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Simulation-driven optimization of a production line

Customer Reference: Siemens Gerätewerk Erlangen

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Customer
Siemens Gerätewerk Erlangen (GWE)



Location
Erlangen, Germany



Timeframe
March 2020 to May 2020



Scope of delivery
Consulting and analysis of the right batch size to find the ideal production setup for 36 parameters for the GWE:

- Consulting to learn more about the pain points, the parameters in the production and the goals
- Development of a simulation model and comparison to the real production
- Analysis of thousands of different scenarios
- Optimization of parameters with simulation and AI algorithms

The Siemens Gerätewerk Erlangen (GWE) is a large plant for the production of controls located in Erlangen with around 1,200 employees. The main products are SINUMERIK, SINAMICS and SIMOTION. The GWE is one of the pioneers regarding digitalization within Siemens. Therefore, the GWE has incorporated various different use cases to show how to improve productions with the Siemens Digital Enterprise portfolio. By uncovering the full potential of an existing production line using a Digital Twin connected to an AI algorithm, Siemens was able to optimize logistics around the line and reduce manufacturing time.

The task

For an efficient production the GWE usually collects incoming orders for some time and order those in so called "batches". A large batch results in small set-up time, but it is challenging for the logistics because the same parts are needed for assembly continuously.

On the contrary, a small batch is positive for the logistics, but requires new setups within short time cycles.

Main objective was to analyze the right batch size and the consequences on production and to find the ideal production setup for 36 parameters (one billion options).



Highlights

- Maximum material requirements reduced by 17%
- Number of containers on the line reduced by 42%
- Production time per day can be reduced by 20 minutes

Comparison real production vs. simulation of production

The solution

The project started with a workshop to learn more about the pain points, the parameters in the production and the goals as basis for the simulation model development.

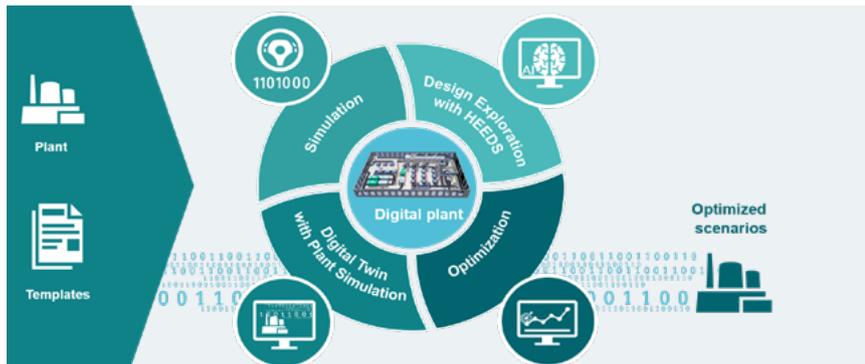
In the second step, a simulation model of relevant parts was created and compared to the real production to make sure the model is accurate.

In the third step, Siemens analyzed thousands of different product orders and production scenarios by combining simulation and Artificial Intelligence algorithms.

The software tool HEEDS generates and tests possible scenarios in the virtual world based on Artificial Intelligence and Data Analytics in order to find the best solution for the defined scenario.

The result

Although Siemens had to handle 36 different parameters with over one billion possible combinations and several competing optimization goals, the result speaks for itself: Optimized logistics around the line (17% less material at peak times, 42% less containers), reduced manufacturing time (potentially 20 minutes a day) and guidelines for optimal batch size.



System optimization: workflow

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