

Pressure comfort of sock welts produced on single cylinder sock machine

A Marmaralı¹ and B Cüreklibatır Encan²

¹Ege University, Engineering Faculty, Textile Engineering Department, 35100, İzmir, Turkey

²Ege University, Emel Akın Vocational Training School, 35100, İzmir, Turkey

arzu.marmarali@ege.edu.tr

1. Introduction

Consumers have become more conscious about every piece of clothing they buy due to easy access to information with the help of technology. Therefore, they are demanding high quality, more comfort and low price. Recently pressure comfort, which is one of the components of clothing comfort, has prominently been researched. Pressure exerted on the body by garment depends on shape of the body, fiber type and fabric structure [1]. Wear trials conducted by Momota et al. [2] and Tsujisaka et al. [3] revealed that pressure values of 10 mm Hg and 2.02 ± 0.29 kPa (~ 15 mm Hg) respectively are felt as comfortable. Wu and Li [4] stated that clothing pressure affects integumentary, circulatory, respiratory and other physiological systems of human body. Therefore, in this study pressure comfort of sock welts produced on single cylinder sock machines were investigated.

2. Materials and Method

All samples were knitted on Da Kong Sock machine (E14, 156 needles, $3^{3/4}$ ") using Nm 50/1 acrylic yarn. Two types of welts, two types of knit structures and two types of welt heights were used (Table 1). Welt types and knit structures are given in Figure 1. Mock rib and mock pique structures of accordion welts were produced by laying elastomeric yarn in the same or alternate needles. Single jersey welt has been sold in market recently and was added to our study to test whether it provides lower pressure.

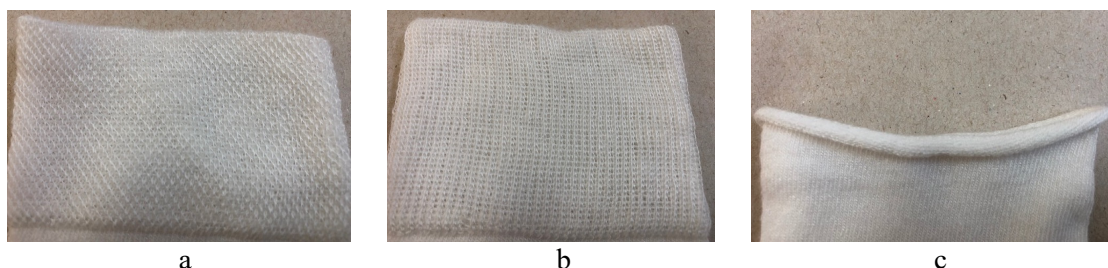


Figure 1. Welt types and knit structures (a. accordion welt – mock pique structure, b. accordion welt – mock rib structure, c. single jersey welt

Welt pressures were measured with Kikuhime pressure monitoring device and MST Professional 2 – Medical Stocking Tester. As in TSE CEN/TR 15831:2010 standard [5], leg circumference was taken as 30 cm for point B₁ (calf area) for both devices.

PASW Statistics 18 programme was used to evaluate test results.

3. Results and Discussion

Table 1. Welt characteristics and mean pressure values.

Welt Type	Knit Structure	Welt Height	Mean Pressure with Kikuhime device	Mean Pressure with MST Professional 2 device
Accordion	Mock Pique	3 cm	21,1 mm Hg	9,1 mm Hg
Accordion	Mock Pique	6 cm	20,5 mm Hg	12,6 mm Hg
Accordion	Mock Rib	3 cm	19,2 mm Hg	10,5 mm Hg
Accordion	Mock Rib	6 cm	20,1 mm Hg	13,6 mm Hg
Single jersey	-	-	6,8 mm Hg	5,3 mm Hg

To determine the statistical importance of variations of both devices' measurements, Independent Samples T Test method was applied. According to the results there was a significant difference between measured mean pressure values ($p=0,000$). Additionally, a strong positive correlation ($p=0,822$) was found between the results of both devices.

4. Conclusion

Results indicated that the difference between mean pressure values measured by these devices was significant. In order to do measurements with the Kikuhime pressure monitoring device, the socks were placed on a special metal ring that does not have the flexibility like a human skin. Therefore, despite the existence of a strong correlation between the two devices, it was seen that MST Professional 2 Medical Stocking Tester device could simulate human body more correctly.

When the test results and statistical analysis were evaluated, single jersey welt was found as the most comfortable in terms of pressure comfort. However, this type of welt can easily get loose due to its weaker structure resulting in a short lifetime. The strength and laundry performance of this type of welt may be investigated in a further research.

If MST Professional 2 – Medical Stocking Tester's results are considered, it can be seen that mock pique welt with 3 cm height provides more comfort, when single jersey welt is put aside.

Acknowledgement

This study was supported by Ege University Scientific Research Projects Coordination Unit (Project number 2017-EAMYO-001).

References

- [1] Pazireh E, Gharehaghaji AA and Haghighat E 2014 Study on the comfort of knitted elastic fabrics based on compressive deformation behavior, *JEFF*, **9(4)** 83-89
- [2] Momota H, Makabe H, Mitsuno T and Ueda K 1993 A study of clothing pressure caused by Japanese men's socks, *Japan Res. Association for Text. End-uses*, **34 (4)** 175-186
- [3] Tsujisaka T, Azuma Y, Matsumoto Y and Morooka H 2004 Comfort pressure of the top part of men's socks, *Textile Research Journal* **74 (7)** 598-602
- [4] Wu X and Li Y 2015 Testing methods and effect of clothing pressure on human body, *International Journal of Business and Social Science* **6 (4-1)** 126-129
- [5] TSE CEN/TR 15831:2010 – Method for Testing Compression in Medical Hosiery