages of performing an experiment, an experimental plan was created, whose steps are shown in **Fig.1**. For the experiment the designer choosed two organic materials: leather and wood. These ecological materials come from waste resulted from technologycal processing. These technological residues come from furniture, sofas, clothing and footwear manufacturers. According to ecodesign principles [4], and in compliance with professional ethics [5], emphasizing the need for both aesthetic design concepts, functional, economical, and environmentally and user friendly, certain processing were applied to create different aesthetic effects. The experiment offers the opportunity to understand and develop rules regarding the approch of a design project [6], creating opportunities for the disadvantaged and for creative industries area [7].

The aesthetic effects proposed and obtained by the designer, are the result of the combination between macrogeometry and microgeometry of material's form, finishings (leather was used on both its sides, giving different aesthetic and tactile properties on each side exposed), processing types, different colors of the analyzed materials and the scale size of the object.

Table 1: *The result of the experiment*

Nr. crt.	**Experiment steps**	**The result of the experiment**	**Comments**	
			Advantajes	*Disadvantages*
1	***Materials coosing***			
	Wood and leather technological waste	 	Using waste falls into ecodesign principles, and it represents a challenge and a material base for the designers and creative industries.	Design concepts based on reusing materials that result from technological processes, allows the designer to make unique or small series ecoproducts (due to variations in structures, shapes, colors and sizes).
2	***Choosing the working technology***			
	Laser cutting and engraving		Precision cut, design compliance, the possibility of obtaining complex shapes.	Superficial burning of edges to certain categories of leather. Workpiece edge deformation by contracting.
	Mechanical cutting: -Cutter -Scissors - Perforating punches with different diameters	  	Mechanical cutting can be done manually (as is the case of this experiment) or by using industrial machinery. Obtained contour is clean, accurate, and the material can undergo insignificant deformations.	Shape and dimensional accuracy depends on the nature of the material (elasticity, thickness, texture), and on the precision of the cutting technique used.
	Gluing	 	A large variety of combinations of materials, textures, finishes, geometries (macro and micro geometry), and different colors can be obtained. Flexibility and elasticity allows a correct solder assembly of the two materials, which accurately tracks the curved or straight profile of the piece. The advantage of using double-sided adhesive tape consists	Defects can occur due to: excess use of adhesive, non-compliance of working technology, the mismatch betweend the contours of the parts (dimensional and form deviation of the parts to be joined), the life of the part depending on the quality of the glue or of the double-sided adhesive tape used.

			in obtaining a more precise assembly.	
3	***Choosing combinations of***			
	Materials: Wood (different species and types of plywood) with leather	 	The combination betweend the two materials offer a wide range of aesthetic possibilities as a result of geometry, finishings, colours and size scale of the pieces used.	Being reusable, the materials present a large range of different dimensions so that the products obtained are more difficult to address in terms of large series technologyes for industrial products.
	Finishings -Leather with different thicknesses -Leather with different textures -Both sides of the leather are aestheticaly valued - Aesthetic effects resulted from different types of cutting	   	Due to the large range of wood and leather textures, several combinations can be obtained with aesthetic effects (variants of: textures, different cutting technologies, contrast between the quality of the surface of the leather and wood fiber surfaces, including wood fiber orientation).	Cutting and assembly technology can create defects in the final product quality finishes. When asamblying the pieces of leather it will be taken into account the thickness of the leather assembly which is mounted on the wooden object, to avoid joining defects to occur, especially for right angle joints.
	Shapes: -Curves -Lines -Conjugated (full-hollow, low-high, Braided,simple, double or another version, fluffy-smooth, glossy-matte)	     	The high versatility of the two materials is an advantage for obtaining a large variety of shapes (flat, curved, combinations of depths).	Aesthetic and dimensional accuracy of the finished product depends on the accuracy of the shape and dimension of the component parts.
	Colours: different color combinations	   	Both leather and wood allow a wide variety of color combinations that can be obtained using ecological materials and coloring technologies. One can appreciate different aesthetic effects obtained by appling leather pieces	Choosing colors should take into account the dimensional tolerance and shape of parts, preventing aesthetic failures due to joining imperfections, by choosing similar colors for the support surfaces (background color).

			with the same colour, but used on different sides on the same surface.	

2.2. Experimental data

For the experiment, samples of different materials were colected: wood and leather. These samples were processed by being cut with laser or mechanical tools such as: different diameters perforating punches, scissors and cutter. Cutting was carried out by selecting different types of lines: straight, curved and combinations between them. Collecting wood specimens aimed to achieve benchmarks with different radius of curvature and surface finishes (different roughness and orientations of the fibers). Leather specimens used were collected by cutting the samples with different thicknesses of material, colors and finishes. Combinations of materials (wood, leather), with different finishes (thickness, glossy-matte, printing, engraving, and color) and shapes (curved, straight) were made. Combinations obtained allow the designer to associate the experiment with different objects with different sizes (objects can be furniture, accessories, industrial products, decorative objects). The game of shapes and finishes allows designers to create objects that can be easily identified by people with visual disabilities. **Table 1** presents the results of the experiment. It should be noted that the result of the experiment allows the designer to understand the phenomens that occur during processing, so it can avoid defects that may occur and prevent or solve them by applying the aesthetic factor. It can be mentioned that by laser processing, the edges of the shape can be defective because of the burning. This phenomenon attracts other deformation (by heat) by contracting the generated contour of the shape. This defect generates a imprecise and unaesthetic combination/assembly, so a possible scrap. Engraving the leather surface generates the same defect, a superficial and unaesthetic deformation of the workpiece surface. Cutting and processing using mechanical technologies (cutter, scissors, perforating punches) is more accurate, resulting in a burr-free and more aesthetic contour. Although the material can get deformed by bending, it will come back into shape and the surface flatness can be restored. The combinations of shapes, finishes and colors are different, as well as the fields in which these aesthetic applications can be used. Tests were performed by using both the nature of these materials and the possibilities of joint: mosaic, braids, conjugated forms. The tactile behavior of different surfaces (two possibilities for leather) generated both by the material properties and how varied they can be treated can lead to obtaining products easily accessible to disadvantaged people: the material is warm to the touch, the surface may present diferent microstructures that can be "readable touch" obtained by printing, engraving, cutting inside or outside with circular or rectilinear surfaces or in combination, the two materials can be colorured by using difrent ecologial treatments and organic colours. Flexibility of the leather type material has the advantage that it can be assembled with a wooden piece by following its geometric shape (easily taking its shape) and can easily be fixed with adhesive and double sided adhesive tape. Classical mechanical assemblies are not excluded.

3. CONCLUSIONS

The experiment demonstrates the versatility of materials that can be recovered from the the industrial product processing. Whatever the nature of the materials analyzed and geometric forms (wood, leather), thickness of the faces and finishes used, the waste can provide the desiger with a wide range of constructive possibilities, aesthetics and functional.

The following conclusions results from the experiment conducted and summarized in **Table 1**:

1. The waste resulted from the manufacturing process of industrial products, in this study, wood and leather, can be a starting point, as a raw material in creating new products and as a starting point for creative industries.

2. The aesthetic capacity and the posibility of tactile recognicion specific for the analised materials, allows their use in products made for people with visual disabilities. The materials are warm and have varied textures, resulting in multiple combinations that can be applied in product design.

3. The materials used allow the development of products with a variety of shapes, textures and colors that can be obtained through both industrial and manual manufacturing technologyes.

4. From the analysis of the experiment conducted it can be concluded that based on the principles of eco design, eco-friendly concepts can be developed.

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RESEARCH REGARDING THE PARTS CUTTING QUALITY FROM FOOTWEAR UPPERS COMPOSITION AND THE QUANTITY OF WASTES OBTAINED

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Abstract: *This paper highlights the importance of cutting of flexible parts that are part of the upper assembly of a footwear product, so that we should take into account both the quality of cut parts and the amount of waste produced during cutting.With regard to the quality of the parts being cut, it is useful to consider the directions of the minimum stretch of the hide, as well as the defective areas of the hide that should be avoided. An important role is played by the quality and condition of the blades, cutting hubs, adjusting the machine and last but not least the worker's qualification. The amount of waste resulting from cutting should be as small as possible, because only in this way we can insure a good usage index of the hide, as well as a reduced consumption norm.To highlight these aspects we considered two models of footwear for women. We have to calculate the amount of waste resulting from cutting. We will make practical and theoretical arrangements so as to obtain an arrangement factor as high as possible, which can exceed 70%. Can be concluded that the quality of the cut parts is particularly good as it is obtained with a smaller amount of waste. To ensure an optimal cutting it is recommended to have highly skilled workers so that they conform to the rule of cutting, according to which the parts are arranged so that the maximum stress direction coincides with the minimum stretch of material.*

Key words: *qualit, cutting, leather, defect , model.*

1. INTRODUCTION

Rational use of materials during cutting the flexible parts [1] from the surface of the leather plays an important role in terms of obtaining a reduced consumption of material during cutting, but we must also consider the quality of the parts, semi-products which is reflected in the quality of the finished product [2].

In order to ensure the quality of the parts during cutting, it is intended to verify the knives used for cutting, pressing surfaces, adjusting the equipment, preparing the hide parts according to area, thickness, colour, defects [3].

During cutting we should take into account the basic rule of cutting, namely that: the direction of maximum stress of the part must match the direction of minimum stretch of the hide. In support of this claim we must keep in mind that parts are subjected to various stresses, both during manufacture and also during wear [4], [5].

For an efficient cutting, we will place in the area of the bend vamps and braids, given that the directions of minimum stretch of the leather are parallel and perpendicular to the spine, and the band has a denser structure and uniform properties.The top bands will be cut out of leather, being arranged along them [6].

2. EXPERIMENTAL PART

To highlight how the cutting of parts influence the quality of the finished product obtained we shall be make arrangements, both practical and theoretical using AutoCAD 2007, for each part in the composition of footwear models taken from various footwear factories, aiming both to avoid existing defects on the hide surface and also to obtain an arrangement factor leading to a good hide usage index [7].

The models studied, namely, footwear for women, are illustrated in the figure below:

Fig.1: *Model produced 1*

Fig.2: *Model produced 2*

Arrangement factor of each part from the composition of the model was calculated according to the formula [8]:

$$F_a = \frac{nA_r}{A_p} \cdot 100 \qquad (1)$$

where: A_r-area of the part's surface;
n-number of parts included in the parallelogram;
A_p-area of the parallelogram's surface.

Average arrangement factor was calculated with the formula:

$$F_a = \frac{A_{set}}{A_{parale\log ram}} \cdot 100 \text{, in \%} \qquad (2)$$

where: A_{set}- sum of the set's areas
$A_{paralelogram}$- sum of the parallelograms areas which include the set's parts.

Area of normal wastes, through marginal and printing decks, namely the area of the total wastes are presented in table 1. area of marginal and printing wastes was calculated for the hide surface area of 250 dm^2.

Table 1: *Variation in area wastes for the two models*

No. model	n_s	A_s [dm^2]	P_s [dm]	F_A [%]	Area of normal and decks wastes		Area of marginal and printing wastes
					[%]	[%]	[%]
V_1	18	8,04	80,18	67,84	32,16	9,97	7,99
V_2	12	8,58	49,64	79,22	20,78	5,76	9

In Table 2 are presented **the consumption norms for 2nd quality hides and usage yields** resulting from use theoretical arrangements.

