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**The Wet Relaxation Of Cotton Interlock  
- A Literature Survey -**

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## The Wet Relaxation Of Cotton Interlock - A Literature Survey.

Most of the published work on wet relaxation of cotton knitgoods has dealt with single jersey fabrics. Historically, this can be explained by the fact that many of the early workers were connected more with the wool industry, where single jersey fabrics predominate, than with cotton and also, of course, because single jersey is a relatively simple structure to study.

The results of one major study on wet relaxation of ecru cotton interlock were published in 1964 by Hurt of HATRA (1), and this remains the only detailed study specifically on this subject. Other publications, notably by Knapton and Fong (2), and by Postle (3), have examined the properties of the interlock structure, but with special reference to wool, which has been found in single jersey studies to behave somewhat differently from cotton.

One area of disagreement between the workers on wool interlock concerns the possible inclusion of a yarn diameter term in the equations defining fully relaxed structure. Knapton has claimed that the yarn diameter effect found in the HATRA work can be attributed to incomplete relaxation, but Postle brings forward a more likely explanation: that as the structure approaches a jamming condition, fabric tightness and yarn diameter become more important; and he points out that interlock and rib structures are closer to jamming than is plain single jersey. (Recent work on single jersey, however, has shown that, here too, fabric tightness has a significant effect).

Whatever the reason, an examination of the results obtained by Hurt reveals that in contrast to the then-understood behaviour of single jersey fabrics, interlock does appear to exhibit an effect related to the diameter and hence the count of the yarn used in its construction. In this work, a relation between yarn count and effective yarn diameter ( $d_e$ ) was first obtained. This was found to be:-

$$d_e = (0.108 / \sqrt{Ne}) - 0.0086 \text{ (inches)}$$

where  $Ne$  is the yarn count.

Converting to the tex and metric system, this becomes:-

$$d_e = 0.0113 \sqrt{\text{tex}} - 0.0218 \text{ (cm)}$$

Hurt then derived empirical relationships for the wale and course spacings in the relaxed cotton interlock structure. After again converting from imperial to metric units these become:-

$$1/w = 0.134 \cdot l + d_e$$

$$1/c = 0.204 \cdot l - 0.27 d_e$$

where  $w$  = wales/cm  
 $c$  = courses/cm  
 $l$  = loop length in cm

Some examples of curves produced by these equations are given in Figures 1 and 2.

The relaxation treatment used by Hurt was a one hour wash in a rotary drum washer at 38°C followed by hydroextraction and tumble drying.

As this treatment involved only one wash/dry cycle, Knapton's criticism is probably valid in that complete relaxation was not attained.

However, as Hurt's paper appears to represent the only piece of detailed empirical research on the wet-relaxation of cotton interlock, it must be taken as a starting point for further study.

## References

1. F.N. Hurt, "*The Fabric Geometry of Wet-Relaxed Cotton Interlock*", HATRA Research Report No. 12, (January 1964).
2. J.J. Knapton and W. Fong, "*The Dimensional Properties of Knitted Wool Fabrics - Interlock and Swiss Double Pique*", *Textile Research Journal*, 1971, Vol. 41, 158.
3. R. Postle, "*Structure, Shape and Dimensions of Wool Knitted Fabrics*", *Applied Polymer Symposia*, 1971, No. 18, Part 2, 419.

Figure 1

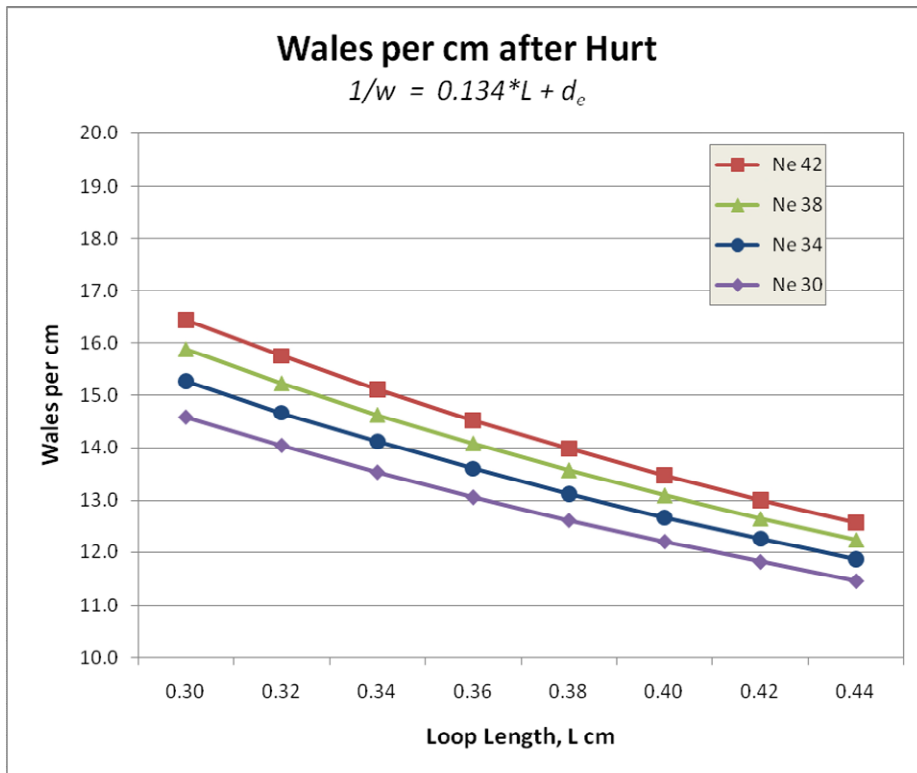


Figure 2

