

Digital Twin: Conceptualization, Implementation and Simulation for a New Production Plant

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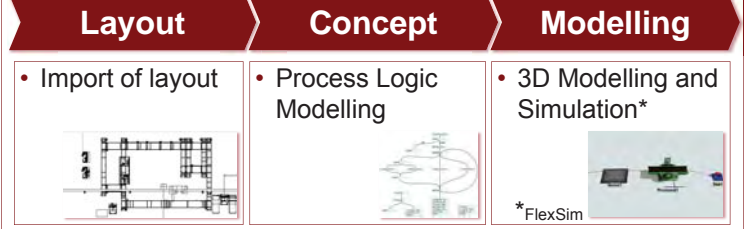
1. Initial Situation, Aim and Approach

Initial Situation and Aim

- Planning of a new production plant (washing machine production)
- Aim: Digital Twin Modelling of whole plant for efficient plant launch
- Modular Simulation Models for all production lines



Simulation Approach



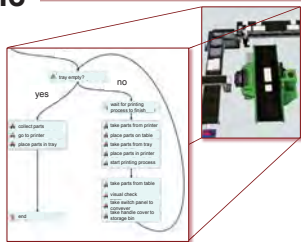
2. Results

Digital Twin Concept

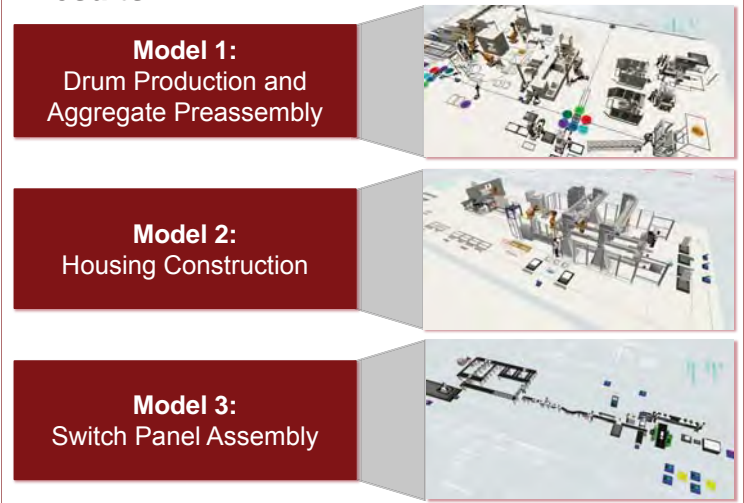
- Integration as a hierarchical Top-Down-Model:
- **Step 1:** Plant Level (System Simulation)
- **Step 2:** Line Level (3D Line Simulation)
- **Step 3:** Equipment Level (Multi-Body Simulation)

Process Flow Logic

- Link of 3D Models to graphical process logic
- Based on Petri Nets (objects as tokens in Process Flow)



Results



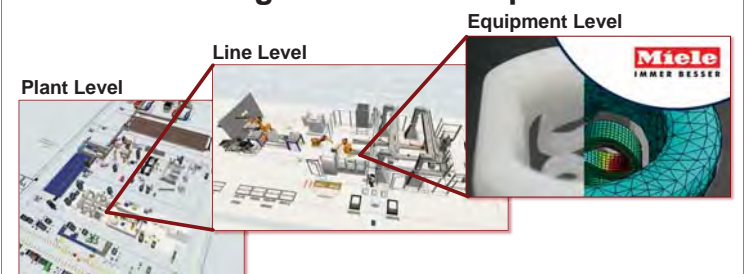
3. Integration into Digital Twin Concept

Virtual Reality

- Visualization of all models in Virtual Reality
- Expert Workshops for model validation
- Identification of optimization potential
- Future applications: training of workers before plant set up



Hierarchical Digital Twin Concept



4. Discussion and Future Work

Discussion

- Models on plant and line level need to be linked to material simulation
- Continuous adaption of Digital Twin to modifications in physical production lines
- Visualization of production status in real time
- Optimization based on real time data

Future Work

- Linking of physical line to Digital Twin
- Control of the system via Digital Twin using algorithms for optimization