Table 2: *Variation of consumption norm and usage index*

Model variant	n_s	A_s [dm^2]	Area of total wastes a_{dt}[%]	U [%]	N_c [dm^2/per.]
V_1	18	8,04	50,12	49,88	16,11
V_2	12	8,58	35,54	64,45	13,31

To estimate the consumption norm we used the formula:

$$N_C = \frac{A_s}{U} \cdot 100 \text{, in dm}^2\text{/per} \quad (3)$$

where: A_s- area of parts from the pair, in dm^2;
U- hide usage percentage, in %.

3. RESULTS AND DISSCUTIONS

Exemplifying the results obtained by calculation will be performed with the help of graphs using Excel software package.

In Figure 3, for each variant of the pattern whose number of parts from the set varies, we present the variation of the arrangement factor and the size of the set area:

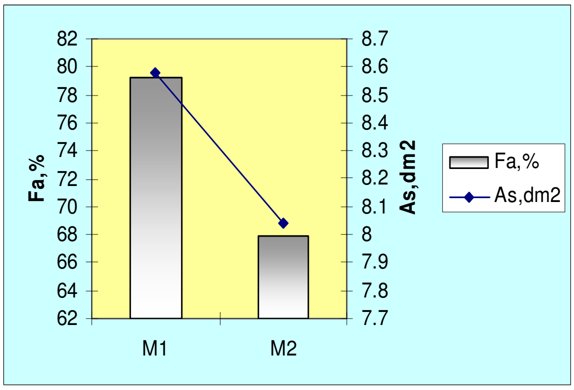

Fig.3: *Variation of the arrangement factor*

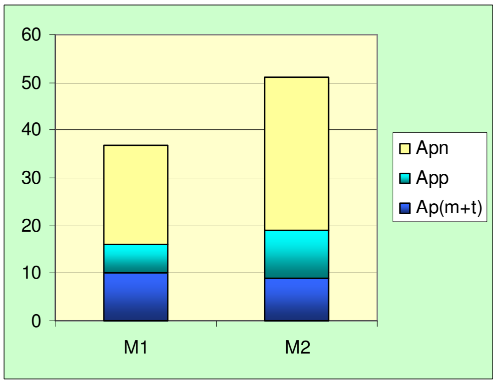

Fig.4: *Variation of total technological wastes*

For M1 model variant (ns = 9) has resulted the highest value of the average arrangement factor and model M2 (ns = 6) it has resulted the lowest value.

Figure 4 shows the variation of total technological wastes, in %, as the sum of normal wastes, through marginal and printing decks.

For the second model, the value of total wastes is 51.11%. This is explained by the higher value of normal and decks wastes, as compared with the case of the one other model. In the case of model 1 the total wastes value is: 36.77% the lowest value.

Figure 5 shows the variation of consumption norm as compared with the size of the total technological wastes.

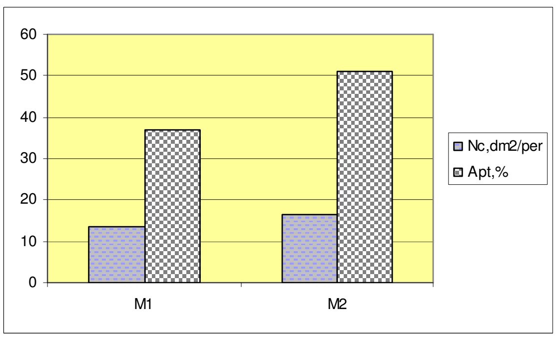

Fig. 5: *Variation of theroretical consumption norm*

Figure 6 shows the variation in utilization percentage of hide. Among the models analysed the highest value of the usage percentage of hide is registered with model 1, namely 63.23%, due to a superior average factor of arrangement.

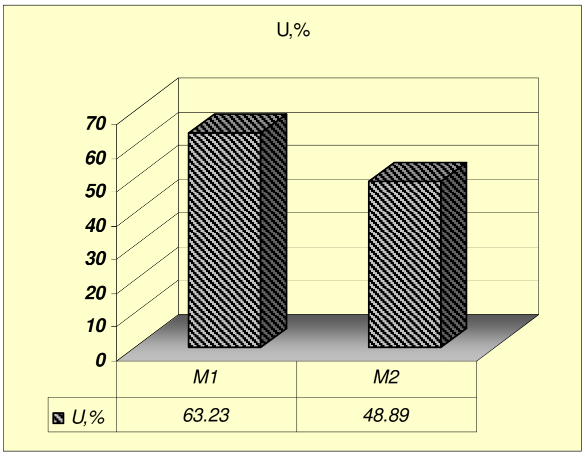

Fig. 6:*.Variation of hide usage index*

4. CONCLUSIONS

In the case of the the two models analysed we notice the significant influence of component parts configuration and the method adopted for arrangement on the utilization percentage of hide, respectively on the quantity of waste produced, that is why it is recommended:

- combined arrangement of patterns of the same model or different models (ie different sizes) in order to minimize normal wastes

-the use of the hide with larger surface for cutting in order to reduce marginal and printing wastes

-estimating specific consumption beginning with the creation of models, in order to intervene on the parts configuration so that normal wastes are reduced

- the quality of the material which is reflected by the quality index of the hide, it is an important factor in the rational use of the hide during cutting the flexible parts

-the parts obtained subsequently must resist the tensile forces during the manufacturing process of the product and the time during wear.

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WAYS OF REPORTING CORPORATE SOCIAL RESPONSABILITY CASE STUDY: THE STATE OF REPORTING OF COMPANIES OPERATING IN THE FIELD OF TEXTILES AND APPAREL

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Abstract: *In this paper we have analysed the current state of reporting CSR activity of companies activating in the textiles and apparel industry. Noticing that the number of companies that invest in CSR programs is increasing on a world-wide level and in the last years even in Romania, we wanted to analyse the situation of the companies from a field of activity less involved in CSR programs. The importance of CSR programs has increased more and more in recent times, from a reputation point of view but mostly of reasons of a stronger involvement of companies in the communities where they are present, but also in educating their own employees which become more motivated if they can participate in various actions undertaken through CSR programs. The implementation of such programs adds value to the businesses developed by the company, taking into account that more segments of consumers have expressed their availability to buy products made by companies that promote such programs. The visibility of CSR projects is made by presenting the programs that the company promotes in sustainability reports, by using means and indicators defined under the Global Reporting Initiative. Following the study we have made, we found out that although world-wide the number of companies that have CSR programs and make sustainability reports is increasing, the number of companies in the textiles and apparel industry that make such reports is very small.*

Key words: *corporate social responsibility, company, reporting, GRI.*

1. INTRODUCTION

The impact that companies have in our society and in the environment has risen with the increase of globalization. Corporate social responsibility is an essential condition for the development of a company through innovation and offering opportunities for differencing in a competitive environment. We believe that CSR needs to be put in the center of the company's strategy, because it is based on the set of moral values and principles that reflect its objectives.

In countries with a developed economy, the companies understood that in order to build a CSR policy aligned to the needs of the society, a dialogue with all its stakeholders must be promoted and that links need to be set between the social and economic performance, because stakeholders become more and more interested in the moral conduct of the company, the decisions of the investors are influenced by the ethical behavior, a collaboration between companies that guarantee to respect the principles of CSR up to the end of the contractual chain is encouraged, employees become more preoccupied on improving work conditions and have a greater productivity at their jobs.

Positive results of applying CSR programs highlight advantages for the company and for the community (improving the security and quality of products, developing social programs for the community in which the company operates); advantages for the environment, being well known that companies that have a CSR program have a chapter destined to finding innovating solutions for a greener world.

2. CONCEPTUALIZATING CSR

A company is, by definition, is a legal entity, a legal person, not a natural person. In these conditions, a question arises: How can a company be responsible, given the fact that responsibility is a human attribute, only found in natural persons?

Friedman's point of view (1970) presented in his paper, *"The Social Responsibility of Business Is to Increase Its Profits"* [1] has stirred a number of controversies along the years, and for a time, splitting the opinions into two different currents: those who said that the only responsibility of the company is its financial responsibility towards the stakeholders and those who supported the social responsibility of the company towards the stakeholders. Friedman's argument has been criticized for not taking into account the active role of the company in the society. In recent years, these two points of view are no longer supported; most of the authors now consider that businesses also have a moral component, a social responsibility.

The European Commission has defined Corporate Social Responsibility as "a concept through which companies integrate, voluntarily, social and ecological aspects in their business operations and in the interactions with their stakeholders", [2] while at the same time considering CSR as "the responsibility of companies for their impact in society", [2] highlighting the economic, social and ecologic roles that these companies have in the present context, marked by the economic and financial crisis and the globalization of business.

Corporate social responsibility refers to the actions of the company that go beyond their legal obligations towards the society and environment. They are voluntary obligations taken by the companies in order to create a more favorable environment for the society in which they operate.

The Organization for Cooperation and Economic Development (OECD) defines CSR as "the multitude of actions taken by companies to consolidate their relations with the societies in which they operate". [3]

By studying specialized literature, we can observe that there are three approaches to CSR, each new approach covering and integrating the one before.

a. **The approach to corporate responsibility as an obligation only towards the stakeholders**

This approach has been described for the first time by Milton Friedman: "the only social responsibility of business is to contribute to the increase of shareholder's profits without using fraud or deception." According to this approach, considered as being a classic, maximization of profits for stakeholders represents the central preoccupation of any company. [1]

b. **The approach to corporate responsibility as an obligation to all stakeholders**

According to this approach, companies are responsible not only to their owners, but they also need to take into account the interests of their stakeholders, because, in turn, they can influence the activity of the company. [4]

c. **The approach to corporate responsibility as an obligation towards society in its entire form.**

This approach starts from the premise that companies work through public consent in order to serve social needs. It is a more recent approach and comes as an answer to the new internal and external company challenges, companies that are fundamentally reconsidering their position on the market and act in accordance with the more and more complex social context to which they belong. [5]

3. THE PRINCIPLES AND GUIDING LINES OF INTERNATIONAL REGULATIONS

For companies that want a formal approach to CSR, a series of guides have been created, in which guiding lines and principles are laid down. These acts are: Guiding lines for multinational companies belonging to the OECD, the 10 Principles created by the Global Compact of the United Nations, ISO 26000 standard, a standard referring to social responsibility, the Tripartite Declaration of the principles referring to multinational companies and social policy under ILO and the Principles relating to business and human rights, created by the United Nations.

United Nations Global Compact

U.N.G.C. is a platform for developing, presenting and implementing corporatist practices and policies. U.N.G.C wants to align the principles and strategies of companies to the ten principles of the human rights, work, environment and anti-corruption. [6]

With almost 8.000 companies participating in over 140 countries, the Global Compact is the largest volunteer initiative in the field of sustainability. The Global Compact is not a regulation instrument, but a volunteer initiative that is based on public responsibility, communication and transparence, which wants to offer a space for innovation and collective actions.

