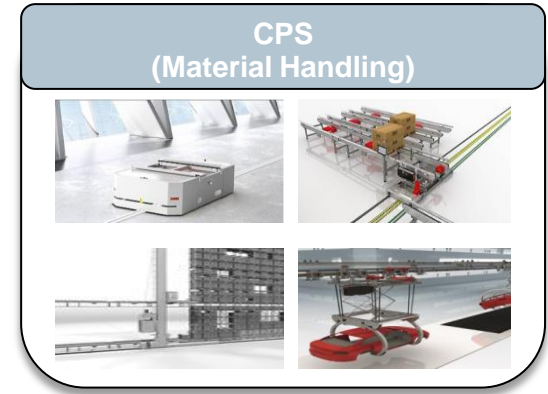# Automated Guided Vehicles, contactless transport systems
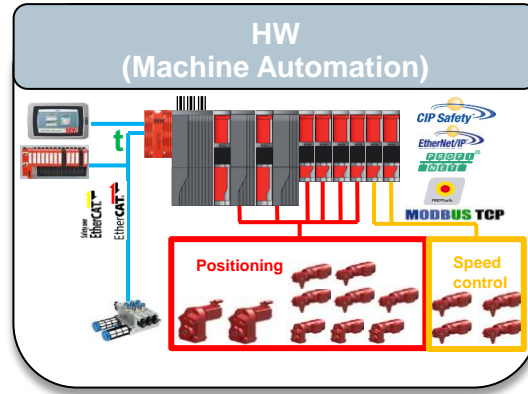
Mr. Franco Zannella
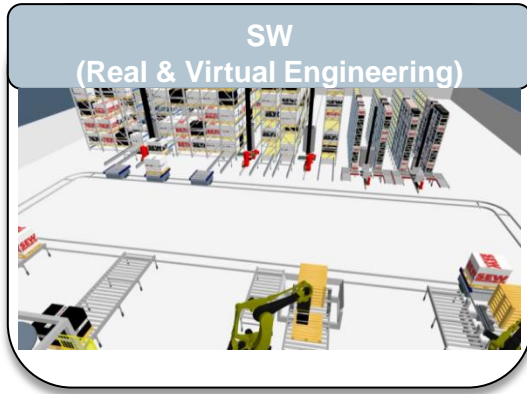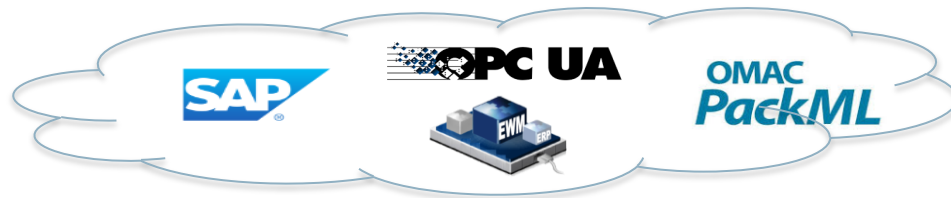
Mr. Antonello Lauriello

Industry 4.0: Smart factory

Transport — Goods receipt — Automatic storage — Assembly Support — Packing Distribution storage — Loading bay administration distribution — Transport

SAP · **OPC UA** · EWM ERP · **OMAC PackML**

SW (Real & Virtual Engineering)	HW (Machine Automation)	CPS (Material Handling)

HW: CIP Safety, EtherNet/IP, PROFINET, MODBUS TCP, EtherCAT, Positioning, Speed control
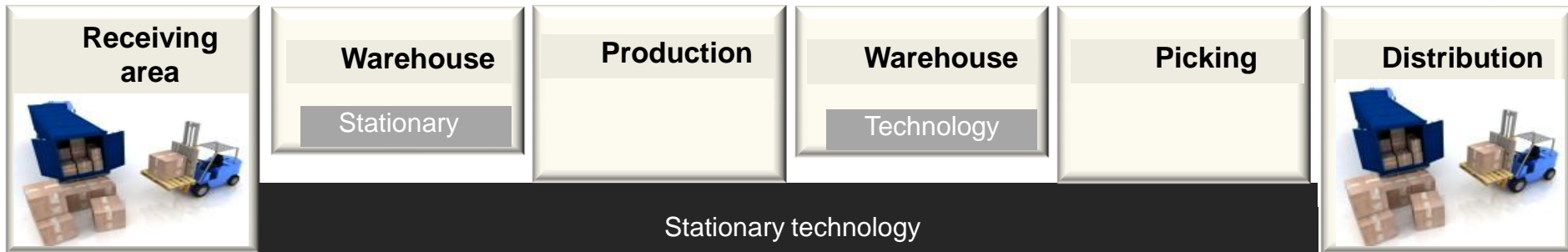
➕ **Flexibility** (Product Mix, Volume Mix)
Productivity (Uptime, Efficiency, Quality O.E.E.)

