Innovation in Production Technology & Organisation

In cooperation with the Institutes EEP, IFF and ISW of the University of Stuttgart

Future is our Product
Innovative. Interdisciplinary. Sustainable.
Fraunhofer IPA as part of the Fraunhofer-Gesellschaft

Fraunhofer Institute for Manufacturing Engineering and Automation IPA

- Among the top three of 70 institutes of the Fraunhofer-Gesellschaft
- More than 50 years of experience
- Core competence in industrial production and automation
Networks of Research and Practice
Fraunhofer IPA provides knowledge transfer

University of Stuttgart
Institutes EEP IFF ISW

Graduate School of Excellence
advanced Manufacturing Engineering

Industry Know-how

Education ➔ Research ➔ Development ➔ Implementation ➔ Application

Stuttgarter Produktionsakademie
Fraunhofer IPA | Universität Stuttgart

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September 2014
# Organization

**Directors:** Prof. Dr.-Ing. Thomas Bauernhansl / n.n.

## Business Units and Research Areas

<table>
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<tr>
<th>Automotive</th>
<th>Machinery and Equipment Industry</th>
<th>Electronics and Microsystems</th>
<th>Power Industry</th>
<th>Medical Engineering and Biotechnology</th>
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<td>Production Organization</td>
<td>Surface Technology</td>
<td>Automation</td>
<td>Process Technology</td>
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## Stuttgart Production Academy

### Competence Center digiTools for Production

- Project Group for Automation in Medical Engineering and Bio-engineering PAMB, Mannheim
- Application Center for Large Structures in Production Engineering AGP, Rostock
- Project Group Process Innovation, Bayreuth
- Project Group Production Management and Informatics PMI, Budapest
- Office for Process Engineering of Functional Materials and Robotics OPER, Osaka
- Fraunhofer Austria Research GmbH, Wien

## Additional Locations

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What we can do for manufacturing companies
Securing competitiveness through…

- Independency
- Excellent network of research and industrial consultancy
- Transferring innovations into applications
- A wide portfolio covering the entire value chain
- Internationality and multidisciplinarity
- Project teams tailored to clients’ needs
- Enabling companies staff for continuous improvement on-site
Current Research Projects
in Production Technology & Organization
Automotive production minus conveyor belt & tact time
Active Research Environment for the Next Generation of Automobiles

ARENA 2036

Flexible production of the future for function-integrated lightweight construction

- Public Private Partnership
- Duration: 15 years, starting July 2013
- Research factory as integration platform
- Sponsored by:
Service-oriented Application Composition
Information and Communication Technology for Manufacturing Optimization

- Federative cloud platform for interoperable production IT
- Companies can take advantage of the various opportunities offered by service-oriented applications
- Flexible and cost-efficient features, that are matched to the needs throughout the manufacturing and service lifecycle

**Sponsored by:**

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Selective and Overspray-free Painting
Energy-efficient Painting of Car Bodies InnoCaT 5

The energy consumed by painting process exceeds half of the total car body production energy consumption!

**Objectives:**
- New coating techniques that do not damage paintwork for increased material and energy efficiency
- New drying concepts for energy-efficient operation
- Modular product/painting strategy for flexible manufacturing of multi-substrate car bodies

**Sponsored by:**
Sustainable Production and Closed-Loop Supply Chain
European Li-Ion Battery Manufacturing for Electric Vehicles

- Introduction of green production technology for battery electrodes based on the (patented) solvent-free TransApp powder coating technology developed at IPA

- Objectives in Fraunhofer IPA work packages:
  - new dry coating method for battery electrodes
  - new manufacturing method for current collector foils
  - contribution to factory planning
  - battery recycling and closed-loop supply chain

- Sponsored by:
  - DAIMLER
  - SOLVAY
  - PRAYON
  - liten
  - UNIVERSITY OF NEWCASTLE UPON TYNE
  - ...and many others
Industrial projects in Production Optimization & Lean Order Management
Typical project approach
“Holistic Optimization of Order Fulfilment and Production”

1. Quick-Check
   4-5 days on-site (project staff 1-2 persons)

   Approach:
   Factory tour, rough analysis and evaluation of fulfilment process
   Definition of 3 reference products or order types
   → Value stream mapping

2. Results
   Management-Summary,
   recommendations, potential estimation, roadmap

Focus on ...
Order fulfillment
• Products and variants, order types,
• Core processes (sales, work preparation, planning, procurement) and IT-Systems (ERP, MES, …)
• Effort und lead time analysis based on reference products

Production
• Production and material workflow
• the utilisation of floorspace
• Cycle time, lying time
• Value added processes

Sourcing-Structure
Suppliers, locations, transport relations, …

Cost-Structure
Direct costs (material, staff), indirect costs, …
Typical project approach
“Holistic Optimization of Order Fulfilment and Production”

Focus on...

1. Detailed analysis
   - quotation process
   - parts lists creation
   - Procurement, production planning
   - Disturbances in production & logistics
   - Production & logistics processes

2. “To Be” concept
   - Description of “To Be” concept for the order types (processes, responsibilities, time requirements)
   - Required adaptation of production IT (measures, prioritization)
   - Required adaptations on data structures (parts lists structure and levels, work plans)

Results

- Detailed information basis for To Be concept:
  Main processes & fulfilment structure
  Estimated potential in productivity
  First proposed measures

- Validated “To Be” concept:
  To be processes and planned measured
  2-3 prototype description on future data, organization and process structure
Project Example
“Development of a order management and production system for a turbulent market environment”

- **Duration:** about 6 months
- **Customer:** Producer of gear components in Germany
- **Subjects / Goals:**
  - Creating transparency
  - Anticipating and avoiding turbulences
  - Optimized build-to-order
  - Continuous production and procurement
  - Tact-oriented production principle
  - Flexible capacity
  - Measuring success
- **Approach:**
  - Analysis / Quick-Check: Order management and production
  - Development “to be concept”
  - Implementation
Project Example
“Optimizing of the development and sample production processes for exhaust systems”

- **Duration:** about 4 months
- **Customer:** Producer of exhaust systems in Germany
- **Subjects / Goals:**
  - Reduction of the cycle time
  - Reduction of administrative costs
  - Optimizing order management
- **Approach:**
  - Analysis / Quick-Check:
    - Construction
    - Order management
    - Production
  - Development “to be concept”
  - Implementation
Project Example
“Optimizing Production Network, Order Management and Production”

- **Duration:** about 1,5 years
- **Customer:** Manufacturer of Textile goods in Turkey
- **Subjects / Goals:**
  - Optimizing production network
  - Optimizing logistic processes
  - Optimizing order management and production processes
  - Optimizing product calculation (variant costs analysis)
- **Approach:**
  - Analysis / Quick-Check:
    - Production network and strategy
    - Order management and production process
    - Logistics processes
  - Development “to be concept”
  - Implementation
Project Example
“Optimizing Production Network, Order Management and Production”

- **Duration:** about 2 years
- **Customer:** OEM Automotive
- **Subjects / Goals:**
  - Setting up a database for logistics planning
  - A transparent method for supplier evaluation
  - Evaluation of sourcing alternatives based on standard process definition
  - Detail Planning logistic (transport, packaging, delivery, handling)
- **Approach:**
  - Analysis / Quick-Check:
    - Product- and sourcing structure
    - Used methods and requirements
  - Development and optimization of new / existing methods
  - Development “to be concept” of logistics / supply planning
Contact Persons for Expert Workshop in Stuttgart, November, 24th-25th 2014

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