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Autonomous airport baggage handling system with AGVs

Customer reference: Siemens Logistics GmbH

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Customer
Siemens Logistics GmbH



Location
Constance, Germany



Timeframe
April 2020 to June 2020



Scope of delivery
Siemens provided an extended simulation model for the autonomous airport baggage handling system with regulation variables for the AGVs:

- Digital twin of an autonomous airport baggage handling system with AGVs
- Standardized simulation and optimization in closed-loop with reduced effort
- The right answers for future planning and actual decisions

Siemens Logistics GmbH is a leading supplier of innovative and high-performance products and solutions in fields such as mail and parcel automation, airport logistics, including baggage and cargo handling, along with digitalization of logistics processes using high-quality software and cloud/IoT applications. The company's main customers include major airports and airlines, global mail and parcel service providers, and international industrial and logistics companies. The optimization of the system performance is extremely complex due to various parameters that must be considered (e.g. number and type of AGVs, number of charging stations). The autonomous airport baggage handling system with AGVs needs to be modeled and simulated in order to predict the optimum for best possible production based on artificial intelligence. By combining simulation and AI, Siemens unleashes optimization potential.

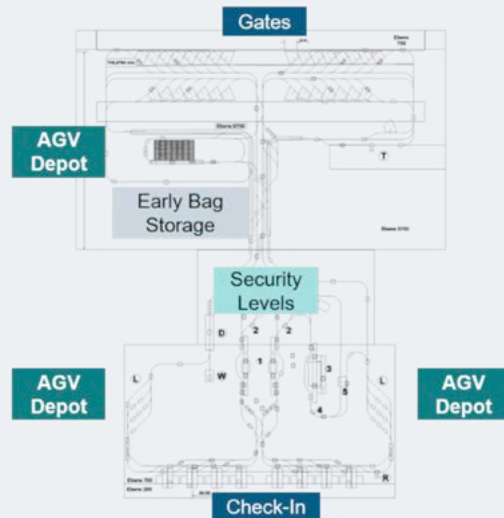
The task

Siemens Logistics GmbH wanted to identify the variables and potentials of a simulated greenfield autonomous airport baggage handling system with AGVs.

Main objective was the optimization of the system performance at the different waypoints with selecting cost efficient system variables and scenarios.

Highlights

- Number of required AGVs reduced by 13%
- Number of necessary charging stations reduced by 17%
- Overall costs reduced by 14%
- Identification of dependencies of battery management
- Efficient search for optimal system configuration



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The solution

To accomplish the customer's requirements, Siemens provided an extended simulation model for the autonomous airport baggage handling system with regulation variables for the AGVs. The flexible optimization solution stores the definitions of customer projects in HEEDS templates.

HEEDS templates describe the defined target function, boundary and auxiliary conditions, defined objectives and defined control variables.

The control variables were described by the number of AGVs per depot, AGV parameter (speed, acceleration, etc.), battery management (strategy, reserve value, minimal charging value), number of parking lots per depot, number of charging station per depot. In total 13 control variables were taken in account.

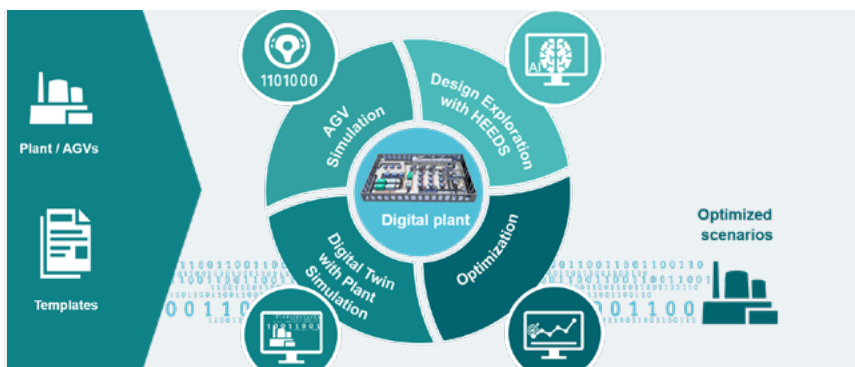
Connecting different simulation models with HEEDS gives the possibility to standardize simulation and optimize in closed-loop with reduced effort and reaching better results in the same time than classical solutions.

The advantage of the solution is the easy to use template to investigate different scenarios. The HEEDS model is independent from the Plant Simulation model which can be adjusted and loaded in HEEDS without manual effort.

The result

Complex simulation processes for AGVs were optimized by closed loop simulation based on artificial intelligence. With leading knowledge in simulation and validation of modern manufacturing technology, Siemens built the digital twin of an autonomous airport baggage handling system with AGVs to unleash optimization potential and provide the right answers for future planning and actual decisions.

Facts that speak for themselves: Number of required AGVs and necessary charging stations were reduced. Overall costs were even reduced by 14%.



System optimization: workflow

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