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FUNCTIONAL DIVERSIFICATION POSSIBILITIES FOR KNITTED USED IN HOMETECH PRODUCTS

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Abstract: *Knitted are successfully used in all human activities: industry, agriculture, army, medicine, sports, leisure, etc. (Agrotech, Buildtech, Clothtech, Hometech, Geotech, Medtech, Protech, Sporttech, Mobiltech, Indutech, Packtech, Oekotech). The technical knitted used in mattress manufacturing, upholstery articles and interior decorations (Hometech branch) comprise a wide range of products of different structures and raw materials, which must meet the specific requirements requested by the beneficiaries: constructive, aesthetic, thermal and sensorial comfort, health protection, harmful substances content, flammability, degradation capacity in a biological environment, availability requirements and for cleaning, remedy and reconditioning, etc.. These requirements stand at the base of the creation and design processes and they are stated in the documentation of the product. Evaluating product quality involves establishing representative features in relation to their intended use and applying standardized testing methods to select optimal variants.*
Regardless of the type of mattress, the upholstering can be made with either weft or warp knitted. These are characterized by an extremely varied design, structural diversity and raw materials of remarkable variety, including ecological and biodegradable ones, durability and versatility.
The purpose of this paper relies in presenting a collection of knitted structures intended for mattress manufacturing, along with their technological and functional characteristics, as well as an example of programming such a structure on an OVJA type knitting machine. 215

Key words: *Knitted, mattresses, structure, characteristics, programming.*

1. INTRODUCTION

Using knitted in all compartments of human activity is possible due to the many advantages offered [1, 2, 3]:

- ❖ diversity of presentation forms;
- ❖ reduced specific mass compared to other textile materials;
- ❖ creation of knitted structures combining the characteristics of woven fabrics (resistance to mechanical stress, reduced extensibility), with those knitted specific (spatial modelling capacity, voluminousness, possibilities for extended diversification, pleasant touch, high economic efficiency);
- ❖ development of new knitting technologies;
- ❖ possibility of directing specific characteristics;
- ❖ use of an extended range of yarns with superior features.

New uses are found daily for knitted that can replace traditional materials, costly ones, or those that are difficult to be made technically.

Technical knitted used for the confection of mattresses (the Hometech branch) have a large variety of products with different structures and primary materials that must meet the specific requirements solicited by the beneficiaries:

- Constructive requirements: dimensional correspondence, composition, structure, weight;
- Aesthetic requirements: the mattresses' appearance, the material that was used for the upholstering, the colour or colour scheme, the sewing, the seams, etc;
- Requirements concerning the thermal and psycho-sensorial comfort, flexibility, extendibility, elasticity;
- Requirements about health safety, the content of toxic substances, flammability, the rate of disintegration in the environment;
- Availability requirements: durability, the ability to maintain its shape, appearance, colours and size over time;
- Requirements concerning the cleaning, mending, refurbishing, decontamination, etc. of the mattress.

These requirements stand at the base of the creation and design processes and they are stated in the documentation of the product.

2. MATTRESS TYPES AND THEIR CHARACTERISTICS

Specialty literature [4 – 10] divides mattresses in multiple types: orthopedic, super-orthopedic, pocket, memory foam, latex, medical and children's mattresses.

Regardless to their type, mattresses can have the following characteristics:

- different variants of dimensions and thickness (14 – 24 cm);
- different degrees of firmness (firm, medium, soft);
- the possibility of using the mattress in both sides (one side for the warm season and another for the cold one);
- detachable cover or not;
- diverse fabrication technologies;
- with or without springs;
- variable warranty period.

Figure 1 ilustrates an example of a spring mattress.