The U.N.G.C. proposes to companies to adopt and support the 10 principles, as well as to act according to their regulations, to transmit to the environment they belong this set of values with a reference to human rights, work rights, protection of the environment and the fight against corruption. This last principle forces companies to adopt concrete policies and programs for an efficient fight against corruption.

In order to join the U.N.G.C., the management of the company needs to take a commitment approved at the highest level, according to which the company obliges to respect the conditions and furthermore to integrate these principles in their business strategy and in its organizational culture. The principles of the U.N.G.C. must be incorporated in the decision making process. The company has to report on an annual basis the ways in which they implement these principles in supporting the development of the U.N.G.C. objectives.

U.N.G.C. develops a culture of dialogue which is a main characteristic for improving performances, promoting dialogue between companies and interested parties by organizing conferences and symposiums where sensible problems of a global, regional or local interest are brought into discussion.

ISO Standard 26000

The ISO 26000 standard for social responsibility has been elaborated after a decade of studies and negotiations, during an innovating and original international elaboration process. This has opened the way to a new category of standards, based on the participative and consensual approach, aiming to elaborate recommendations under the guise of “guiding lines” and not conformity demands for a specific managerial system, like the “certifications” proposed by other standards (ISO 9000, ISO 14001).

ISO 26000 identifies seven central subjects that the organizations (governmental institutions, companies, syndicates, consumer associations, NGO’s, etc.) need to use in an integrated fashion. For each of these, the standard offers information in regards to the purpose, relation with social responsibility, principles, reasons and correlated actions.

The standard states as fundamental practices: acknowledging social responsibility and involving the stakeholders (starting a dialogue with them, checking results, use of certifications, creating consultancy committees, publishing detailed reports regarding social performances of the company, creating mechanisms for solving stakeholder conflicts, etc.) [7]

Global Reporting Initiative (GRI)

The GRI wants to popularize and standardize at a global level the tripartite reporting of companies. In order to reach this objective, GRI comes up with reporting rules and common indicators. Together, these recommended directions form the Sustainability Reporting Framework. At present, over 1000 organizations in 60 countries use the GRI Sustainability Reporting Framework to build their sustainability reports. [8]

In May 2013, the Global Reporting Initiative has launched the fourth generation of sustainability reports. As a first objective of this guide, they want to offer a new model that sustains a standardized, transparent and consistent reporting. A second objective is aimed at guiding the organization in coming up with more credible and relevant reports, concentrating on themes that are specific for their activity and which will lead to practical standards. [9]

In order to facilitate reporting, the new guides are structured in two parts: Part I *Reporting principles and Standard Disclosures* and the second part is dedicated to the implementation manual for elaborating sustainability reports. The GRI standard is made up of a series of quality principles and criteria, which need to be respected in the CSR reports and in a series of communications that need to be followed for a relevant reporting.

4. CASE STUDY. THE STATE OF REPORTING OF COMPANIES OPERATING IN THE FIELD OF TEXTILES AND APPAREL

Companies have been using the GRI standards for reporting since 2009 in Romania and 1999 in the USA.

According to data from the GRI, we can see that year after year, more and more companies report their activity according to the set principles and methodology. At present, on the GRI site, there are 24.138 CSR reports, belonging to companies from all over the world.

By analyzing the situation of companies from Romania, we have found out that between 2009-2014, seventeen Romanian companies have published their CSR reports, a total of 40 reports – according to the GRI database – the first of which have been filed in 2009 [10]

If analyze the reports based on the field of activity of the companies that offer such documents, we will see that the situation is as follows: out of the 24.138 reports, only 269 belong to companies activating in the field of textiles and apparel, which represents only 1.11%.

The distribution on continents of the companies that have created such reports is the following:

Europa - 101 reports, representing 38%;
Africa - 20 reports, representing 7%;
Asia - 99 reports, representing 37%;
South America - 19 reports, representing 7%;
North America - 30 reports, representing 30%.

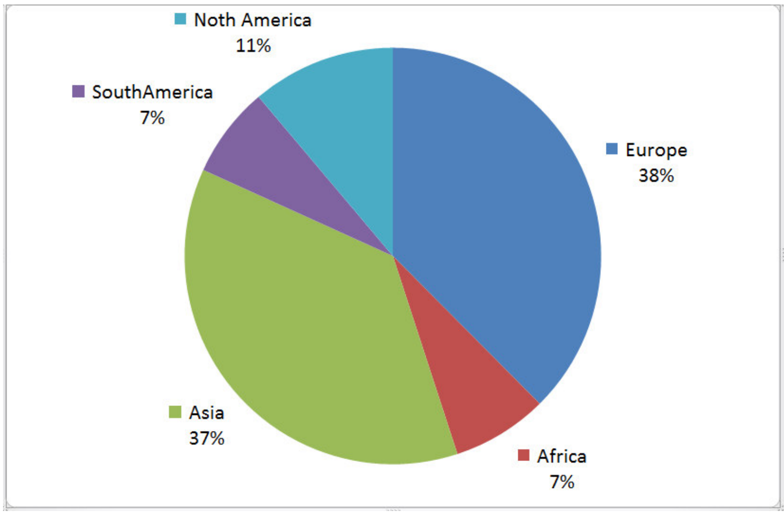

***Fig. 1:** Situation based on continent of the number of CSR reports*
***Source:** made by the author according to the GRI database*

By analyzing the repartition on continents of the number of reports, we can see that in Europe, the reports have become a major factor of interest. Thus, from Europe, a number of 101 reports have been filed, which represent 38% of the total reports made from 1999 until today in the field of textiles and apparel, but at the same time realizing that Asia comes strong from behind, due to the fact that in the last decades, the textiles industry made a great leap.

If we analyze the evolution of the number of reports filed since 1999 and until today, the situation is this:

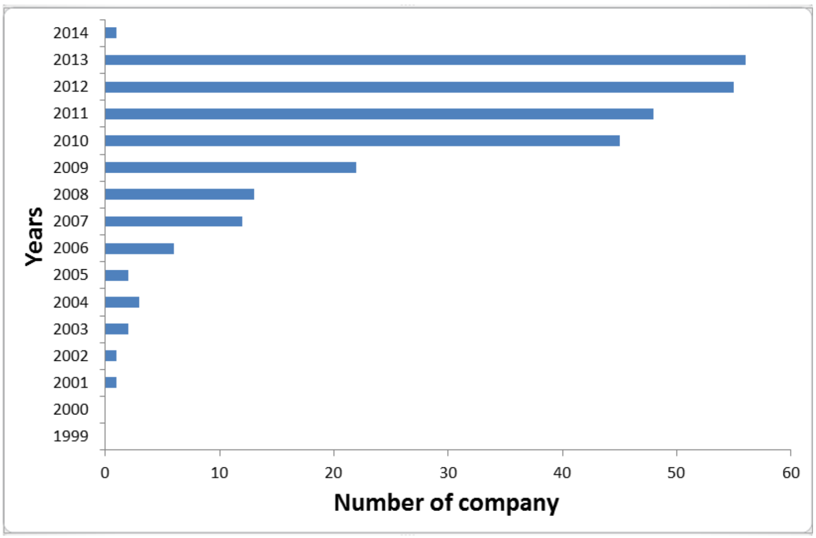

Fig. 2: *The evolution in the number of CSR reports*
Source*: made by the author according to the GRI database*

If in 1999-2000 no company from the textiles industry has filed a report regarding its CSR activity, starting with 2001, a company filed the first report regarding this activity. This company (Puma) filed a report yearly and continued its investments in this direction. [10]

We observed that beginning with 2007 the number of companies that report their activity in the field of sustainability has started to increase, a trend that is not showing signs of stopping. Although the economic crisis has affected many companies, which led to the diminishing of investments, we can see that in the CSR field, companies have continued to direct funds, being aware that only by investing in the community will they be able to obtain favorable results in the long run.

The small number of reports filed in 2014 is justified by the fact that in this period, companies file their reports for the precedent year, so, until the present date (march 2015) only a single company has filed its report.

5. CONCLUSIONS

The concept of CSR, which manifests itself more and more in companies, has radically changed the way in which they act. These companies stop being preoccupied exclusively on gaining immediate profit, being obliged that in order to develop, to give the same level of importance to social aspects as well as the protection of the environment. In this context, corporate social responsibility is not a subject that is promoted only for the reputation and visibility of the companies, but the implementing of these concepts has become a capital point for developing on a durable basis for companies and a major and essential objective in the globalization context of economic and social development processes.

Although on a world level the number of companies that report their CSR activity is growing, we see that the companies from the textiles and apparel industries have a very small representation, occupying only a percent (1.11%) of the total companies that have activities in this field. We note a slight increase of the interest in this field, the number of companies being doubled in recent years, but still it is insufficient for the ascending trend which the CSR concept has registered in the last decades in success companies.

In Romania, no company has filed a sustainability report. We consider that this has to change, especially since starting with 2016, according to the European Directive 2014/95/UE [11] all companies with more than 500 employees will be forced to report a series of nonfinancial indicators, and this will oblige Romanian companies to create sustainability report.

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APPROACH METHOD OF CURRENT COMPETITIVE MARKET - AGILE INDUSTRIAL CORPORATION

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Abstract: *The term "agility" - agile enterprise - was introduced by a group of American researchers led by R.Dove as a result of some studies in a program sponsored by the US government, a program that primarily aimed at exploring the possibilities of making up production systems which could compete with the efficient production system "lean", introduced in most Japanese companies. Researchers involved in this program have formed Agility Forum, which aims to develop the concepts introduced. In 2001 appears the first paper, by R. Dove, entitled "Response Ability - Understanding the Agile Enterprise", John Wiley and Sons Editors, in which was synthesized the phase of research field.*
Agility can be defined as "the ability with which an organization manages to develop successfully in a business environment whose changes are unpredictable." Being agile means to control change, to notice market opportunities and by being continuously innovating, to succed on the market. The purpose of this paper is to support the idea that agility is a feature derived from the design and also to show that by applying the principles of RRS, which characterize agile systems, it is confirmed the fact that any industrial production system which wishes to be agile it should be designed.

Key words: *agile enterprise, production system, market, ability.*

1. INTRODUCTION

The level of agility of a company, or of the component parts of its structure is a function whose variables are represented by the opportunistic management - offering reliability, on one hand and innovation management - leadership, on the other hand. [1], [2].

Which of the variables is decisive is a relative question regarding the dynamic competitive environment in which the organization operates. The fact that we can speak of a degree of agility leads us to the need to quantify conceptually, so that later we can have the possibility to compare similar items according to their degree of agility. [3], [4], [5].

2. INDUSTRIAL CORPORATION AGILITY AND ITS DESIGN

Being "agile" requires an amplification of a company's leadership or its "reliability". Figure 1 shows a quadrant of agility, whose coordinates are given by "reliability" (reactive) and leadership (proactive): [6], [7], [8].

- Leadership is crucial when leaders are systematically choosing the optimal solutions and any misstep leads to the advantage of competitors, positioning leaders in reactive situations. Any opportunistic competitor, with good reliability, will do nothing else but to wait for the other's mistake, actually ceasing to innovate, to be proactive.
- Choosing an area of the quadrant agility actually represents for any enterprise, a fundamental strategic option to differentiate it from its competitors. [9]. At this point it is necessary to find answers to the following questions:

a. How innovative, opportunistic corporate management must be, regarding the needs of the competitive environment in which it operates?

b. At what speed are the market rules of corporate products changing?
c. Is the corporation able to respond quickly enough to market evolution?
d. What are the principles and methods that allow the design of an agile enterprise?
The last question is perhaps the most important of all, and the management of a modern enterprise is forced to respond. [10].

