Engineered Viscose Fibres Delivering Enhanced Wearer Comfort and Fabric Performance

Matthew North
Kelheim Fibres GmbH
Man-Made vs. Natural Fibres

- Man-made fibre producers are able to engineer products to meet specific requirements
  - Fibre Count
  - Fibre Length
  - Fibre Strength
  - Fibre Colour
  - Fibre Cross-Section
Examples of Modified Cross Section Fibres

- Inflated fibres for enhanced product performance
- Trilobal Galaxy® fibre offering improved absorbency
Viloft® Fibres for Apparel

• Viloft® fibre is engineered with a flat cross-section

• Improved fibre flexibility delivering softness

• Improved moisture transport and thermal insulation properties

A natural source of inspiration
Viloft® - a natural source of inspiration

• Viloft® fibres are produced using FSC-certified renewable raw materials

• Viloft® fibres are certified to the Öko-Tex 100 Standard

• Kelheim Fibres GmbH is certified to ISO9001:2000
Cross-Section – Influence on Fabric Performance

- The behaviour of the individual fibres in the yarn increases the number of voids (air pockets) in the yarn.

- The amount of air in the fabric is increased and contributes to the improved thermal and moisture management performance of the fabrics.

- The flat cross-section of Viloft® fibre has a significant influence on wearer comfort.
Behaviour of Fibre in Yarn

• A combination of Viloft® fibres with round fibres increases the number of voids in the yarn

• In 100% yarns, Viloft® fibres also promote the creation of voids
Objectives

- Determine the potential benefits of the use of Viloft® fibres in apparel fabrics
- Investigate the link between cross-section, yarn air content, and wearer comfort
- Validate the assumptions relating to the performance of fabrics manufactured with Viloft® fibres
• Compare fabrics containing Viloft® fibres…
  – In 100%
  – In blends with cotton
  – In blends with viscose
  – In blends with Modal
  – With other cellulosic fibres

• …in identical fabric constructions
Viloft® - Fabric Ranges for Comparison

• Single Jersey + Single Jersey Elastic

• Nm85/1 Ring E36/30 Gauge S + Z (Viloft® 1,9 dtex)

• Yarn blends
  
  100% Viloft®
  67%/33% Viloft®/Cotton
  50%/50% Viloft®/Cotton
  100% Cotton
  
  50%/50% Viloft®/viscose microfibre
  50%/50% Viloft®/MicroModal®
  50%/50% Cotton/MicroModal®
  100% MicroModal®
Viloft® - Fabric Ranges for Comparison

- Single Jersey + Single Jersey Elastic
- Nm50/1 E28/26 Gauge Z (Viloft® 1,9 dtex)
- Yarn blends:
  - 100% Viloft®
  - 100% Cotton
  - 67%/33% Viloft®/Cotton
  - 50%/50% Viloft®/Cotton
  - 50%/50% Viloft®/Cotton*
  - 50%/50% Viloft®/viscose
  - 50%/50% Viloft®/viscose

*Compact Spun
Air Content of Yarns

• Using microscopy in combination with AxioVision software from Zeiss, the air content of a selection of the fabrics tested was determined.
Air Content of Yarns

<table>
<thead>
<tr>
<th>Material</th>
<th>Air in Cross-Section</th>
<th>Fibre in Cross-Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viloft 100%</td>
<td>31.1%</td>
<td>68.9%</td>
</tr>
<tr>
<td>MicroCV 50% Viloft 50%</td>
<td>54.9%</td>
<td></td>
</tr>
<tr>
<td>CO 50% Viloft 50%</td>
<td>46.3%</td>
<td></td>
</tr>
<tr>
<td>Micro Modal 50%</td>
<td>43.2%</td>
<td>56.8%</td>
</tr>
</tbody>
</table>
Fabric Testing

- Residual Shrinkage
- Elasticity
- Wash Pilling
- Martindale Pilling
- Burst Strength
- Fabric Twist
- Wash Fastness
Martindale Pilling – Nm85/1 Single Elastic

Viloft® Basic Trials
Viloft® - Tests at the Hohenstein Institute

- Thermal Insulation (Rct *10³ m² K/W)
- Water Vapour Permeability Index (iₘₜ)
- Water Vapour absorbency potential (Fᵢ g/m²)
- Perspiration Buffering Test
Thermal Insulation ($R_{ct} \times 10^3$ m² K/W)

- Of the fabrics tested 100% Viloft® delivered the highest thermal insulation result.
- Fabrics containing man-made cellulosic fibres generally gave better performance than cotton.
Thermal Insulation ($R_{ct} \times 10^3 \text{ m}^2 \text{ K/W}$)

- The thermal insulation value of a cotton fabric can be increased by adding Viloft® fibre to the blend.

- An increase of 19% was achieved by increasing the level of Viloft® from 0 to 67%.
• Fabrics in 100% Viloft® deliver the best performance

• 100% Viloft® fabrics exceed the criteria defined by Hohenstein for functional underwear
- 100% Viloft® Fabrics deliver comparable performance to MicroModal fabrics
- Man-made cellulosic fibre fabrics outperform cotton fabrics
- Addition of Viloft® to the blend enhances the performance of cotton
The index is a combination of the capability of a fabric to absorb and transport perspiration.

All the fabrics tested had similar levels of performance.

Most fabrics met the criteria for “very good” performance.
Thermophysiological Wearer Comfort

- The results of these tests are combined to deliver an objective measure of wearer comfort.

- Fabrics in 100% Viloft® delivered the highest level of wearer comfort of the fabrics tested.
Summary of Hohenstein Results

• Fabrics containing 100% Viloft® fibres achieve the highest wearer comfort rating of the fabrics tested

• The incorporation of Viloft® fibres can improve the thermal insulation performance of blends

• Fabrics containing Viloft® fibres
  – deliver high levels of thermal insulation
  – meet the moisture management criteria for functional underwear
  – show excellent levels of wearer comfort

• The fabric series based on Nm50/1 yarns mirrored these results
Conclusions

- Of the fabrics tested, those with a high air to fibre content ratio deliver better wearer comfort results.
- The unique flat cross-section of Viloft® fibres lead to a higher air content in yarns and fabrics.
- The results of the Hohenstein tests confirm the superior performance of Viloft® fabrics in terms of wearer comfort.
Our thanks are due to:

*Linea K* - Roger Kargel

and to you, for your attention