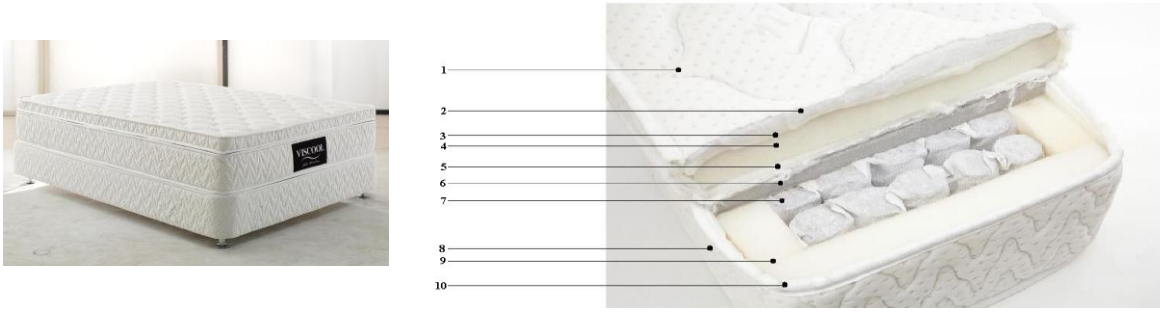


***Fig. 1**: Viscool mattress*

1. Double relief rib jacquard, with 99% PES, 1% PA, 375g/m^2; 2. Syntethis cotton 500g/m^2; 3, 5 Rolles of PU foam (1.5cm); 4, 6 PU foam plate (of 5cm and 3cm tchikness, respectively); 7. Pocket spring system – coils packaged in individual textile bags; 8. Ventilation capsule; 9. PU foam support frame (5cm thick si 15cm tall); 10. PU foam border (0.8 cm thick, 32cm tall)

In figure 2 another examples is presented – Dormeo mattress.

Dormeo Memory 2+12 Silver Plus mattresses are realized with Ecocell foam and memory foam, materials that have a benefic effect on sleep and health. The combination between the two innovative materials and the addition of silver fibers regulates excessive sweat for a relaxing sleep. The silver fibers have an antibacterial, antistatic and isothermal effect.

Dormeo Orthopedic [9] is a firm, anatomical and orthopedic mattress that sustains and encourages the correct position of the spine during sleep (figure 2). The innovative core made out of Eliocel is more rigid, but very light, ensuring at the same time a good support for the body.

***Fig. 2**: Spinal support offered by Dormeo orthopedic mattresses*

1 The outside exterior is treated, offering protection against fungi, bacteria and dust mites.

2 The additional silicone layer ensures supplementary protection against bacteria, having anti-allergic proprieties.

3 The cellular structure of Eliocel ensures air circulation. As such accumulation of humidity inside the mattress and excessive sweat during sleep is prevented.

4 Eliocel (13 cm) is a last generation material that offers an optimal support fir the body during sleep and antibacterial protection.

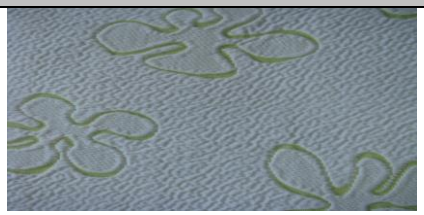
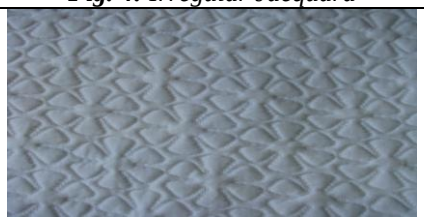
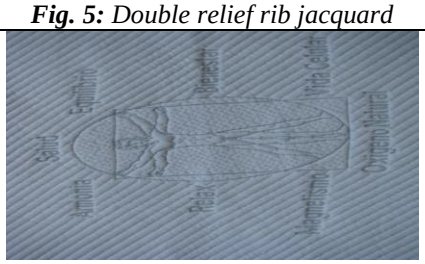
3. COLLECTION OF KNITTED STRUCTURES DESTINED TO MATTRESS MANUFACTURING – CHARACTERISTICS

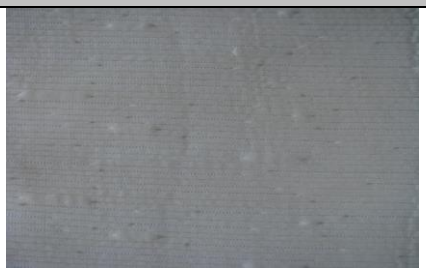
Integrated knitted fabrics are complex multilayer type structures. The fibers used for the fabrics are specifically chosen according to the final use of the fabric. Both faces of the fabric contain fibers with aesthetical, comfort, protection and durability features, while the filling fibers serve the purpose of thermic isolation and elastic rebound after compression.