➕ **Energy Saving** (Green label, rigenerative)
Operating efficiency (TCO, Engineering, Maintenance)

The factory of today

- Production is oriented on throughput
- Mass production, no customized products
- Long changeover time for production of new products on the same line
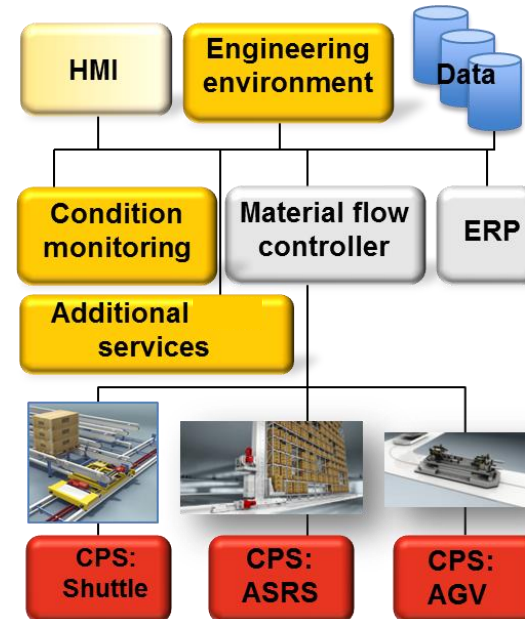- Stationary conveyor technology for in-plant logistics

Receiving area	Warehouse	Production	Warehouse	Picking	Distribution
	Stationary		Technology		

Stationary technology

But: More and more flexibility and customized products are needed.
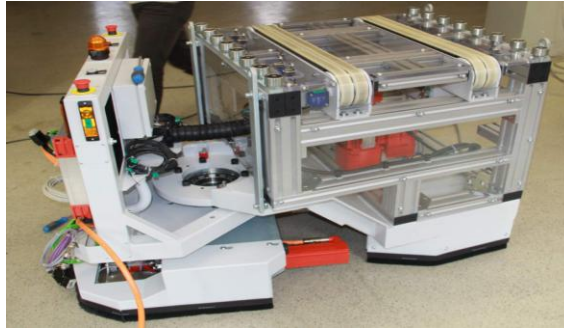How can production be adapted?

The factory of the future (2018 →)

- Production is oriented on different incoming order, with different and customized product "One Piece Flow".
- The machines can be quickly adapted and in a flexible way, for the different products needs to be produced.
- Mobile technology and logistic assistant are working inside all productive area of the facility, included warehouse

HMI	Engineering environment	Data

Condition monitoring	Material flow controller	ERP

Additional services

CPS: Shuttle	CPS: ASRS	CPS: AGV

How to get this flexibility ?

Inductive power supply contactless

Efficient in operation
contactless supply system, maintenance free, high protection class, simple installation, modular system, flat pick-up

- **Supply unit**
    - 4 kW / 16 kW (for panel installation)
    - Line cable current 85 A (25 kHz)

