MODSIMTex

Development of a rapid configuration system for textile production machinery based on the physical behavior simulation of precision textile structures

EURATEX
4th Annual Public Conference
MODSIMTex Project

Grant Agreement Number: NMP2-SL-2008-214181

Project Coordinator: INTEXTER-UPC

Partners involved: 12

Start date: 1 November 2008

Duration: 42 months

Total Budget: 4,624,494 €

Community financial contribution: 3,299,340 €
The objective of the project is to develop a simulation system (software) for the physical-mechanical properties of the textile structures that enables the rapid manufacturing process configuration.

The system will support the product development and production for the following products of the textile value-added chain:

- Spinning
- Weaving
- Knitting
- Non-wovens
Today

New product to manufacture

Preliminary machinery setup

Production test

Parameters achieved? No

Yes

Production

Future with MODSIMTex

New product to manufacture

MODSIMTex System

Production

Delivery

Energy, material and time waste

Delivery
<table>
<thead>
<tr>
<th>Organization</th>
<th>Country</th>
<th>Role in MODSIMTEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTEXTER-UPC</td>
<td>Spain</td>
<td>Coordinator and R&amp;D performer, expert on mathematical modelling of textile structures (spinning)</td>
</tr>
<tr>
<td>KEMLG-UPC</td>
<td>Spain</td>
<td>A.I. experts</td>
</tr>
<tr>
<td>TU-LODZ</td>
<td>Poland</td>
<td>R&amp;D performer, expert on mathematical modelling of textile structures and simulation of knit fabrics.</td>
</tr>
<tr>
<td>STFI</td>
<td>Germany</td>
<td>R&amp;D performer, expert on non-woven structures simulation</td>
</tr>
<tr>
<td>DITF-MR</td>
<td>Germany</td>
<td>Multi-stage innovation management expert, Assessment of innovation level</td>
</tr>
<tr>
<td>SPOLSIN</td>
<td>Czech Rep.</td>
<td>Ring-spinning yarn and weaving fabric expert manufacturer</td>
</tr>
<tr>
<td>T.F.A.</td>
<td>Czech Rep.</td>
<td>Weaving machinery and products expert</td>
</tr>
<tr>
<td>HEIMBACH</td>
<td>Germany</td>
<td>Needle-punch non-woven manufacturer expert</td>
</tr>
<tr>
<td>ROEDERS</td>
<td>Germany</td>
<td>Non-woven manufacturer expert</td>
</tr>
<tr>
<td>SANTONI</td>
<td>Italy</td>
<td>Knit products and knitting machinery expert</td>
</tr>
<tr>
<td>INFOTEX</td>
<td>Spain</td>
<td>Textile Simulation Software Developer</td>
</tr>
<tr>
<td>BMS</td>
<td>Belgium</td>
<td>Textile on-line process monitoring and control expert</td>
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Main Tasks of the Project

- Development of mathematical models for the physical properties of the textile structures, registering their relationship with production machinery setup parameters.

- Development of the simulation system based on finite elements, using the mathematical models defined previously.

- Development of the artificial-intelligence based system, using A.I. algorithms and also focused in the production machinery setup parameters.

- Integration of both systems in one sole integrated simulation system.

- Integration of the simulation system into the manufacturing processes, through interfaces with the textile machinery responsible of producing the textile structures studied in this project.

- Finally, the integrated simulation system will be embedded in a textile CAD/CAM design software package, directly applicable to production.
Processes in focus

- **Spinning**
  - F.E.M./Math. Model: INTEXTER, KEMLG, INTEXTER
  - A.I.: TU-LODZ, KEMLG, INTEXTER
  - Model Validation: DITF-MR, INFOTEX
  - Industrial Process: SPOLFIN
  - Final Software: INFOTEX

- **Weaving**
  - TU-LIBEREC
  - F.E.M./Math. Model: INTEXTER
  - A.I.: TU-LODZ, KEMLG, INTEXTER
  - Model Validation: DITF-MR, INFOTEX
  - Industrial Process: TFA
  - Final Software: INFOTEX

- **Knitting**
  - TU-LODZ
  - F.E.M./Math. Model: INTEXTER
  - A.I.: TU-LODZ, KEMLG, INTEXTER
  - Model Validation: DITF-MR
  - Industrial Process: SANTONI
  - Final Software: INFOTEX

- **Nonwovens Production**
  - STFI
  - F.E.M./Math. Model: INTEXTER
  - A.I.: TU-LODZ, KEMLG, INTEXTER
  - Model Validation: DITF-MR
  - Industrial Process: HEIMBACH, RÖDERS
  - Final Software: INFOTEX

Legend:
- Industrial partner (machinery constructor)
- Industrial partner (textile manufacturer)
- Industrial partner (software developer)
- Research centre
Integration in the production process of the Modsintmex system

User data input

Raw material parameters
T ->
U ->
V ->
W ?
X ?
...

Final product parameters
A ->
B ?
C ?
...

Process settings
A ?
B ?
C ->
...

Calculation

Data output 1

Raw material parameters
T ->
U ->
V ->
W ->
X ->
...

Final product parameters
A ->
B ->
C ->
...

Process settings
A ->
B ->
C ->
...

Data output 2

Raw material parameters
T ->
U ->
V ->
W ->
X ->
...

Final product parameters
A ->
B ->
C ->
...

Process settings
A ->
B ->
C ->
...
Integration in the production process of the Modsinttex system

- Raw Fibre Procurement
- Nonwovens Production
- Product Model: FEM, Math. Model
- Process Model: Math. Model
- Product development process
- Online Process controller
- Delivery

Processing Experience in Case Base

Product quality lab.
MODSIMTex

Thank you for your attention

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