Textile Learning
Factory 4.0 –
Preparing Germany’s
Textile Industry for
the Digital Future

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7th Conference on Learning Factories, CLF 2017
April, 2017
4 Divisions
400 Employees

Natural & synthetic fibrous material
Yarn
Fabric
Composite
(Semi-) Finished parts

RESEARCH AND SERVICE IN ONE HAND

Digital Capability Center Aachen
Fiber based solutions 4 you
Institut für Textiltechnik Aachen

International locations

Augsburg/GER

Ansan/Korea

Geleen/NL

Istanbul/TR
i4.0
Information
Production
Product
Knowledge
i4.0 Information - SozioTex

SozioTex
Scientific Team

ELSI aspects
= ethical, legal and social implications

Technological change

Interaction

Social change

Human

Machine

Design
i4.0 Information - SozioTex

Please point your camera to the ID marker on the bobbin creel.

Keep the ID marker in sight to see the augmentation.
i4.0 Production - SPEEDFACTORY

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag
i4.0 Production - SPEEDFACTORY
i4.0 Product – mi ZX FLUX
i4.0 Product and Production – StoreFactory
i4.0 Knowledge - Digital Capability Center Aachen

Product
- Smart, customizable wristband

Machines
- 1 Warping creel
- 2 Warping machine
- 3 Weaving machine
- 4 Light table
- 5 Coating & thermo-setting device
- 6 Inkjet printer
- 7 Cutting machine
- 8 Sewing machine
- 9 Testing station
DCC Aachen
We believe that mastering Industry 4.0 needs to be addressed holistically

**Major hurdles to overcome ...**

- Difficulty to coordinate actions across different organizational units
- Lack of courage to push through radical transformation
- Lead from the top
- Lack of necessary talent, e.g., data scientists
- Hire and build digital talent
- Concerns about cybersecurity when working with third-party providers
- Solve real business problems
- Lack of a clear business case that justifies investments in underlying IT architecture

The Digital Capability Center Aachen supports companies along their digital transformation journey.
The DCC Aachen provides insights into all relevant areas of Industry 4.0

- **Resource optimization** (e.g., yield, energy)
- **Increase asset utilization** (e.g., predictive, remote, and self-guided maintenance)
- **Labor efficiency** (e.g., human / robot collaboration)
- **Improve quality** (e.g., adaptive quality assistance)

**SOURCE: Manufacturing Practice**

- **Digitally powered performance management**
- **Expert-system-supported root-cause problem-solving**
- **Analytical skills** for Big Data
- **Abilities to work with new digital elements**, e.g., collaborative robots
Based on experiential learning modules we demonstrate how to approach and benefit from Industry 4.0

**CxO workshop agenda**

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
<th>Content</th>
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<tbody>
<tr>
<td>Introduction</td>
<td>30 min</td>
<td>• Industry 4.0 key concepts and themes</td>
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<td></td>
<td>• Introduction to Factory of the Future</td>
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<tr>
<td>Observation of “Lean Company”</td>
<td>30 min</td>
<td>• Tour of facilities and model line operating in good practice current state mode</td>
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<tr>
<td>Briefing</td>
<td>15 min</td>
<td>• Introduction to the case study (company profile)</td>
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<td></td>
<td></td>
<td>• Digital diagnostic basics</td>
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<tr>
<td>Industry 4.0 waste walk</td>
<td>60 min</td>
<td>• Digital waste walk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interviews with shop floor operators</td>
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<tr>
<td></td>
<td></td>
<td>• Identify digital improvements</td>
</tr>
<tr>
<td>“Industry 4.0 line” shop floor visit</td>
<td>45 min</td>
<td>• Industry 4.0 showcase (e.g., predictive maintenance, supply chain management 4.0, e-buyer)</td>
</tr>
<tr>
<td>Debrief and discussion</td>
<td>30 min</td>
<td>• How to get started at your site – approaches to diagnostics</td>
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**Key takeaways from CxO workshop**

- ✓ Real Industry 4.0 experience
- ✓ Learn to digest digital potential
- ✓ Insights into digital solutions
The DCC Aachen features a fully operational production line showcasing key digital shop floor applications.

- Product configuration and order process
- Product development
- Production planning
- Purchasing
- Internal logistics
- Production
- Packaging and shipment
- After sales service
- Digital assistance for operator
- AR assistance for maintenance
- Digital performance management
- Condition monitoring
- Coating and thermosetting
- Weaving
- Printing
- Cutting
- Sewing
- Quality control and packaging
- Internal logistics
- AGV & AR for logistics
- Self-adjusted workstation
The line can be converted from “Lean” to “Industry 4.0” operation to enhance the learning experience.

**Digital applications shown in future state**

1. Condition monitoring
2. Product tracking & tracing
3. Digital assistant system
4. Digital performance management
5. AGV in logistics
6. YET
7. iCycle time
8. Real-time WIP
9. Predictive maintenance
10. In-line QC & adaptive machining
11. Human machine collaboration
12. 3D printing

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**Level 1: Current State Operation (Lean)**
- Experience lean working principles on a real manufacturing line

**Level 2: Future State Operation (Industry 4.0)**
- Live demonstration of Industry 4.0 solutions

Experience lean working principles on a real manufacturing line and live demonstration of Industry 4.0 solutions.
You will be able to explore state-of-the-art applications with the most effective digital technologies.

Digital solutions will be implemented over the course of 2017.

Three examples:

- **Condition monitoring**
  Improve equipment reliability and reduce down-time by -75%.

- **Digital performance management**
  Increase productivity of your managers by +10%.

- **Digital assistant system**
  Reduce training time and operators’ skill variability by -50%.

SOURCE: Manufacturing Practice
Until 2018 the DCC Aachen will evolve into a full “digital company”, adding new digital solutions in several waves.

- **2017**
  - Grand Opening
  - Digital shadow
  - Smart tracking system for operators
  - Digitally supported assembly workplace

- **2018**
  - Predictive Maintenance
  - Augmented reality for Gemba Walk
  - Lifecycle management

- **2019**
  - 3D printing
  - Collaborative robot

- **2020**
  - Augmented reality for maintenance
  - Augmented reality for quality control

- **2021**
  - Picking robot
  - iCycle time

- **2022**
  - Augmented reality for logistics
  - Real-time WIP

- **2023**
  - IT security
  - Self-adjusting processes

**SOURCE:** Manufacturing Practice
We are building the leading global network of Digital Capability Centers – showcases and testbeds for Industry 4.0

Digital Capability Center
Chicago
Partnership with DMDII – a major manufacturing hub with 200+ players, and leading universities

Digital Capability Center
Aachen
Joint partnership with ITA (RWTH Aachen), PTC and other leading technology providers

Digital Capability Center
Venice
Joint venture with an Industrial Association and leading IoT players

Digital Capability Center
Beijing
Partnership with leading universities and wide range of industry partners

Digital Capability Center
Singapore
Public-private partnership with ARTC, A*STAR and 40+ industry players

SOURCE: Manufacturing Practice
The DCC Aachen was founded by McKinsey & Company and the Institut für Textiltechnik as a joint partnership with PTC and leading technology providers.
Contact us for more information

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