Standardized simulation of complex AGV systems at EK Automation

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Executive Summary

The main business of EK Automation is the production and installation of AGV systems. As these material flow systems are getting more and more complex it became necessary for EK to be able to do simulation studies in advance to ensure the correct dimensioning in terms of vehicle quantity or transport strategies and identify potential risks as early as possible in the corresponding projects. Nowadays there is a rapidly increasing number of systems with more than 100 vehicles existing. Due to that fact the high customer demand made it necessary to create a standardized process and toolset for simulation studies to get in the position to realize them quickly and in a simple and repeatable way.
Who is EK Automation?

EK Locations

EK Headquarters
EK Locations
Sales Offices
Facts & Figures

180 +
This is the number of our planners, technical developers, designers and project managers who achieve measurable success worldwide with their intelligent, innovative product ideas.

30 +
Million euros annual turnover

40 +
Systems each year

250 +
Vehicles each year

20%
Market share for installed systems in Europe. This makes EK AUTOMATION the leading AGV supplier in Europe.

60%
Exports

1,000 +
Running systems with 9,000 vehicles worldwide

Our company history

2013

2010

2000

1990

1980

1970

1960

Teletrak

Eungheinrich

DEMAG, Jungheinrich PTS GmbH

Gründung

INDUMAT GmbH

TELETRAK

Fördertechnik

Siemens Industry Software
Our customers are our reference

What is an AGV system?
Vehicles – a small overview

Navigation

Free navigation
- Natural navigation
- Laser guided navigation
- Magnetic spot navigation

Static navigation
- Inductive navigation
- Optical navigation
Why simulation?

Simulation benefits for AGV systems

General benefits
- Bottleneck analysis
- Birds eye visualization and time lapse functionality
- Finding systems performance limits
- Early and quick results
- Optimization of buffer sizes

AGV related benefits
- Optimization of AGV quantity
- Quantification of blocking percentage
- Quantification of approach routes
- Verification of transport strategies
Development process for AGV simulation

- Purchase of simulation tool
- Standard toolset
- Standard process for simulation projects
- Training of employees
- Learning curve effects

This helps speeding up simulation projects by 60-80% compared with starting from scratch.

Flexibilization with workload classification

Level 3

Toolset modifications

Level 2

Additional logic required

Level 1

Standard toolset

Standardized checklist and sales quotation

1. A standardized checklist will be handed out to the customer.
2. There will be made a standardized sales quotation based on the information from the checklist.
Standardized input data

- Layout data
  - Track segmentation
  - Station locations
  - Blocking sections
- Transport data
  - Transport volumes
  - Time windows
  - Transport strategies
- Vehicle data
  - Speed
  - Capacity
  - Battery data

Simulation results

Standardized simulation toolset
Standardized simulation toolset

![Diagram of standardized simulation toolset]

Siemens Industry Software
Standardized simulation toolset

Standardized connections to Plant Simulation objects
Standardized 3D visualization

How does it look like?
Intralogistics with transport robotic

- 90 laser guided transport robots
- 1 billion litres of milk per year
- Up to 20,000 transports within 24 hours
- Biggest and most modern dairy in the world

Aylesbury dairy uses wi-fi controlled robots to transport milk

16 September 2016 Last updated at 10:22 BST

One of the world’s largest fresh milk processing plants is using robots to do some of the more strenuous jobs, alongside people.

At the Arla super dairy in Aylesbury there are 90 automatically guided vehicles that are controlled using wi-fi.

2D-surface: Current state
AGV systems will always be simulated based on the same toolset objects.
Connections to other simulation objects are possible.
Modifications can be created on demand.
This toolset is available as a standard object library.
The complexity is not limited and only restricted by the system performance and the license model.
Standardized simulation helps speeding up simulation projects by 60-80% compared with starting from scratch.
Classification and splitting of workload helps reducing reaction times significantly.
THANK YOU VERY MUCH FOR YOUR ATTENTION