Innovative Textiles Test in Wearing Brace

Nagyné Szabó Orsolya[1], Koleszár András[2]

Left assistant lecturer, tecnical instructor
Óbuda University Rejtő Sándor Fakulty of Light Industry
and Environmental Protection Engineering
Institute of Product Design
H-1034 Budapest, Doberdó u. 6. tel.: 06-1666-5935

Abstract: *Scoliosis affects approximately 12 million people worldwide. Millions of scoliosis sufferers are routinely misinformed about the accelerating nature of their spinal curvature progression. While doctors have yet to find a cure, some experts have uncovered solutions available for relief and the stop the progression. Scoliosis is a common disease in teen ages. Depending on the severity of the disease requires conservative treatment, which means a 5 mm thick plastic armor, which is to be worn 24 hours a day. To wearing it is not just physical hardship but it causes psyche trouble as well.*

Currently, the underwear that is worn by children under the corset is the commercially available materials and tailoring forms determined. Our goal is the patterns unique design, which takes account of the disease and the consequent body deforms. Panel seam line affect the location of the zones, the pressure exerted on the body.

This research has not finished yet, there are new underwear models under testing.

Keywords: *scoliosis, corset, brace, underwear textile test*

1 Introduction

Garment is an important part of the underwear. The comfort and good hygiene is largely determined by the material of underwear, technological development, the method of production. However, there are situations in life when an illness is part of the patient's medical aids to be worn every day. In these cases, even more important role in the underwear. This paper, the more severe forms of scoliosis are dealing with when the district is required to wear for the patient. This disease typically affects children under age of puberty, a higher percentage of them are girls. The corset will only be effective if the 23 hours from 24 hours is wearing per day. The constant wear not only the physical burden, but it can cause very serious psychological problems. The dressing is difficult, because a 5 mm thick plastic "armor" to wear on one side of the body, pressure on the other side is not touching

the body. Where the body and the plastic plates meet, it often happens that rubbed the skin, which paid and discomfort. The Budapest University of Technology and his colleagues within the framework of a project working on the creation of a composite material, which is lighter than the currently used plastic, and intelligent features.

2 Corset creating

Material of corset is made from 180 degrees thermoplastic plastic. The corset material must be hard and rigid. The material thickness about 5 mm.

The corset is made of high thermoplastic plastic after sampling of the body is made of plaster.

Physiotherapist adjusts for sampling the child's posture. [1]

Orthopedic technician create of the plaster molds to determine the basis pressure points, and free places left. /figure 1./

1. Figure. Cheneau corset in front side

2. Figure: Cheneau corset back side

3 Connection between clothing phisiology and innovetive textiles

The insulating ability of clothes and the raw material of the corset to be tested in different temperatures of the body "comfort." We are looking for special raw material and solution that has not been used to look at wear the corset that improve these physiological conditions and comfort.
The two most important features of the clothing thermal insulation and water vapor permeability. These affect the thermal regulation of man. We test 3 different knitted textiles as an underwear T-shirt under the original, and the perforated corset.

3.1. Selection aspects of suitable textiles

We are looking for such an intelligent and functional textiles, which are due to their composition, or finishing result, suitable for protecting the health quality of life. In our study, we tried to find answers to a newly developed, commercially available material parameters which are under test conditions, which are the physiological needs of customers in the best match.

Basic requirements for textiles:

- Good air permeability
- Antibacterial
- •Moisture-wicking•
- Good abrasion resistance
- Washable
- Good to be processed.

We tested corset 3 kind of textiles

1. „Traditional” 97% cotton 3% elastan type knitted material
2. „Outlast” PCM 66% cotton, 28% viscose, 6% elastan knitted material
3. „Coolmax” 100% PES antibacterial finished knitted material

   In addititon we are detailed functional properties of no. 2 and no. 3 textiles.

3.2. A PCM thermal control materials (no.2 textile)

At the textiles also used special particles in the liquid-crystalline materials, changes in the physical state of the unusual phenomena can be observed:

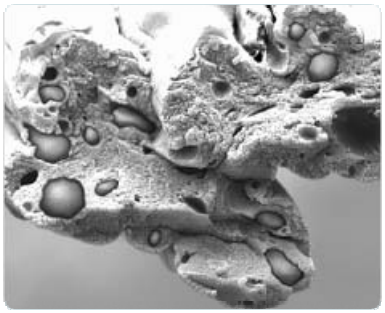
- The melting of solid phases at the first one for liquid, dense, confusing, "liquid crystal" state,

- Followed by further heating the isotropic liquid, and gaseous materials. A "normal" liquids isotropic properties of the liquid-crystalline state, however, the material coming from different directions and respond differently influences ("anisotropic" phase). The "Phase Change Material," the phrase in English PCM-agent spread after phase-alternating phase-changing, state-set exchange properties. The PCM-s ability to absorb a significant amount of heat energy, temporarily stored and then adapting to the changes in the environment of this latent heat is utilized.
If temperatures in the range of their physical state change request:

- Solid phase near liquid state is cooling,

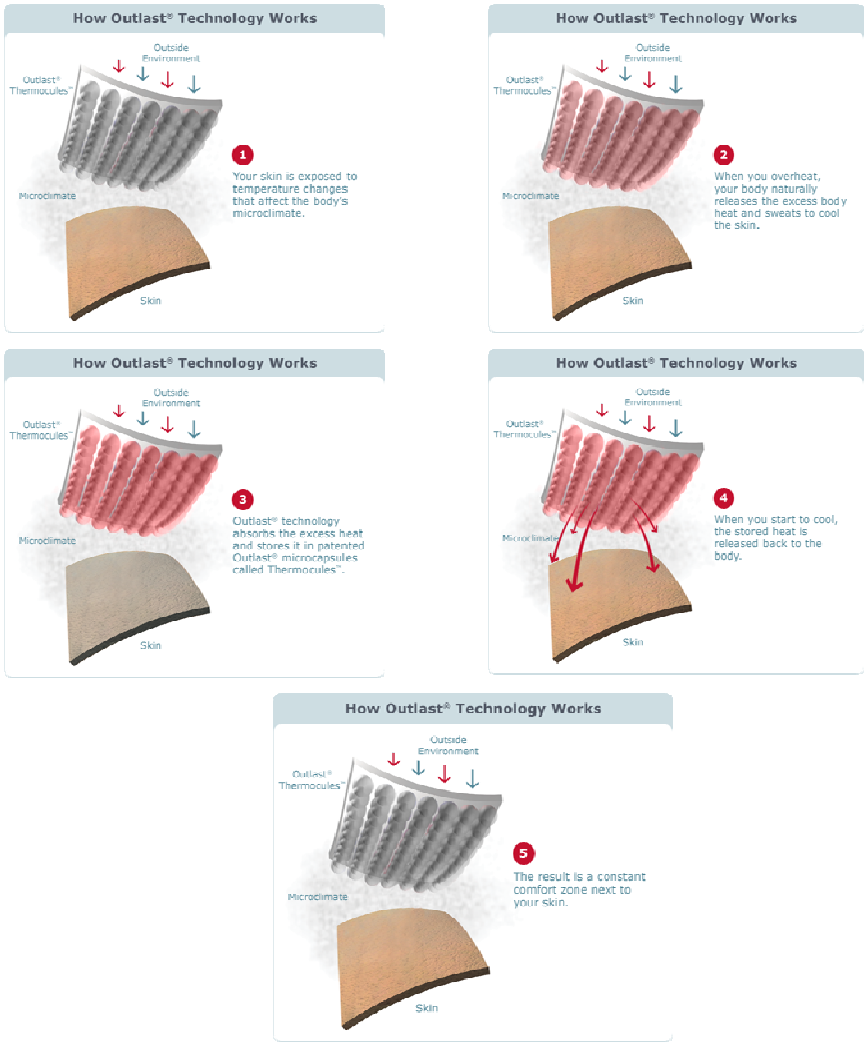
- Liquid cooling halmazállapotból firm has an external effect, ie, heat loss is heat. The PCM is stopped before the melting point of the heating cycle. [5]

The 3. figure shows the microscopic image of viscose fibers inside the capsules



3. Figure: Capsules in viscose fibre

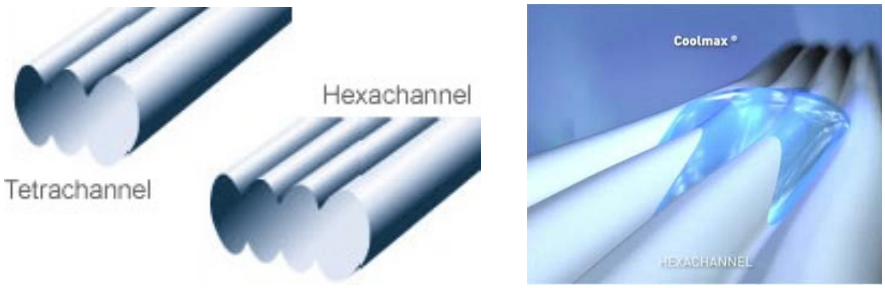
That Outlast technology, the company was first developed for astronauts is now the basic materials of everyday life can be used in many fields, especially for clothing. The Outlast technology physiological effect of the 4. sequence diagram is shown.