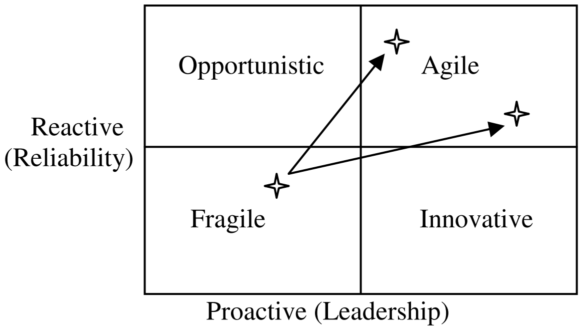

Fig. 1: *Agility quadrant*

The interpretation of coordinates and business elements is as follows:

Reliability: It permanently looks for answers from consumers' needs and responding quickly to the emergence of market opportunities, opportunistic, reactive, robust attitude;

Leadership: It introduces a new way of seeing business, it discovers new meanings in the existing status, it changes rules, it captures a new perception, and it has an atypical thinking;

Business elements: The position of the market enterprise, technological level of production, supply strategy, operating modes, human resources strategy, new product development, innovation level.

For a better understanding of the approach, the definition of specific terms is necessary:

- System – a group of modules that interact within a common structure that serves a unique purpose.
- Framework structure – a set of standard procedures governing interactions between the modules of a system compatible.
- Module – a subunit of a system that has intrinsic: identity, purpose and capability in its interaction with other modules of the system considered.

3. PRINCIPLES OF RRS (REUSABLE, RECONFIGURABLE, SCALABLE) SYSTEMS AND THEIR USE IN AGILITY DESIGN

The principles underlying the RRS system resulted both from observations on the characteristics of such systems and the observation of the characteristics of systems built by people. RRS systems principles are listed in the following table:

Table 1: *The principles of RRS systems*

Modules existence	The system is composed of distinct, separable modules, which are not integrated into the assembly
Compatibility when connected	The systems' modules contain standard interface, which facilitate their connection or disconnection, within the actions taking place in the system
Facilities for reusability	Management of modules assembly includes tools that allow its reconfiguration and maintenance
Non-hierarchical interactions	There are interactions between system's modules, direct communication and negotiation on non-hierarchical basis
Dissemination of capacity for decision	The decision is distributed to the modules, but it can be rapidly recentralised if the neccessity arises
The distribution of control tasks	Control for fulfilling the objectives of

and information	the module is performed at the modul level, information is circulating locally, but is globally accessible
Establishing their own relations	The existence of some relations and common action programs established between modules, with its own dynamic
Flexible capacity	Changes in capacity at the module level, without restriction set globally, including feature referring to the number of staff
Modules redundancy	The ability to decide fluctuations of capacity and decide tolerances of errors and also their correction mode
Evolutive structure	The existence of open structures, able to adopt and create new module, identical or different from the existing ones

Application of RRS principles in designing the agility of production systems leads to safety regarding the approach to current competitive market. [11].

Table 2: *Using the RRS principles when designing the agility*

RRS designing principles	Production equipment (cluster type machines)	Production processes (flexible manufacturing cell)	Production enterprises
Modules existence	Transfer encapsulated modules, storage modules, utility modules, transfer boxes	Flexible equipment, modulated workstations, pallet telehandlers, servers on rails	Design, engineering, manufacturing, assembly, distribution of resources, made modularly
Compatibility on connection	Human, mechanical, electrical and also standard and common control interfaces	System interfaces: mechanical, electrical, human systems	Procedures informational system, interfaces with the exterior
Facilities for re-use	Extension / modernization of equipment by adding new modules, their standard maintenance	Equipment without massive foundations, light, simple and fast to move in other production configurations	Flexible departments of supply / sale, which have many external sources, flexible in their turn
Non-hierarchical interactions	The modules in the process decide on actions to be taken in order to achieve their own targets, low control for module level	Equipment which act autonomously solving problems including the interface level	Management systems that allow free allocation of resources, both inside and outside the organization
Disseminating the capacity for decision making	The equipment can be quickly reconfigured at the process modules level, if the situation requires it; reconfiguration is done with maximum speed	Reprogramming production is done in real time and is instantly transmitted to cells or modules, if the necessity arises	Opportunities offered by the market are seized and distributed quickly at the modules level. The decision is taken at the level where lies the problem that needs to be decided
The distribution of control tasks and information	“Smart” process modules that keep their own records which build and evaluate their characteristic operating curves	Operational programs and their history are contained in the equipment; tasks requirements are addressed to the interface when necessary	Integrated information system at organization level, a system that uses autonomous online databases from the process when necessary
Establishing their	Real-time control system	The software at the level	Integrated command in

own relations	that makes modules being available anytime for reconfiguration and reprogramming if needed	of control cells allows dynamic changes of processes that are performed at the working cells level	production flows level, allowing their rapid modification
Flexible capacity	Equipment that can be easily interconnected in extended assemblies in order to perform similar tasks	Manufacturing cells that allow easy incorporation of similar modules	The existence of unrestricted resources available anytime for multiplying the number of productive modules
Modules redundancy	The identical utilities basis of equipment, which allows the processes duplication on the same base or different basis	Cells containing multiples of the same type of modules, which allow for capacity fluctuations	The system contains duplicate of capabilities, for example in resources allocated to the production
Evolutive structure	The basic structure of the equipment allows the assimilation of new types of modules and introduction of new technologies	The various utilities or transport equipment can be extended without restriction imposed by cells or modules from the composition	The enterprise information system consists of an open architecture based on server-client relationship.

4. CONCLUSIONS

1. When designing agile systems, which could be understood as either the whole enterprise or its critical components such as operating procedures on the market, strategies of supply-sale or production processes as a whole, means to include in the inner structure of the system the power to react anytime and to any type of change.

2. Any manager is interested in both the static, but especially in the dynamic aspects of the enterprise system; considering the static aspect being the architecture of the ensemble and the dynamic one, the perpetual effort daily to reconfigure the architecture in order to make it operational in the competitive environment offered by the market.

Sustaining an opportunistic/innovative profile, which equals being agile, means, first of all, to possess a type of architecture composed of easily reconfigurable, reusable and scalable systems.

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IDENTIFICATION REQUIREMENTS CUSTOMER SERVICE PROVIDED ON THE LEVEL OF LIGHT INDUSTRY COMPANIES

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Abstract: *Moldova is a small country whose territory is 350 km from north to south and 150 km from West to East. Analyzing data from the Statistical Yearbook 2012 shows that 437 enterprises were active dealing with textiles, footwear etc., from 2005 - only 310 companies. Motivation is the business of an assured market, the demand for products and services - volume and structure - which manifests itself on the domestic and foreign markets. Improving customer service is one of the main objectives of production enterprises. Service level directly affects the economic capacity of the enterprise by increasing its contribution in increasing company profits. Increasing the level of service in shops can be determined by reducing factors that negatively influence the desire to purchase, ie „ eyes scan "; lengthy speech to the seller on the phone; excessive attention to the buyer; arrogant and indifferent gaze of the seller. As a tool for gathering information served questionnaire that was distributed to 50 respondents, which ranks in the age group: 18-27 years with urban living environment. The questionnaire included questions that allow to analyze the efficiency of customer service and the factors influencing the decision to purchase in local shops in the field of Light Industry. The paper identified measures to increase the level of customer service, which would help to increase sales.*

Key words: *level of service, consumer,business, study, expectations, questionnaire.*

1. INTRODUCTION

The marketing concept, one of the most important stakeholders in an organization are clients, so the customer is the starting point of the overall strategy of the organization [1]. The level of customer service the company is the result of the whole system of logistics activities. Its direct impact on sales and profits necessary to establish service level objectives of the company's logistics strategy. In an intensely competitive business environment, the level of service is an important means of differentiation from competitors and increase customer loyalty [2]. Improving customer service is recognized as a necessity for many organizations and is included as an objective in their business plan, marketing plan or plan logistics. Study level of service expected by customers can be determined directly or indirectly. Satisfaction measurements made directly obtained by conducting surveys. It should be noted that the intended measure customer satisfaction surveys are not standardized. Measurements of customer satisfaction conducted indirectly relies on tracking and monitoring company records sales, profits and customer dissatisfaction. A combined approach using scores obtained by applying direct measurements plus a qualitative analysis of reaction respondents indicating that they are satisfied with the service purchased. Providing a level of service adopted to market requirements depend upon the extent to which the management company fails to provide all components of customer service [3].

2. LIGHT INDUSTRY IN MOLDOVA

According to the Statistical Yearbook whole industry in Moldova include [4]: mining and quarrying, manufacturing, electricity generation, gas and water.

The paper analyzes the manufacturing of Moldova, namely dealing with [4]:
- textiles;

- manufacture of wearing apparel; dressing and dyeing of fur;
- production of hides, leather and footwear;
- manufacture of luggage and leather goods;
- manufacture of footwear.

Evolution of Light Industry in Moldova in the period 2005-2012 is presented in table 1 [4].

Table 1: *Evolution of Light Industry in the period 2005-2012*

Name industry	Indicator	2005	2006	2007	2008	2009	2010	2011	2012
Textiles	Number of businesses	69	75	77	77	95	91	83	91
	Industrial production value manufacture, mil. lei	369,2	586,2	670,8	626,1	487,6	548,2	1104,8	1314,5
Manufacture of wearing apparel; dressing and dyeing of fur	Number of businesses	160	178	203	208	228	238	226	226
	Industrial production value manufacture, mil. lei	577,7	729,2	897,2	902,9	800,5	921,5	1081,8	1018,4
Production of hides, leather and footwear	Number of businesses	44	48	57	55	59	64	57	63
	Industrial production value manufacture, mil. lei	204,3	248,1	260,6	300,1	234,1	333,1	346,7	331,4
Manufacture of luggage and leather goods	Number of businesses	8	8	8	9	9	9	9	9
	Industrial production value manufacture, mil. lei	40,6	50,8	57,3	76,0	58,7	75,6	86,4	79,0
Manufacture of footwear	Number of businesses	29	33	41	40	43	51	43	48
	Industrial production value manufacture, mil. lei	134,4	168	173,6	188,7	168,8	257,4	259,5	252,2

Although Moldova is a small country whose territory is 350 km from North to South and 150 km from West to East. It appears that in 2012 have enabled 437 enterprises dealing with textiles, footwear etc., from 2005 - only 310 companies. Motivation is the business of an assured market, the demand for products and services - volume and structure - which manifests itself on the domestic and foreign markets.

3. THE PROCESS OF PURCHASING

Currently, the client is not forced to buy the first product that meets his needs, but can choose between prices, designs, trademarks and service level. Consumers of all categories, almost all market levels are much better informed and educated on what it stands for. Therefore, consumers can be divided as [5, 6]:
- messy - looking for the most advantageous purchase;
- occasionally - sometimes buy from a certain company;
- loyal - usually buy from a certain company;
- strongly - buy only from a certain company.

