LENO WEAVING

Opportunities and Constraints of the Needle Leno Technology

ir Geert De Clercq

ing Gregory Haezebrouck, Hannelore Biebau

Prof. Dr. ir Lieva Van Langenhove, Dr. ir Simona Vasile

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Textile Technology
Advanced Production Facility

Fancy Yarns
Technical Yarns
Leno
3D on Multirapier

Spinning
Technical Yarns
Weaving

Wearable electronics

Knitting

Contact: ir Geert De Clercq
Email: geert.declercq@hogent.be
Phone: +32/9/24.24.297
Textile Finishing
Rent a Lab

- Plasma
- Laser engineering
- Magnetron Sputtering
- Coating & Lamination incl.
- UV-coating
- Hot Melt (slot die, spray)
- Digital Technologies
- Printing, Coating
Advantages of Needle Leno

- Increased speed (400-500 ppm+)
- Simple technology
- Reduced warp tension

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Substituting Technology

- Heddle leno
- Warp knitting
- Standard weaving

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Opportunities

- Increased productivity
- Engineered stress-strain diagram
- Dimensional stable fabrics
- Gauze fabrics for special uses
- Curtains and upholstery fabrics
- Floor covering
Constraints

- Technology-related teething troubles
- Reduced patterning possibilities
- Lack of scientific know-how
- Measuring standard for resistance to shifting

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Gauze Fabrics

- Grid fabric in PP-tape (secondary backing)
- Single warp beam
Gauze Fabrics

- Grid fabric in PP-tape (secondary backing)
- Single warp beam
- Tension difference between straight and crossing warp

- Solution = double backrest (?)
Use of Twin Beams

- Opportunities
  - Different yarns for straight and crossing ends
  - Different tension for both warp systems
Engineering Stress-Strain

- Stiff Yarn
- Crossing End
- Fabric in Warp Direction
- Leno Couple
- Elastic Yarn
- Straight End

Stress vs. Strain graph with various yarn types and fabric structures.

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**Improved Dimensional Stability**

- **Standard woven fabrics**
  - Decrease of crimp in stretched direction
  - Increase of crimp in perpendicular direction
  - Inward bending
- **Leno fabrics with tension variation in warp**
  - No crimp in straight ends
  - No crimp variation in straight ends
  - No crimp variation in weft
  - No bending
Improved Dimensional Stability

- Standard woven fabrics
Improved Dimensional Stability

- Leno fabrics with tension variation in warp
Improved Dimensional Stability

- Leno fabrics with tension variation in warp
Gauze Fabrics

- PVC-coated yarns
Gauze Fabrics

- Result: semi-transparent printable fabrics
Result: semi-transparent printable fabrics
Curtains and Interior Fabrics

- Lightweight fabrics (curtains)
- Weft patterning:
  - Weft density
  - Weft yarns
Curtains and Interior Fabrics

- Lightweight fabrics (curtains) with additional fancy yarn
Curtains and Interior Fabrics

- Upholstery fabrics (chenille)
Curtains and Interior Fabrics

- Upholstery fabrics (chenille)
Curtains and Interior Fabrics

- Upholstery fabrics with weft patterning
Curtains and Interior Fabrics

- Upholstery fabrics with weft patterning
Sunscreens

- Coated glass in straight warp
- PES in crossing warp
- Bending of glass yarns to be avoided
Lenocarpet

- Flat woven textile floor covering
- Coarse monofilament in straight warp
- Fine multifilament in crossing warp
- Possibility for fancy yarns in weft
- Warp stripes possible via crossing warps
- Very light weight, less than 600 g/m²
Settings

- Pilot bar – Needle bar – Reed to be aligned perfectly
- Especially critical with higher warp density
  - No crossing of warp ends
  - Needles can damage filaments
Settings

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Conclusion

- **Needle Leno**
  - Faster $\Rightarrow$ higher yield
  - Simple and user friendly

$\Rightarrow$ New applications

- Lot of know-how yet to discover $\Rightarrow$ more research needed
- Teething troubles to be cured

*(Needle) Leno = Emerging Technology*
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QUESTIONS ?

Thank you for your Attention!
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For more Information on the Research on Needle Leno, feel free to contact:

ir Geert De Clercq - geert.declercq@hogent.be

Gregory Haezebrouck - gregory.haezebrouck@hogent.be

University College Ghent, Department of Textiles
Voskenslaan 362, B-9000 Gent, Belgium
Tel +32/9/242 42 97     Fax +32/9/242 42 92