4. Figure: Outlast technology physiology effect[8]

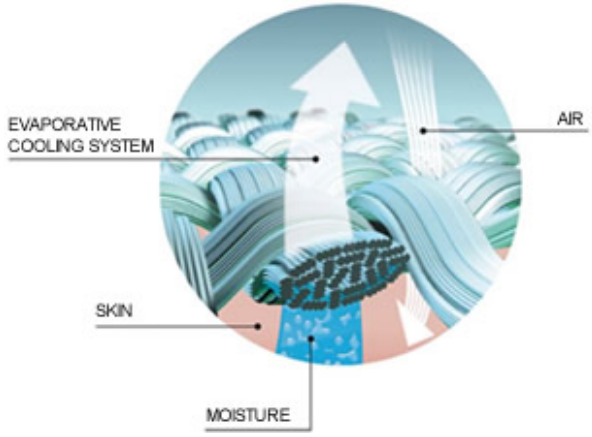
3.3. Coolmax (no.3 textile)

COOLMAX fabric with a specially designed polyester fiber made from elemental that wicks away perspiration from the body, and through the material quickly evaporates, so the clothing wearer comfort improvement of the 6th shown in Figure 4, and 6-channel fibers develop. The increased fiber surface due to the tissue surface of the water quickly evaporates. [7]



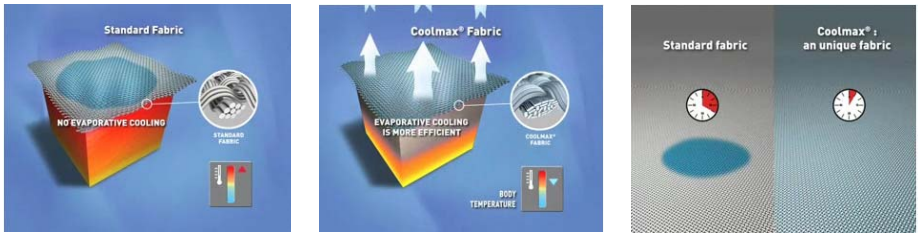
5. Figure: 4 and 6 channels PES fibers [7]

It made of special polieszter textiel and the skin affect can be seen in figure 7



6. Figure: Coolmax textile evaparete sistem [7]

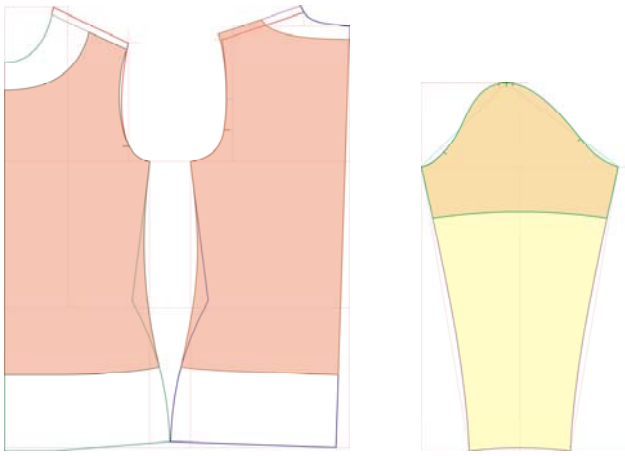
It can be seen in figure 7 the traditional cotton and the coolmax textile evaporate system.



7. Figure: Coolmax and a traditional cotton evaporate system [7]

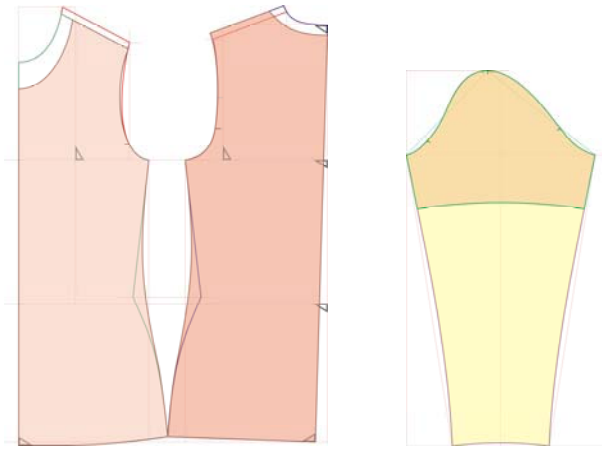
4. T-shirts construction

The T-shirt pattern construction is made of custom tailored, taking into account the body idiosyncrasy.