The appreciation of a product of shoes, clothing etc. includes a number of variables that encompasses the cognitive, emotional and spiritual. Add to this the fact that the decision to buy a particular product is influenced in turn by the ratio: price - quality.

Findings of a product varies from one consumer to another, being dependent [5]:

1. The ability of consumers to prefer to evaluate and select a product;
2. The degree of satisfaction of product functions according to its destination.

How to carry out this assessment process is highly complex, can be short or long and varies from one individual to another. Once the consumer has visual contact with the object you would like to purchase, starting a conscious process of association, the object in question is linked to the rest of the garderopa to existing products. Schematically, this process can be represented as in figure 1[5, 6, 7].

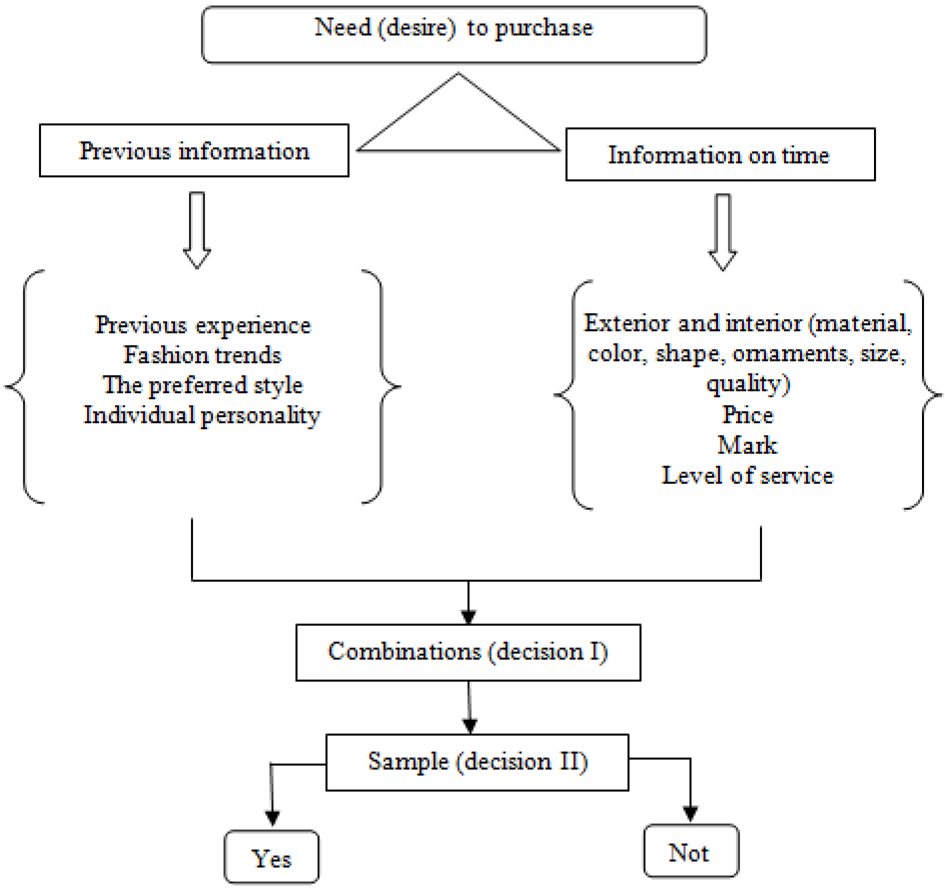
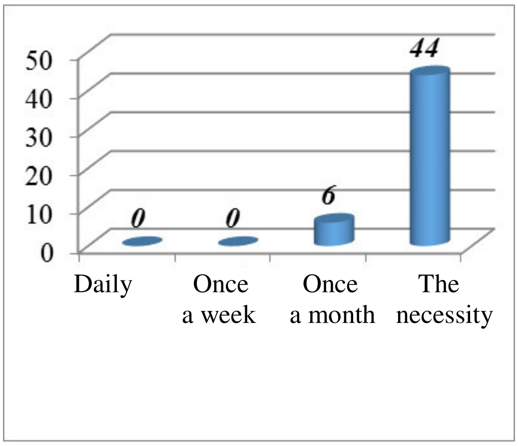


Fig. 1: *The purchase of products*

4. CASE STUDY

The study was conducted in Moldova during october-november 2014. As a tool for gathering information served questionnaire that was distributed to 50 respondents, which ranks in the age group: 18-27 years with urban living environment. The questionnaire included questions that allow to analyze the efficiency of customer service and the factors influencing the decision to purchase in local shops in the field of Light Industry.

After applying the method of study was collected data on the level of service provided by light industry enterprises. Then it will present an analysis of the results obtained from the survey respondents on the basis of 7 questions addressed in the questionnaire. For a better visualization of the results obtained from the questionnaire will be presented in graphical form (fig. 2-8).



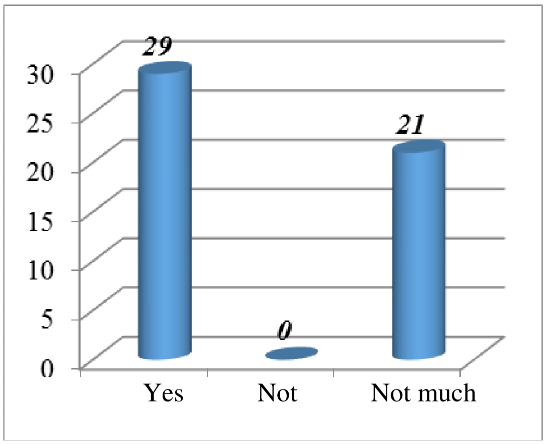


Fig. 2: *The frequency of purchasing clothing and footwear*

Fig. 3: *Customer satisfaction about the level of service in shops in the Light Industry*

From figure 2 shows that more often correspondences and leather garments attorney if needed (N = 44). Is because they have a low income, which is justified by the concerns, needs more a priority within the family. After supporting (N = 6) that attorney once a month, they regularly seek market, store promotions and discounts considerable.

According to the survey 58% (N = 29) of respondents are satisfied with the level of service in shops in light industry and 42% (N = 21) - small (fig. 3).

When her purchase decision, respondents take into account the quality of the product; its price; providing security to the product purchased; level of service provided; brand; ambience inside the store; promotion and packaging (fig. 4).

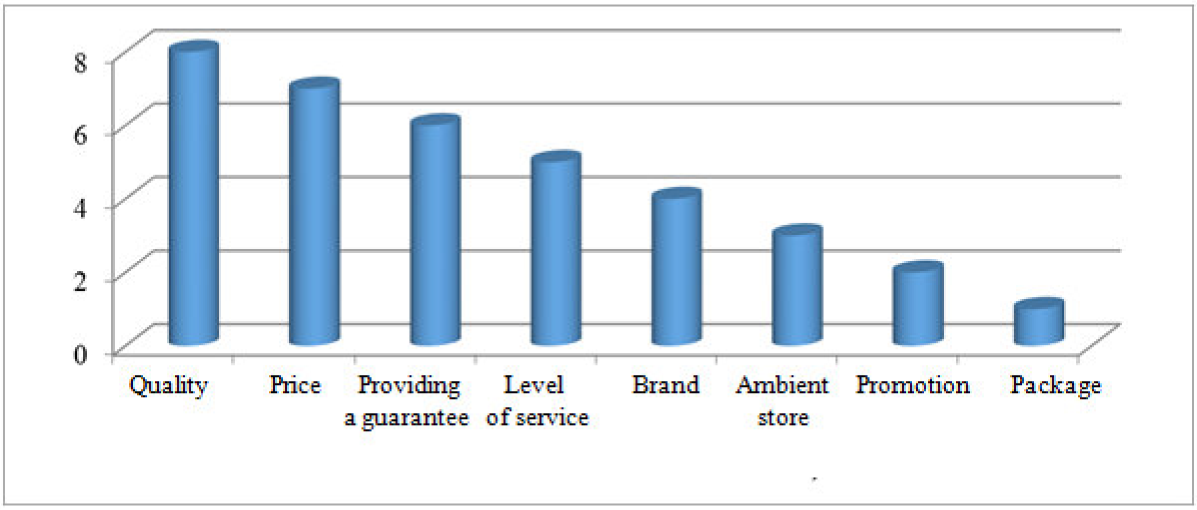


Fig. 4: *Factors influencing the decision to purchase listed in order of importance*

In the corporate store promotions sellers announces existing customers showed 86% (N = 43) of respondents (fig. 5).

II In deciding to purchase or not the product 90% (N = 45) of respondents are influenced by the level of service offered by companies in Moldova (fig. 6).

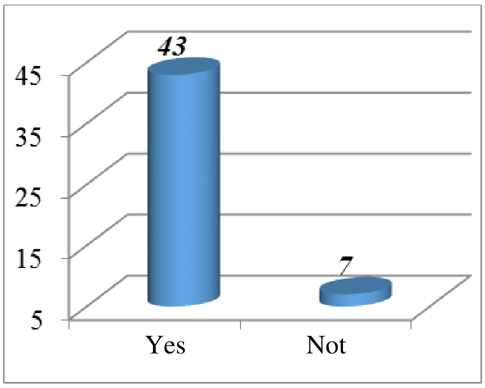


Fig. 5: *Communication by the seller existing promotions in store*

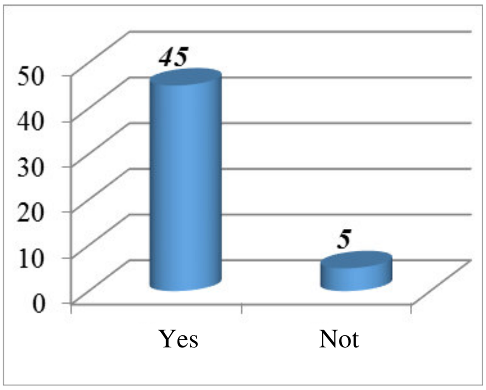


Fig. 6: *Influence of the decision to purchase service*

Gives correspondences to buy products because the seller has a look of indifference (N = 25); shows an exaggerated attention to the buyer (N = 23); talking on the phone for minutes on end (N = 22) or faced with a look of scanning (N = 22), making to feel be uncomfortable in the store (fig. 7).

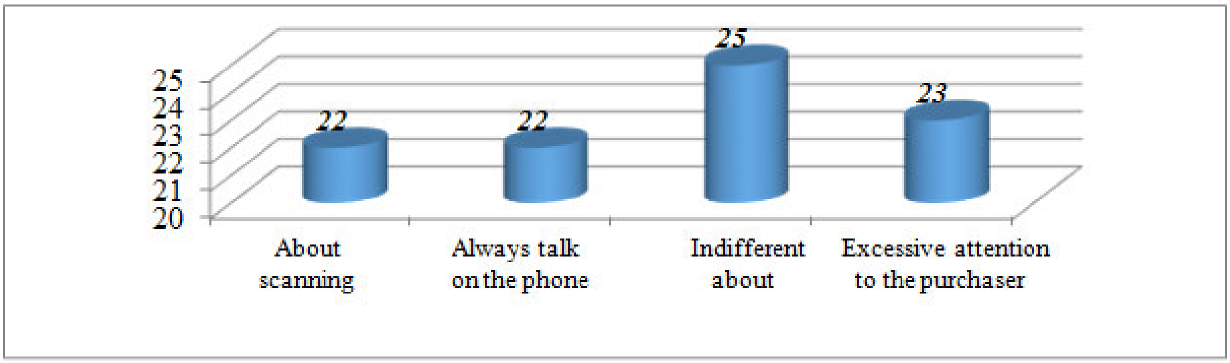


Fig. 7: *Actions contributing to the abandonment of the seller of the product purchase*

Because the procurement process to be loved correspondences recommended companies: increasing kindness sellers (N = 34); rapid intervention in case of questions from the buyer (N = 28); customer questions honestly (N = 26); welcome input (N = 21); honesty (N = 16); and not least the appearance of the seller (N = 12) (fig. 8).

