**Project introduction iComposite 4.0**

**Project key figures**

**Key figures:**
- **Duration:** 01.01.2016 – 31.12.2018
- **Project budget:** 5,147,000 Euro
- **Sponsored by:** BMBF
- **Managed by:** PTKA

**Project content:**
“Development of an integrative and self-regulation production system for the large-scale production of multi-material FRP Parts”

**AZL at your service:**
- Development of smart production systems (CPPS)
- Process chain development
- Process investigations
- Process costing and optimization
- Production machine design
- Bilateral and joint partner projects

**Project partners:**
- **Schuler**
- **Frimo**
- **Siemens**
- **Apodius**
- **Toho Tenax**
- **ID Systec**

**Storing of production history on integrated RFID-Chip**
- **Additive fibre spraying and quality assurance**
- **Additive fibre placement and quality assurance**
- **Controlled resin injection and quality assurance**
Project introduction iComposite 4.0
Raising productivity for large-scale production

Increasing need for lightweight design for various markets
➢ Composites are one key enabling technology

BUT:
■ Inefficient material usage (scrap up to 50%)
■ High reject rates (up to 20%)
■ Limited automation
■ No consecutive quality assurance
➢ Small and medium production volumes
➢ Increased productivity is required

Aim of iComposite 4.0: 50 % part cost reduction by automated preforming and product function oriented production
Project introduction iComposite 4.0
Setup of a self-regulating production system

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1. Multi-material design
   [Toho Tenax]
2. 3d fibre spraying
3. Comparison of mechanical properties
   [Apodius]
4. Autonomous adaption of continuous fibre design
   [Toho Tenax]
5. Manufacturing of individual continuous fibre patches
   [BA Composites]
6. Automated draping
   [AZL]
7. Adaptive RTM process
   [AZL]
8. Data tracking
9. Process & machinery integration

3d fibre spraying

Toho Tenax
Project introduction iComposite 4.0
Cost reduction by automated preforming

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3d-Fibre Spraying + Towpreg Placement + Resin Transfer Moulding

Cost reduction by:
+ Load optimized multi material design and cost efficient base materials
+ Automated preforming and no scrap production

However:
- Product fluctuations possible
- Production solely oriented on geometrical tolerances
Project introduction iComposite 4.0
Cost reduction by product function oriented production

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Material- and cost efficient part production

- Adaption of reinforcement to simulation
- Prediction of mechanical properties by structure simulation
- Inline quality control
- Reinforcement with individualised pattern for compensation of fluctuations
- Modell based process control
- Adaptive RTM: “zero scrap” due to adaption of process to individual preform

3d fibre spraying: Process fluctuations can result in scrap

≈ 2,000 mm

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The future of composite manufacturing at AZL
AZL at your service:
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Project introduction iComposite 4.0
Setup of production system at AZL started

RTM press and tooling

- textile demonstrator preform
- 3d fibre spraying and optical measurement system
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Predicted cost savings by iComposite 4.0

Cost structure for lightweight production \[\text{VDMA12, YB14}\]

- 50% Invest
- 35% Operation
- 50% Material

Cost savings by increase of production: 30%
Reduction of labour costs by automation: 30 - 40%
Cost reduction by usage of cost efficient base materials: 35%
Cost reduction by multi-material design: 30 - 40%
Scrap reduction: 25 - 50%
Production rejects: 5 - 20%

Potential reduction of part costs: 49 - 64%

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Project partners and funding

Project partners:

“Project partners: [List of partners]

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