In what follows a collection of knitted structures destined to mattress fabrication will be presented, produced on circular OVJA 1.6 E knitting machines, pertaining to Mayer&Cie firm, in one of the profile firms in Romania [11].

***Table 1:** Knitted fabric models/ Characteristics*

No.	Knitted fabric model	Yarns processed	Constructive characteristics
1.	 ***Fig. 3*: Double relief rib jacquard**	Front yarns: Bamboo-viscose 100% Nm 20/1; Back yarns: PES 100% 150 den; Filling yarn: PES 100% 600 den, Rapport 1/2	Width: 2,42 m Weight: 264 g/m^2 Thickness: 2,95 mm

No.	Knitted fabric model	Yarns processed	Constructive characteristics
2.	 ***Fig. 4:*** *Irregular Jacquard*	Front yarns: PES 100% Nm 18/1; Back yarns: PES 100% 150 den; Filling yarn: PES 100% 600 den, Rapport: 1/4	Width: 2,38 m Weight: 277 g/m^2 Thickness: 3,16 mm
3.	 ***Fig. 5:*** *Double relief rib jacquard*	Front yarns: Cotton 100% Nm 24/1; Back yarns: PES 100% 150 den; Filling yarn: PES 100% 600 den, Rapport: 1/2	Width: 2,20 m Weight: 263 g/m^2 Thickness: 3,34 mm
4.	 ***Fig. 6:*** *Irregular Jacquard*	Front yarns: PES 100%, Nm 20/1; Back yarns: PES 100% 150 den; Filling yarn: PES 100% 1200 den, Rapport 1/3	Width: 2,54 m; Weight: 305 g/m^2; Thickness:
5.	 ***Fig. 7:*** *Double relief rib jacquard*	Front yarns: Cotton Biofairtrade 100% Nm 20/1; Back yarns: PES 100% 150 den; Filling yarn: PES 100% 1200 dtex, Rapport: 1/4	Width: 2,30 m Weight; 270 g/m^2 Thickness: 3,11 mm
6.	 ***Fig. 8:*** *Jacquard through application*	Front yarns: Cotton Biofair 100% Nm 20/1; Back yarns: PES 100% 150 den; Filling yarn: PES 100% 600 den, Rapport: 1/2	Width: 2,30 m Weight: 280 g/m^2 Thickness: 3,25 mm
7.	 ***Fig. 9:*** *Irregular Jacquard*	Front yarns: PES 100% 18/1 Nm; Back yarns: PES 100% 150 den; Filling yarn: PES 100% 600 den, Rapport: 1/4	Width: 2,40 m Weight: 260 g/m^2 Thickness: 3,22 mm

No.	Knitted fabric model	Yarns processed	Constructive characteristics
8.	 *Fig. 10: Double relief rib jacquard*	Front yarns: Bamboo-viscose 100%, 20/1 Nm; Back yarns: PES 100% 150 den; Filling yarn: PES 100% 1200 den, Rapport: 1/4.	Width: 2,30 m Weight: 275 g/m^2 Thickness: 2,76 mm

4. PROGRAMMING INTEGRATED KNITTED (USED AS HOMETECH ARTICLES) ON OVJA 1.6 E MAYER&CIE MACHINES

Programming an integrated knitted – jacquard type on a circular knitting machine OVJA 1.6 E (Mayer&Cie) is illustrated underneath [11].