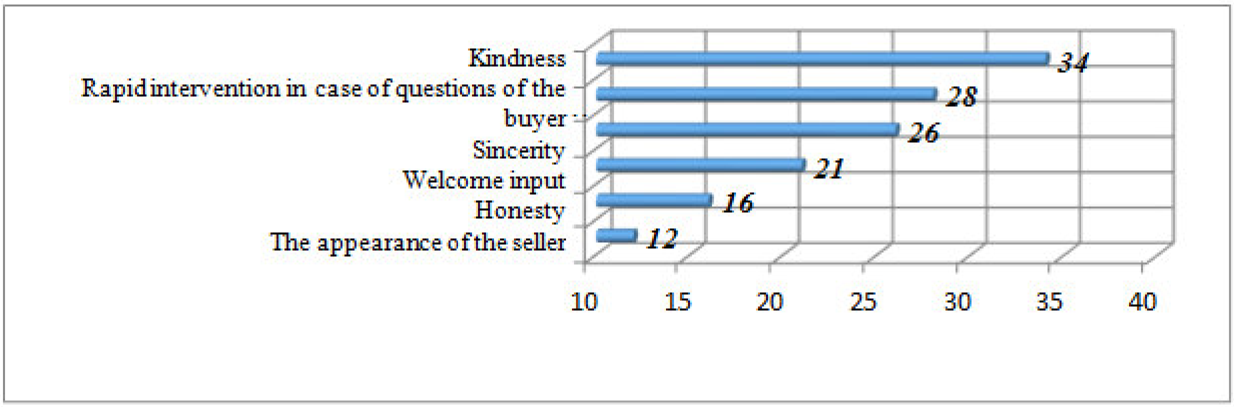


Fig. 8: *Features seller that will enhance sales*

Based on survey respondents was determined consumer expectations in customer service, namely those sides that should be changed at customer service. These are:
- increasing kindness sellers;
- enhancing the preparedness of sellers, sellers increase sincerity;
- enhancing responsiveness to customers;

- increasing the cultural level of sellers;
- reduction of excessive advertising of a product unwanted client.

5. CONCLUSIONS

Based on the analysis, we can mention certain that domestic enterprises of light industry should review their attitude to the marketing of products produced, ie on the level of service in the company stores as a business success is not determined only by a but also in large measure client.

Questioning respondents was determined that wish to purchase is greatly influenced by the level of service.

Increase the level of service in shops can be determined by reducing factors that negatively influence the purchase desire, namely:

- eyes "scan";
- lengthy speech to the seller on the phone;
- excessive attention to the buyer;
- indifferent and arrogant gaze of the seller.

And increasing purchasing factors that generate desire, namely:

- product quality;
- appropriate price of products sold;
- providing security;
- store ambience.

Just to increase the level of customer service, which would help increase sales, domestic producers should focus on:

- increase the training of sellers;
- promote kindness and sincerity sellers;
- meet buyers with a sincere smile;
- increasing the level of education of sellers;
- increase attractiveness to the customer;
- raising communicated buyer-seller;
- favorable climate in the store.

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STUDY ABOUT A FURNITURE COMPANY THAT USES NEW TECHNOLOGIES AND COMPUTERIZED EQUIPMENT

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Abstract: *In Romania, there are companies that uses new technologies and computerized equipment leading to obtaining high quality products and profit. Furniture industry has continuously developed due to high demand for diversified products for all age groups. Romanian goods shall be delivered both in the country and abroad. The tapestries furniture made in our country, classical or modern, by leather in different colours or with textile coating materials fashionable chosen is already enjoying much attention from the external and internal customers. The workforce employed in the furniture manufacturing industry is qualified, managed to shape the wood into complex and elegant products that are able to give full satisfaction to all consumers*
SWOT analysis is defined as a complex research of economic aspects, technical, sociological, legal and managerial aspects that characterize the activity of a company and allows the formulation of an opinion on the past and present condition of the company. SWOT analysis may be carried out both at the level of functional areas of the company: financial, commercial, production, human resources, research and development, management and at the level of firm as a whole. By this analysis was obtained a clear picture of the current state of the analysed company, helping to knowledge and understanding of the general context in which the company operates.

Key words: *quality, furniture, management, production, analysis, SWOT*

1. INTRODUCTION

Today, European furniture industry has a high level of production quality in technical, aesthetic, design and fashion terms, and has a very good image worldwide. The furniture industry is one of the key sectors for Romania in the country's sustainable development strategy. Situated on a prominent place among export processing segments, companies active in the production of furniture have developed a strong presence in European and world. Modern equipment and technologies adopted in the majority of furniture factories have increased the competitiveness of the furniture.Price-quality ratio of the products is very good that makes the Romanian products to be popular on the market. [1-4]

2. CASE STUDY

COMPANY PRESENTATION

The company "Z" Ltd, is a company with private capital which has the area of activity manufacture of tapestries furniture. This furniture is delivered in 20 European countries. The main company outlet is in France, Switzerland, Italy, Austria but also the entire eastern European area.

Parent company owns five production locations in Poland and in Romania were they are working around 1,500 employees.

Efficient logistic systems allow for prompt and in time delivery of the furniture direct in subsidiaries of European clients.

The offer to the beneficiaries in terms of price-quality ratio is very good because of the current integration of the newest trends and thanks to the collaboration with the best known designers. The company assure a very large field of tapestries furniture for clients in all age groups and having the most varied preferences, so:

- "Z Italy" is generic brand for sofas tapestries with leather, emanating an Italian air and incorporates only selected materials
- „Z World“ is addressed to international customers
- „Z WoW“ is the young component
- „Living & Dining“ includes residential furniture, tables and chairs "made in Europe" but also some pieces imported from Far East

This company uses new technologies and computerised equipment and the results began to appear gradually.

On the basis of the financial information of the company, presented in table no.1, and on the basis of other information received from the company, it may make a SWOT analysis of the firm.[2],[5-13]

Table 1. *Financial information. Balance Sheets*

Year	Turnover (RON)	Revenue (RON)	Costs (RON)	Debts (RON)	Gross profit (RON)	Clear profit (RON)	Gross loss (RON)	Clear loss (RON)	Average number of employees
2000	1.158.136	1.184.467	1.223.225	3.077.079	-	-	38.757	38.757	85
2001	8.745.580	8.803.176	9.001.469	5.934.136	-	-	198.293	198.293	217
2002	16.254.268	16.432.800	14.760.640	6.494.535	1.672.160	1.544.299	-	-	319
2003	28.265.015	28.917.216	27.287.027	10.116.261	1.630.188	1.435.107	-	-	376
2004	39.709.461	40.383.969	37.253.801	14.537.701	3.130.168	2.178.886	-	-	459
2005	51.988.647	53.511.449	49.506.743	24.067.682	4.004.706	3.328.308	-	-	579
2006	72.410.519	75.373.978	71.930.883	23.558.363	3.443.095	2.710.479	-	-	689
2007	132.323.876	136.470.939	134.433.266	35.977.186	2.037.673	1.514.475	-	-	747
2008	141.432.984	143.024.040	140.304.306	34.526.259	2.719.734	2.227.476	-	-	664
2009	162.730.830	163.119.513	156.231.835	29.265.463	6.887.678	5.746.383	-	-	629
2010	170.435.659	170.647.890	169.654.678	27.548.034	6.875.365	5.876.437			650
2011	170.546.054	170.705.678	168.543.285	26.945.024	7.056.127	5.963.096			630
2012	172.987.995	172.999.768	171.152.980	22.458.241	7.345.097	6.165.093			624
2013	218.650.729	221.874.505	180.763.879	18.093.458	9.945.854	8.245.963			605

Turnover

The turnover of "Z"Ltd is steadily increasing since 2000. From 2000 until 2013 the turnover has increased with 217.492.593 RON, that means with 18779,53%
The highest turnover was achieved in 2013 - 218.650.729 RON.
The lowest turnover was achieved in 2000 - 1.158.136,00 RON

In the last balance sheet (in 2013) the turnover increase with 45.662.734 RON, that means 26,39 % compared to previous year.

Revenue

Revenues obtained by „Z” Ltd have an ascending evolution since 2013.
Since 2000 up to the year 2013 revenues have increased with 220.690.038 RON that means 18.632,01 %.

The higher revenue have been obtained in 2013: 221.874.505 RON

The lower revenue has been obtained in 2000: 1.184.467,00 RON

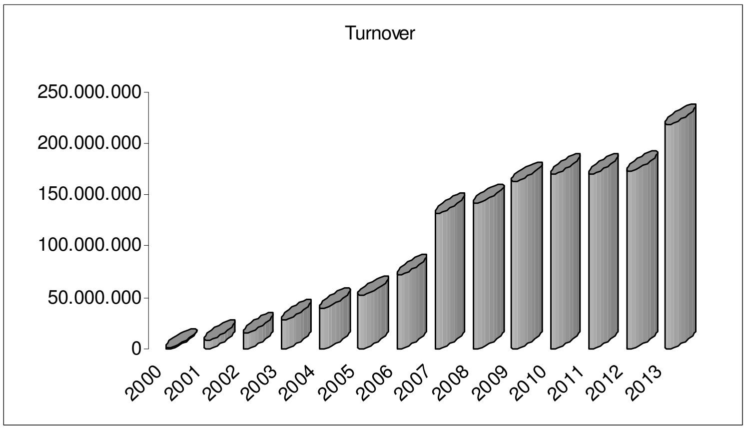

Fig. 1: *Turnover evolution (RON)*

In the last registered balance sheet, in 2013, the revenues increased with 48.874.737 RON that means 28,25 %, compared to previous year.

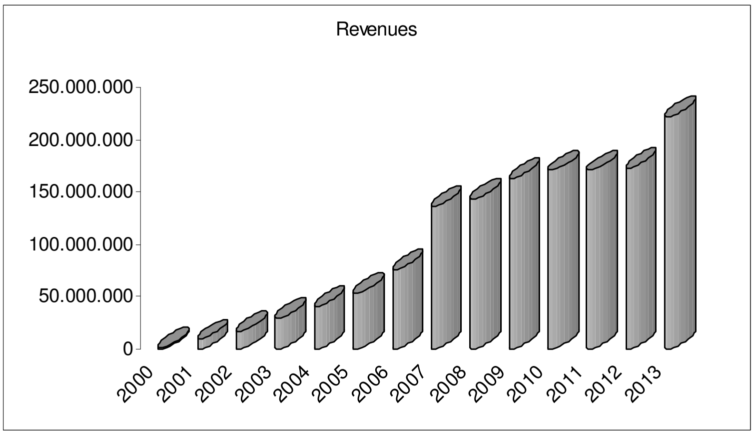

***Fig.2**: Revenues evolution (RON)*

Costs

The costs made by "Z" Ltd are in continuously increase since 2000. From 2000 since 2013 the costs increased with 179.540.654 RON, that means 14.677,64 %.