8. Figure: T-shirt pattern construction

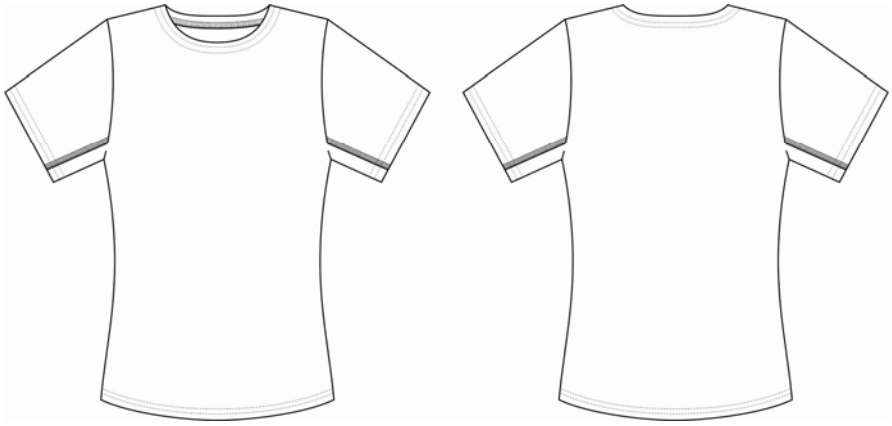
The T-shirt construction does not contain any surpluses. The material properties taking into account the need to change the editing / body circumference as -15% according to body height-5% / that shirt is tight on the body. Wrinkles creases avoiding the creation of the under corset. [3]



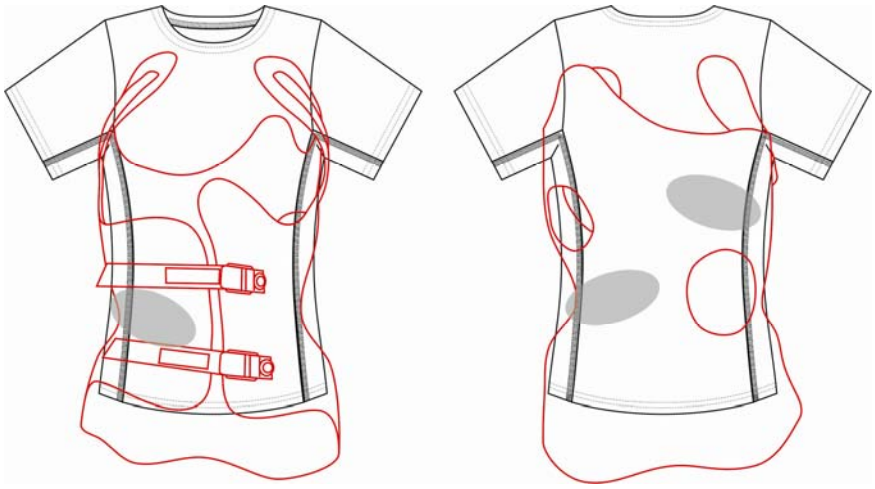
9. Figure: Changed T-shirt pattern construction

4.1 Cutline design

The construction designed to take into account the pressure points in the corset, these places are not designed to cut line.



10. Figure: Cut lines place



11. Figure: Cut lines place and pressure points connection

5. Sewing technology

The products of sewing technology aligned with the expectations that the stitching of overlapping technology so that the pressure exerted by the corset will not be rubbed off the skin. The clothing should be modeled to avoid seam allowance near the armpit area. /Figure 8/

12. Figure: T-shirt with overlapping stitching and without stitching

5.1 Seam types

The seam type /figure 13/a, 13/b/ is used at t-shirts because it isn't pressured to the skin. In the skin can be seen penetration area /figure 2/ if wearing a normal t-shirt for a long type eg. one day under corset. This overlap seam type makes smaller uncomfortable feeling.

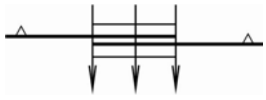


Figure 13/a **Figure 13/b**

13. Figure: T-shirt seam type

Conclusion

After complete the products there are some children who tests them. The experience gained here in further product development is to be utilized.

After choosing the form and technology is possible to find the best material that help children to increase their comfortable feeling.

References

[1] ORSOLYA NAGY SZABÓ: Corset and Clothing Phisiology, *Proceedings of IJCELIT*
International Joint Conference on Environmental and Light Industry Technologies
18 – 19 November 2010, Budapest, Hungary, Óbuda University

[2] ORSOLYA NAGY SZABÓ, KOLESZÁR ANDRÁS: Patterns for Corset Wearing Children
18 – 19 November 2010, Budapest, Hungary, Óbuda University

[3] DAMEN-RUNDSCHAU: *Halbarmshirt und string*, Vol. (1999/12) No., pp.14-18, ISSN

[4] NAGYNÉ SZABÓ ORSOLYA - KOLESZÁR ANDRÁS: „FUNCTIONAL DESIGN AND TESTING OF CORSET UNDER LINEN"
SECTION R: *Medical and Health Science (Orvos-és Egészségtudomány)*
XXV. microCAD 2011 International Scientific Conference (Miskolc University)
Miskolc, 2011, március 31-április 1. pp.49-54 (ISBN: 978-963-661-971-8)