Fig. 11: *Double relief rib jacquard*

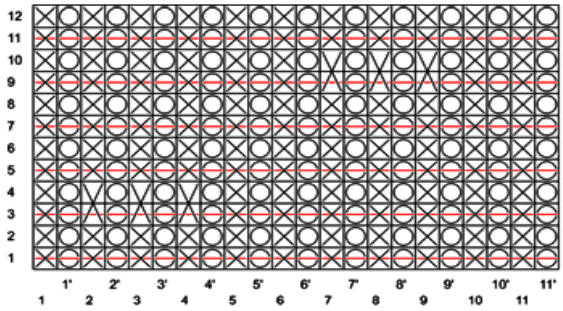


Fig. 12: *Representation through conventional signs of the structure's rapport*

Yarns processed
Front yarns: PES 100% 75 den;
Back yarns: PES 100% 150 den;
Filling yarn: PES 100% 300 den, Rapport: 1/2

Constructive characteristics
Width: 2,50 m; Mass = 145 g/m^2; Thickness:2,29 mm.

Structural parameters:
Ds/h = 45; Ds/v = 55;

Rând	D		C	Rând	D		C
	l	s			l	s	
R1	C2	C1	ZA	R13	C2	C1	ZA
R2	A2	A1	ZC	R14	A2	A1	ZC
R3	C2	C1	ZA	R15	C2	C1	ZA
R4	A2	A1	ZC	R16	A2	A1	ZC
R5	C2	C1	ZA ZC	R17	C2	C1	ZA ZC
R6	A2	A1	ZA ZC	R18	A2	A1	ZA ZC
R7	C2	C1	ZA ZC	R19	C2	C1	ZA ZC
R8	A2	A1	ZC	R20	A2	A1	ZC
R9	C2	C1	ZA	R21	C2	C1	ZA
R10	A2	A1	ZC	R22	A2	A1	ZC
R11	C2	C1	ZA	R23	C2	C1	ZA
R12	A2	A1	ZC	R24	A2	A1	ZC

ZA – utilizing individual selection for normal stitch formation;
ZC – utilizing individual selection for non-knitted stitches formation.

Fig. 13: *Programming Double relief rib jacquard*

5. CONCLUSIONS

Technical knitted used for the confection of mattresses (Hometech branch) come in a large variety of products that must meet the specific requirements solicited by the beneficiaries. These requirements stand at the base of the creation and design processes and finalised with filling the documentation of the product.

Taking into consideration that aesthetic and comport requirements are fist rank, in order to respond better to the user's solicitations, in mattress upholstery (regardless of their type) weft knitted are used. They are characterized by an extremely varied design, structural diversity, prime materials of remarkable variety, including ecological and biodegradable ones. All these leas to obtain satisfaction from the users during the visualisation of the mattress model, aspect, of knitted used, the colour or chromatic scheme, as well as improved performance during mattress usage.

In this paper a collection of weft knitted structures destined to mattress fabrication are presented, produced on circular OVJA 1.6 E knitting machines, pertaining to the Mayer&Cie firm.

REFERENCES

[1] L. Lutic, "*The evaluation of durability characteristics for Knitted used in Hometech type articles"*, Buletinul AGIR no.1 / 2018, http://www.buletinulagir.agir.ro/numar_revista.php?id=147

[2] ***, SR EN 14976/2006. *Materiale textile. Material pentru saltele. Specificaţii şi metode de încercare*

[3] AGIR.: *Manualul Inginerului Textilist*, Vol. III, Editura AGIR, Bucureşti, 2004

[4] http://www.online-home.ro

[5] https://www.bekaertdeslee.com/en

[6] http://www.ramedepat.ro/saltele

[7] http://www.ikea.com/ro/ro/catalog/categories/departments/bedroom/10609/

[8] http://www.deslee-interior.com/functions/content.

[9] http://www.dormeo.ro/

[10] http://www.ramedepat.ro/saltele?gclid=COTXorXPhrACFUVc3wod5TFKmQ

[11] Technical book Mayer & Cie, 1996, http://www.msv.com.pl/en-maszyna-3980-966579189-mayer__cie_ovja_16e.html