Most of the charges were made in 2013 - 180.763.879 RON.

The fewest charges were made in 2000 - 1.223.225,00 RON.

In the balance sheet of the year 2013 the costs increased with 9.610.890 RON, that means 5,61 %, compared to the previous year.

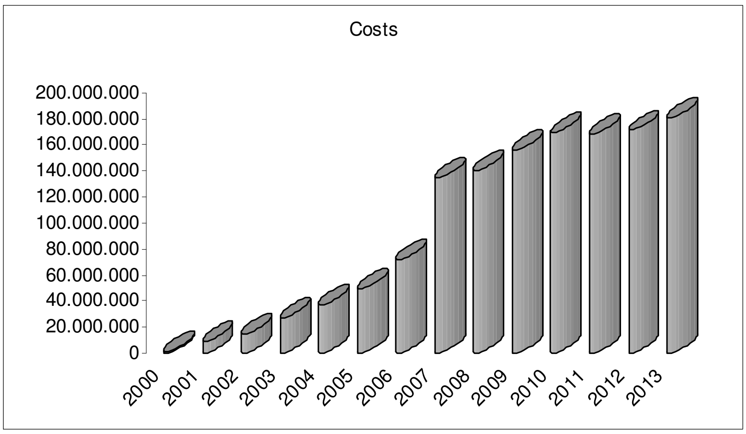

***Fig.3**: Costs evolution (RON)*

Profit/loss

"Z" Ltd obtained profit in 2002-2013 and losses in 2000 and 2001. The profit was lower in 2007 - 2008 and increased in 2009. Between 2009-2012 the profit was almost constant.

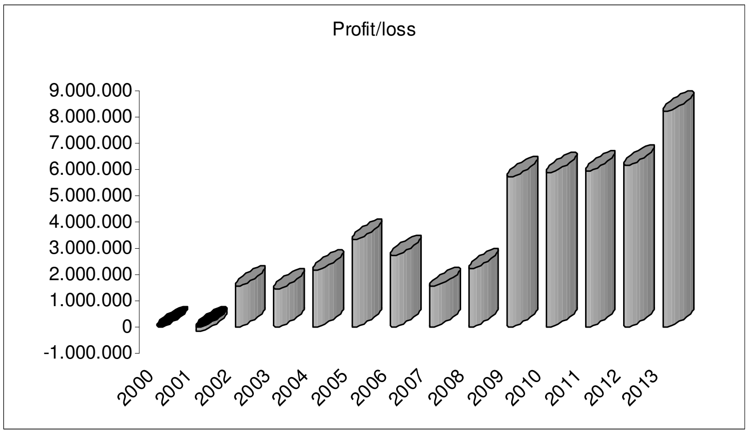

***Fig . 4**: Revenue/costs (profit/loss) evolution (RON)*

Debts

The debts of "Z" Ltd have an ascending trend with some decreases in 2006, 2008 -2013. The values were 23.558.363,00 RON - 2006, 34.526.259,00 RON - 2008, 18.093.458RON - 2013.

Since 2000 till 2013 the debts are increased with 15.016.379,00 RON, that means 488%.

The higher due has been in 2007: 35.977.186,00 RON.

The lower due has been in 2000: 3.077.079,00 RON.

According to the balance sheet of 2013, the debts have fallen with cu 4.364.783 RON that means 19,43 % compared to the previous year.

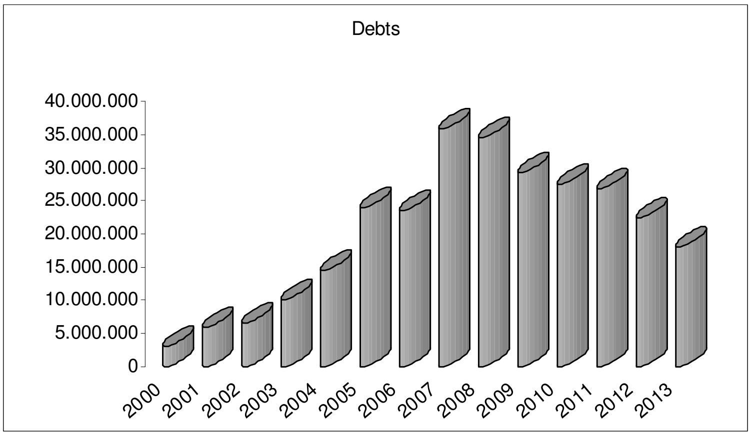

***Fig. 5**: Debts evolution (RON)*

Employees

The number of employees of the "Z" Ltd has an ascending evolution. Since 2000 up to 2013 the number of employees has increased with 520 that means 611,76%.

Most employees have been in 2007: 747. Less employees have been in 2000: 85

According to the balance sheet of 2013, the number on the employees falls with 19 persons, that means 3,04 %, compared to the previous year.

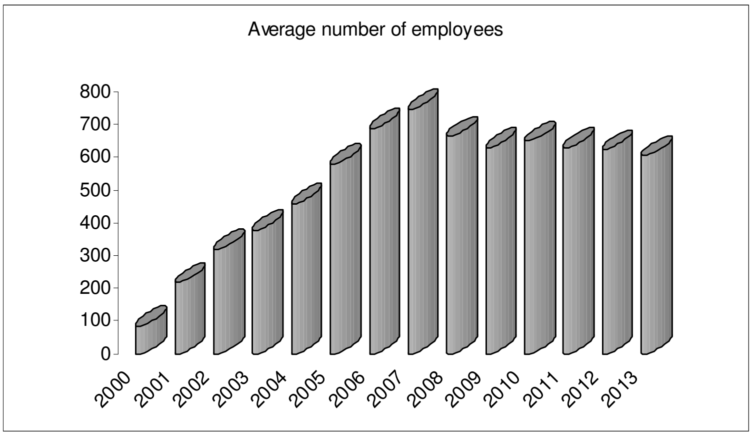

***Fig.6**. Employees evolution*

From the analysis diagnosis we have summarised the main strong points and weak points, at the company level [5,6,7,8].

Strengths:

- the turnover increase since 2000 till 2013
- the revenues increase since 2000 till 2013. Between 2006-2007 the growth was exponential.
- the costs increase since 2000 till 2013
- the profit was fluctuating but since 2002 increase till 2013
- the existence of some labels that allows workers to check at any time payment for work performed
- the furniture made by the "Z" company is delivered in 20 European countries.
- the staff has the technical and economic training
- the supply is made to external suppliers;
- the use of raw materials and high-quality materials
- small stock of finished goods
- frequent training sessions for staff specialization
- staff attachment toward the company and its objectives
- teamwork
- the company has qualified staff to develop and implement new technologies;
- were modernized and upgraded sections with computerized equipment leading to increased production;
- the company is very well informed and participate in trade fairs and exhibitions of specialty both in the country and abroad
- the company is constantly concerned to maintain and develop relationships with the current partners, as well as the discovery of new potential collaborators.
- the company uses a participatory management at all levels by promoting teamwork to achieve the objectives;
- the company uses a system of self-stimulation of the staff to lead to motivate him to work at full capacity to deliver products on time

Weakness:

- High level of the tax on profit and wages;
- long time for debt recovery;
- fluctuated incomes;
- fluctuated employees number
- the wages have had a higher growth rate of labour productivity but lower than inflation

Opportunities:

- high product demand will extend the market of the products both in Europe and in other countries.

Threats:

- A strong competition with products produced in other countries
- increase in price of raw materials
- the lack of qualified permanent staff

Recommendations:

- preparation and training of specialists for departments where there is a shortfall of qualified personnel
- modernisation of production units
- purchase of new modern equipment and adequate software

3. CONCLUSIONS

The years of crisis have affected the furniture industry in Romania. This aspect comes from the graphs presented above. From a management point of view, the furniture industry in Romania is faced with problems related to human resources management, financial management, forecasting and planning, investment and manufacturing management. Lack of workers, increasing prices of raw materials and utilities emphasizes furniture industry problems.

Some commercial companies are concerned with the implementation of new strategies that lead to the development of high quality products, which are offered to the clients as quickly as possible.[11,12,13]. Achieving this objective leads directly to the success of the company and getting the profit.

Development and implementation of new technologies and computer equipment leads to:

- productivity increase
- increase in product quality
- lower production costs
- disposal of stocks

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ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

THE USE OF LOANWORDS IN THE TEXTILE AND FOOTWEAR INDUSTRY

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Abstract: *This paper focuses on the words borrowed from English, French, Italian, Turkish, Slavic nad other languages used in the textile, fashion and footwear industry. We are well aware of the fact that after the Second World War, globalization spread the English language, thus influencing more and more the language of technology, science and commerce and last but not least fashion and textile industry. With some of these words we are already so used that we do not even think to consider their origin, we take them as our own words. In the present paper we will try to clarify some of these aspects, i.e. their origin and how they were introduced into Romanian language, how popular or unpopular they are and how relevant they are for our day-to-day vocabulary. The idea of globalisation is that, with time, there will be a progressive integration of national economies which will eventually lead to a single global market, the same being true of words taken from different languages and being intregrated into our own language. The fact is that the technical vocabulary of the world nowadays tends to become global – so, more and more English lexical items achieve incontestably international status and our language makes no exception, especially among young people.*

Key words: *loanwords, globalisation, fashion, textile and footwear borrowings*

1. INTRODUCTION

The role of a language is, in many ways, similar to that of money. Just like money, which helps people to sell their ware and get the goods they need for daily existence, a common language enables people to get things (objects, information, help), to convey and exchange ideas, etc.[1]

The economic and political power of Britain and the United States in the last two centuries has enabled the English language to take on a dominating role in today's world. Its global use in fields such as publishing, science, technology, commerce, diplomacy, air-traffic control and popular music makes it necessary to define it as a WORLD LANGUAGE.

Economic as well as cultural goods are being exchanged along with the current process of globalisation. This implies that not only the economy (i.e. production, transportation, trade), but also cultural products such as art, music, fashion, lifestyle, communication (World Wide Web) and language are being globalised. The globalisation process is thus taking place on various levels. In this paper, however, the issue of language is the main aspect of interest.

In the years after the fall of the communist regime in 1989, when Romania opened to the West, the influence of English on the Romanian language rose to an unprecedented level. Nowadays, English words can be found in all Romanian newspapers and journals, can be heard on any Romanian TV channel.[2]

Languages use different internal or external means to create those lexical units (with different degrees of specialization) in order to adapt themselves to those specific nonlinguistic circumstances, as well as to satisfy the users' needs to account for them in linguistic and meaningful terms. Accordingly, languages may either build new forms from old ones by resorting to internal means, that is, to the so-called word-formation or morphological processes, or also they may borrow words or terms from other (foreign) languages.

