Transform Production Systems Engineering to Realize the Smart Factory
• Christian Heck
• Solution Manager Production Systems Engineering
• Bachelor in Electrical Engineering and Automation
• 15 years practical experience for Siemens
  • Software integration for HMI systems
  • Engineering, construction and commissioning for production plants in the Oil & gas industry
  • Service development for data analytic services using IoT systems
  • Solution manager for production systems engineering
• 35 years old, married, 3 children (7,4,1)
feed back insights to continuously optimize product and production

Digital Product Twin

Digital Production Twin

Digital Performance Twin
Consequences

Inefficient Engineering because of none value added activities

Higher product and production cost by not optimized production solutions

No utilization of the digital twin potential
Production Systems Engineering for the Smart Factory

- (Manufacturing) Process planning
- Factory and Line Design
- Automation Concept and Design
- Logistics Planning and Production Flow Simulation
- Manufacturing Process Simulation
- Automation Engineering
- Virtual commissioning - for Production Lines
- Virtual commissioning - for Production Plants
- Process and Resource Knowledge Management
- Engineering data exchange with external partners
- Closed loop Production Systems Engineering

Scenarios in engineering: study, concept, basic, detailed etc.
Drive modularization and standardization across disciplines to enable the digital thread

- Reduce project cost and degree of component variants
- Reduce time to market through faster engineering with re-use components
- Improve maintenance, operations and repair with reduced spare parts and variants
Link the digital twin of the product and the digital twin of the production

- Increase your manufacturing planning productivity by up to 40 percent
- Increase collaboration between product design, manufacturing and shop floor execution
- Reduce cost of change with early detection and communication of product design issues

- Optimized Product Design based on manufacturing constraints
- Base Factory and Line Design on common Resource Structure
- Optimize machine design in context of product and manufacturing planning
Engineer a virtual representation of your production system

- Efficient layout planning and machine design
- Point cloud integration to synchronize with plant context
- Early optimization through digital representation

Collaboration

- Update Resource and Process structure with optimized Plant Design

Manufacturing Process Planning

- Load Factory Design, Process and Resource Information for Simulation

Logistics Planning and Production Flow Simulation

- Load Factory Design, Process and Resource Information for Process Simulation

Manufacturing Process Simulation

- Integrate mechatronic design, mechanical engineering and simulation

Mechatronic Machine Concept

Product

Resource

Process

Engineering

Resource and Library Management

Cost & Profitability Management

Digital Engineering thread managed in Teamcenter
Predict and optimize the overall manufacturing performance of your production system

- Reduce new system costs by as much as 20 percent
- Reduce inventories by as much as 60 percent
- Reduce throughput time by as much as 60 percent
- Optimize systems for reduced energy consumption

Resource and Library Management
Digital Engineering thread managed in Teamcenter
Cost & Profitability Management

Engineering

- Logistics Planning and Production Flow Simulation
- Manufacturing Process Simulation

Collaboration

- Update Resource and Process structure with optimized Plant Design triggered by simulation insights
- Update Plant Design along optimized plant behavior based on simulation insights
- Integrated machine development to optimized manufacturing performance
Automatically generate electrical and automation projects

- Increased engineering efficiency through mechatronic templates and parallel engineering
- Better Quality and faster change management with automated generation of automation and electrical data
- Reduced total cost of ownership with use of PLM integrated OOTB software
Virtually validate the behavior of your production system

- Shorter time to production with reduced commissioning time
- Better production performance and higher PLC code quality
- Reduced cost for prototypes and shop floor commissioning

Virtual Commissioning for Production Plants and Production Lines

Engineering

Process
Resource
Plant Behavior
Process Behavior
Electrical / Automation
PLC code / HMI
Validated Process Behavior
Validated Plant Behavior

Collaboration

Automation Concept and Design
- Corrected Automation Design
- Updated Electrical design

Automation Engineering
- Corrected PLC code
- Updated HMI design

Resource and Library Management
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Cost & Profitability Management

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Commission the physical production system

Create the digital twin of production based on the digital planning model.

- Installation of equipment
- Shop floor commissioning
- As built documentation

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Resource and Library Management

Cost & Profitability Management

Engineering

Collaboration

Process Planning
Closed loop connection of process execution with planning

Factory and Line Design
As built update for Factory and Machine Design

Manufacturing Process Simulation
As built Robot programs

Automation Concept and Design
As built updates for Automation Design

Automation Engineering
As built update for HMI and PLC code

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Optimize production based on the digital performance twin

- **Manufacturing Process Planning**
  - Analyze process steps, process parameters with real manufacturing operations (Closed loop manufacturing)

- **Manufacturing Process Simulation**
  - Analyze cell / line operations with real performance.
  - Compare energy estimation and real consumption.

- **Logistics Planning and Production Flow Simulation**
  - Verify overall energy consumption
  - Buffer / logistics estimation with operational data

**SIEMENS**
Ingenuity for life

- Machine Data, Energy Data, Operational Information, Equipment data
- Cost & Profitability Management
- Resource and Library Management
- Digital Engineering thread managed in Teamcenter

- Resource
- Plant Behavior
- Process Behavior
- Electrical / Automation
- PLC code / HMI
- Validated Plant Behavior
- Validated Process Behavior
- Process Simulation
- Machine Data, Energy Data, Operational Information, Equipment data

Compare with predicted behavior, analyze differences, detect anomalies, predict failures etc.
Synchronize the digital production twin

• Consume shop floor improvements in current engineering cycle

Next generation Production System

Resource and Library Management

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Cost & Profitability Management

Closed loop Production Systems Engineering

Shop floor improvements
- mechanic
- robotic
- electric and automation
The real benefit

- Increased efficiency in engineering to shorten time to market and stay ahead of competition
- Improved manufacturing productivity through better and more flexible solutions
- Enabling the digital twin of performance to drive engineering and operational excellence