Technische Universität Braunschweig

Institut für Werkzeugmaschinen und Fertigungstechnik

SPIRE-06-2015 project ideas
PPP Information Day, 21 October, Brussels

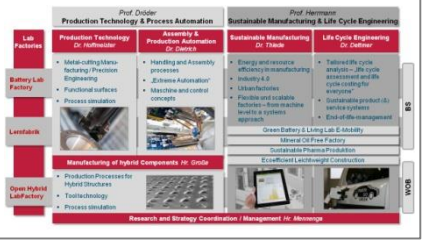
Jan Beier

Technische Universität Braunschweig – Institute of Machine Tools and Production Technology / Sustainable Manufacturing and Life Cycle Engineering

Who we are and what we do

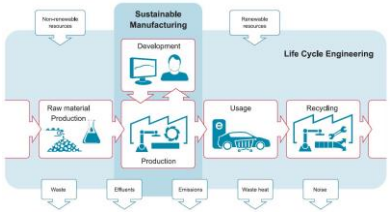
Institute of Machine Tools and Production Technology at TU Braunschweig

- Located at the heart of Germany
- Two chairs: Production Technology & Process Automation and Sustainable Manufacturing & Life Cycle Engineering
- Currently 60+ employees



Chair of Sustainable Manufacturing & Life Cycle Engineering

- Two main working fields: Sustainability in production and Life Cycle Engineering
  - Energy and resource efficiency in manufacturing, Industry 4.0, Urban factories, flexible und scalable factories
  - Tailored life cycle analysis, sustainable product (&) service systems

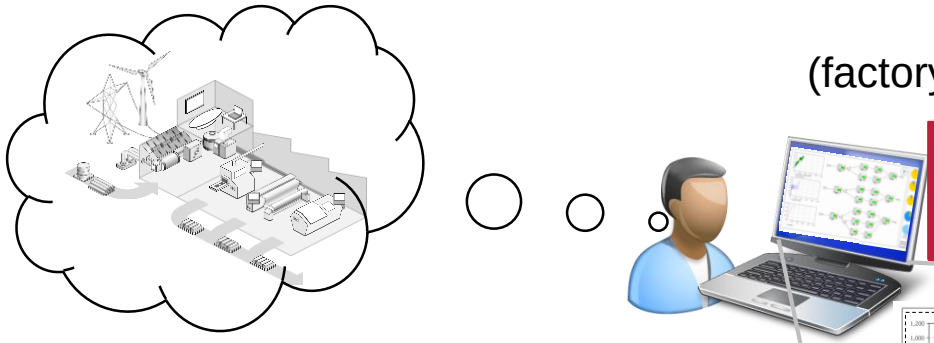


Relevant EU-projects

EMC2-Factory Eco Manufactured transportation means from Clean and Competitive Factory

EUREKA

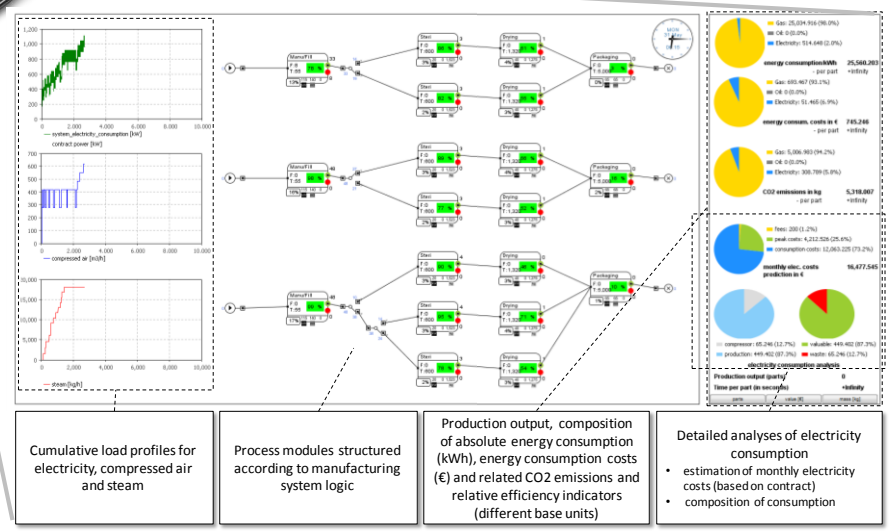
Example: Developing an energy and resource-oriented simulation suite



(factory) system level as the relevant context for....