In the *Article on Linguistics* from Encyclopædia Britannica [3] it is stated that languages borrow words freely from one another, a process that usually takes place when some new object or institution is developed for which the borrowing language has no word of its own.

2. WHAT ARE LOANWORDS?

A **loanword** (or **loan word** or **loan-word**) from the German *Lehnwort* [4] is a word borrowed from a donor language and incorporated into a recipient language without translation. It is distinguished from a calque, or *loan translation*, where a *meaning* or *idiom* from another language is translated into existing words or roots of the host language.[5] *Calque*s are different as they do not refer to lexical borrowings but to the borrowing of translations.

Young people find loan words *cool*, in a way that the other generation does not. Many social domains are now actively introducing and using English words, for example in advertising where the use of English lexicons can help to sell goods. [6]

Romanian language has taken over a great number of words from English. These *borrowed words* or *loanwords* have nevertheless become a permanent part of Romanian. Most of them have been modified to bring them into line with the phonological rules of Romanian, and as such they can help a non-native English speaking Romanian or they can, on the contrary, confuse him.

Lexical borrowings or loanwords are a necessity of a language to cover a notion or concept that did not exist before and the Romanian language cannot create a correspondent to cover that meaning. Sometimes a borrowing may never become nativized and occasionally the loan word will actually affect the borrowing language itself. Researchers measured the degree of a loan word's integration into the language by frequency of use, native synonymy replacement (i.e., existing words in the Language 1 will be replaced by the new loan words with similar meanings), morphophonemic/syntactic integration (adapting to the sound and grammar systems of the Language 1), and speaker acceptability.

3. LOANWORDS IN ROMANIAN

The process by which a foreign word becomes a loan word is gradual. True loan words are typically regarded as phonologically, morphologically, and grammatically integrated into the host language. We can recognize two levels of borrowing: 'pure' borrowing, where the word retains all its native features, and 'adjusted' borrowing, where the word adapts to the structural criteria of the host language. Different linguists, like Bloomfield[7] and Olmsted[8], distinguish between three levels of linguistic integration: words used but retaining foreign phonology, words partially integrated into the borrowing language, and words fully integrated and indistinguishable.

Many of the words in the fashion and textile field come directly from Romance languages, especially from French but also from Italian, Spanish and Portuguese. From French we have acquired terms related to sophistication such as *chic*, *haute couture* ('higher tailoring'), *pręt-â-porter*, *boutique*, and *élégante*; style such as *lavaliere* ('any of various items of women's clothing in styles associated with the reign of Louis XIV of France or a pendent necklace'); design, such as *mannequin* and *modiste*; types of fabric or cloth, such as *batiste* ('a fine light cotton or linen fabric like cambric'), *broche* ('material, especially silk woven with a pattern on the surface'), *chiffon*, *crochet*, *denim*, *marocain* ('a crępe fabric of silk or wool or both'), *satin*, *voile*; elements related to footwear, such as *chaussure* or *sabot*; garments such as *décolleté / décolletage* ('a woman's dress, blouse, etc., signifying that it has a low-cut neckline, revealing the cleavage and often the shoulders as well'), *negligee*, *chemise*, *chemisette*, *gilet* ('a light often padded waist-coat, usually worn for warmth by women'), *lingerie*, *mask* ('a covering for the face, worn either as a disguise or for protection'), and *salopette* ('trousers with a high waist and shoulder-straps, worn especially as a skiing garment and as a Frenchman's overalls').

From Spanish there are few terms, for example words for different types of garments, such as *bolero* ('a woman's short open jacket, with or without sleeves'). We will only highlight here one of the borrowings from Arabic language related to types of fabric. Thus, the widespread term *mohair*, that is, a fabric in imitation of the true mohair ('a kind of fine camlet made from the hair of the Angora goat') which is made of a mixture of wool and cotton, is also said to be ultimately adopted from Arabic. Although borrowed directly from Turkish, this is a Persian term, *macramé* (a fringe, trimming, or lace of knotted thread or cord; knotted-work; the art of making this).

But the most part of words in our study are of English origin:

babydoll/baby-doll (babydoll style with the laced corsage, adorned with a lace ribbon); *black tie* (1. black bowtie usually worn with a tuxedo. 2. men's evening outfit); *body* (a piece of clothing the *body* is similar to a tight bathing suit, made of an elastic fabric which shows off the figure; *jeans/bluejeans* - the blue fabric was original from Nîmes, France, being called *denim* (nowadays the name was borrowed by a famous cologne for men). This blue fabric became the material used to make the trousers of cowboys, firemen and sailors from Genoa (the French name of the town is Gênes, this being the etymon of the word *jeans*)[9]; *jumpsuit* (*jump suit* 1. a coverall worn by parachutists for jumping, 2. a one-piece garment consisting of a blouse or shirt with attached trousers or shorts[10]; *little black dress (*which can also be found abbreviated *LBD* – a short dress in black colour)[10]; *leggings* (*legging* 1. tight-fitting stretch trousers, typically worn by women or girls 2. strong protective overgarments for the legs[10]; *clutch* (a special type of handbag); *smoching* (*smoking*, *to smoke* "a fuma"): Etymologically the term *smoching* comes from the gesture of smoking, the reference being made to that moment when gentlemen used to retire quietly, enjoying a brandy and a cigar in one of the corners of their club; *T-shirt* (a shirt that has short sleeves and no collar and that is usually made of cotton)[11]; *top* (a piece of clothing, the top designates the upper part of an outfit, a garment worn on the upper half of the body); *trench coat/trenchcoat* (1. trench coat a waterproof overcoat with a removable lining designed for wear in trenches, 2. a usually double-breasted raincoat with deep pockets, wide belt, and often straps on the shoulders)[11]; *tuxedo* "(the short form for tuxedo coat, named after the exclusivist club Tuxedo Park in New York"): To explain this term, The Webster Dictionary makes reference to the term *dinner jacket* (*dinner* "cina"; *jacket* "jacheta, haina"): "1. coat worn by a man to an important event. 2. outfit worn by a man to such an event, including a coat, dark colored trousers, with satin or grosgrain facings on the jacket's lapels and buttons and a similar stripe along the outseam of the trousers, a bow tie and, in most cases, a girdle'; *trening* (*training*- in fashion terminology *trening* refers to sports suits); *catwalk (*A compound (*cat* "pisica"; *walk* "a merge"), the term is a metaphor, the models defiling on the catwalk being performed in a slow tempo, displaying large movements which are meant to draw the attention; *dress code* ("cod vestimentar"- at present, most oficial events impose a certain dress code, this appearing written on the invitation.); *dressing* (1. the closet is an element of furniture found in any home, 2. The term also entered the domain of gastronomy meaning a cold sauce based on vinegrette or mayonaise used for salads; *fashion* (1. a popular way of dressing during a particular time or among a particular group of people, 2. the business of creating and selling clothes in new styles, 3. fashions: clothes that are popular); *fashionist(a)* (a native word made up by adding the suffix *-ist(a)*; *skinny* (the term refers to a type of jeans similar to leggings, being tight on thighs); *trend* (the term refers to the fashionable articles of clothing at a certain moment in time); *trendy* (1.currently popular or fashionable liking or tending to like whatever is currently popular or fashionable, 2.influenced by trends; *trendsetter* (someone who starts a new fashion, style, etc., or helps to make it popular);

There are also some borrowed words from the footwear industry from Turkish: *pingea* (<Tk. *pence* – piece of sole used to replace the fore part of the used soles; *târlici* (<Tk. *terlik* - soft, heelless indoor slippers made of cloth or wool).

From French we also borrowed terms such as: *espadrilă* (<Fr. *espadrille* – light footwear made of cloth with a sole made of string or a special material); *botină* (<Fr. *botine* – elegant shoe worn by women and children)*; galoş* (<Fr. *galoche* – rubber footwear worn over shoes to protect them against dampness or mud); *sanda* (<Fr. *sandale* – summer light footwear made on plastic, leather or cloth with minimal uppers); *mocassin* (<Fr. *mocassin* – very soft and comfortable footwear with a flat sole and no laces); *şoşon* (<Fr. *chausson, sabot* – winter footwear worn over the shoes, sabot – footwear carved out of a piece of wood or made of a wodden sole and thick leather uppers).

There are some terms from Slavic: *opincă* (<Sl. *footwear* – peasant footwear made of rectangular piece of leather or rubber, tight around the foot with leather lacings). From Hungarian we borrowed: *bocanc* (<Hun. *bakancs*- strong military or sport boot made of leather with a thick sole)*; cizmă* (<Hun. *csizma* – leather, rubber footwear with a top as high or over the knee). From Italian language in the footwear terminology we have: *gheată* (<It. *ghetta* – footwear made of leather or synthetic materials imitating leather, covering the ankle); *scarp* (<It. *scarpa* – dancing shoe, slipper, indoor shoe); *stilletto* (<It. *stiletto* – a spike heel shoe).

From German language there are some loanwords: *şlap* (<Germ. *Schlappe* – flat beach slipper); *cioci* (<Germ. *Socken* – white woolen knee-high sockswom inside the sandals by peasants); *pantof* (<Germ. *Pantofell* – outdoor footwear made of leather, synthetic material or cloth, covering the foot up to the ankle).

From English language we have some borrowed words that have entered into our vocabulary recently: *sneakerşi* (<Eng. sneaker – light shoes usually made of textile, having a sole made of rubber); *loaferşi* (<Eng. *loafer* – comfortable footwear similar to moccasins); *peep-toe* (<Eng. *peep+toe* – open toe shoes or sandals); *flip-flops* (<Eng. *flip-flop(s)* – flat sole footwear with a Y-shape strap between the big toe and the second toe); *şlapi* (<Eng. *slipper* – light comfortable footwear, slippers).

Regarding spelling we can notice there are:

- integrated anglicisms: *jeansi/blugi*, *legginsi*, *smoching*, *trenci/trencicot*, *trening.*

- non-integrated anglicisms: *babydoll*, *black tie*, *white tie*, *body*, *jeans*, *jumpsuit*, *little black dress*, *T-shirt*, *trench coat*, etc.

Most registered terms are not integrated phonetically and morphologically into the structure of the Romanian language, not being mentioned in Romanian lexicographical literature. The different orthographic systems of the two laguages (phonetic spelling for Romanian and etymological spelling for English) pose the greatest problems.

Fashion anglicisms are divided into necessary and luxury Anglicisms, the terms having in view various categories encompassed by the domain of fashion: fashion styles, articles of clothing, prints, accessories. Most registered terms are not integrated within the system of Romanian, either phonetically or mophologically, their spelling causing great difficulties.

3. CONCLUSIONS

One of the most outstanding features of Modern Romanian is its large and varied vocabulary. Romanian has borrowed many words from so many other languages and made them its own. The English elements, like other foreign elements entering Romanian, are adopted and adapted to the Romanian language system, with little or no resistance. One thing is certain the borrowing of English elements does not alter the Romance character of the Romanian language.

We must keep in mind that the native Romanian speaker has been getting information from all over especially the World Wide Web, information that is primarly in English - which is considered the dominat language of international business, economics and global communication -, thus behaving like a sponge and absorbing words, mostly the younger generation, fascinated by the freedom of expression.

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