Energy and material oriented system simulation

- Dimensioning (and control) of infrastructure and equipment (machines, TBS)
- Realistic evaluation
  - Cost (e.g. peak surcharges)
  - Environmental impact (LCA)
  - Technical performance
- Derivation and assessment of all possible energy efficiency measures (energy eff. motors, batch size)

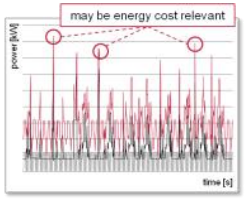


Cumulative load profiles for electricity, compressed air and steam

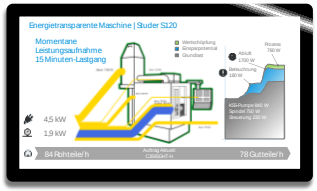
Process modules structured according to manufacturing system logic

Production output, composition of absolute energy consumption (kWh), energy consumption costs (€) and related CO2 emissions and relative efficiency indicators (different base units)

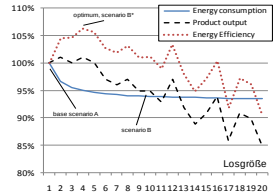
Detailed analyses of electricity consumption
- estimation of monthly electricity costs (based on contract)
- composition of consumption



Load profile



Visualization

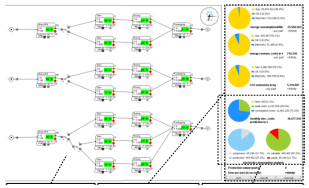


Scenario analysis

Project idea: multi-level simulation, real-time monitoring, visualization and evaluation of energy and material flows for energy and resources efficiency

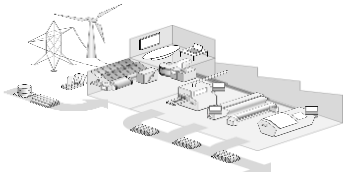
Resource oriented simulation suite

- Multi-objective decision making on **several levels of a factory**
- Identifying and **predicting consumption patterns**
- Modeling of **flexible energy use** in prod. systems
- Control of **volatile energy/ resource demands** as a prerequisite for **industrial symbiosis** (also scheduling issues)



Ubiquitous sensor network

- **Real-time** integration of data from the physical system
- Metering **energy** and **resource** flows
- All **technical building services** including electricity, compressed air, heat and space heating



Innovative tools

- **Visualization** of energy and material flows
- **Innovative** and up-to date tools: touch tables, physical machine models
- Dynamic **life cycle assessment** (LCA) and **life cycle costing** (LCC)

Test site

- Provide test bed to **validate** and **demonstrate**
- Enablement for **implementation**
- Basis for **learning** and **teaching**
- Environment to create **new ideas**

Die Lernfabrik
Forschung · Ausbildung · Anwendung

What we are looking for

Your partners from TU Braunschweig

- Prof. Christoph Herrmann (Institute of Machine Tools and Production Technology)
- Prof. Stephan Scholl (Institute of Chemical and Thermal Process Engineering)
- Prof. Arno Kwade (Institute of Particle Technology)

Existing contacts and partners

- Consortium from Open Hybrid Lab Factory
- LIs non-ferrous, e.g. aluminum and zinc
- SMEs, including technology providers

Looking for ...

- (International) partners from process industries, e.g. non-ferrous, (petro-)chemical
- Both SMEs and LIs
- Technology providers: software, automation, factory planning, technical building services ...

Thank you!

Contact details

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