- **Pick-up**
    - 1.5 kW to 3,6 kW
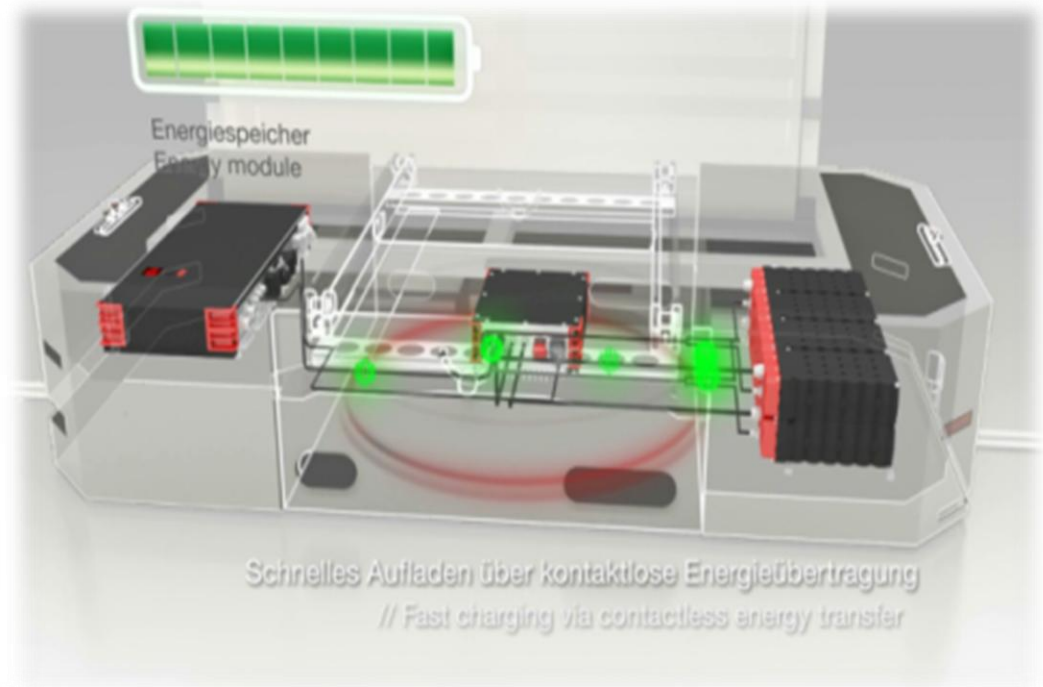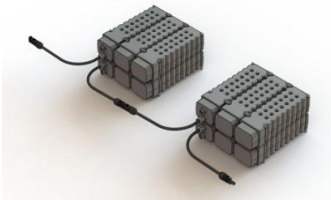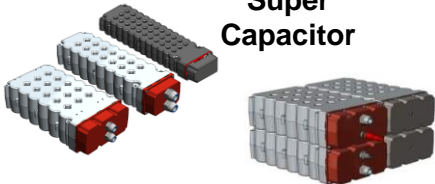   - Overload capability for the supply units and for the pick-ups THM20E

SW

Parameterization + error diagnostics

Supply unit

Line filter

TPS Stationary converter

TAS Transformer module

TCS Compensation capacitors

TCS

Compensation box
High frequency cable for connection of compensation box

Flat Pick-up THM
High frequency cable for power transfer

High frequency cable for connecting the power supply unit and line cables – no power transfer in this area

Energy buffer for AGV:

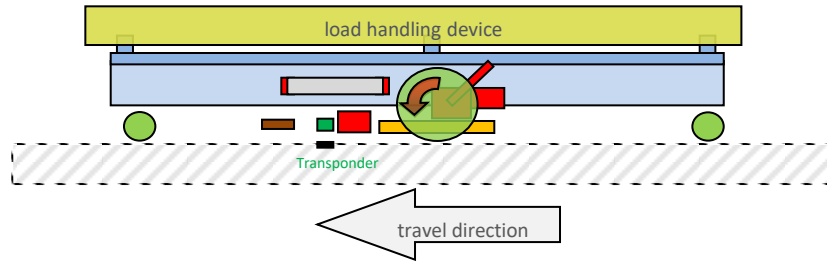## Hybrid system with Super Capacitor for energy management

Energy buffer management.

Super Capacitor

Energiespeicher
Energy module

Schnelles Aufladen über kontaktlose Energieübertragung
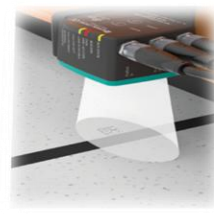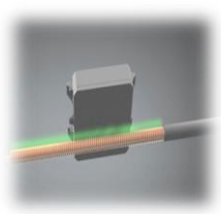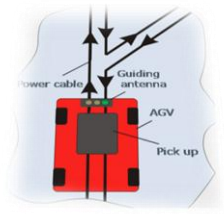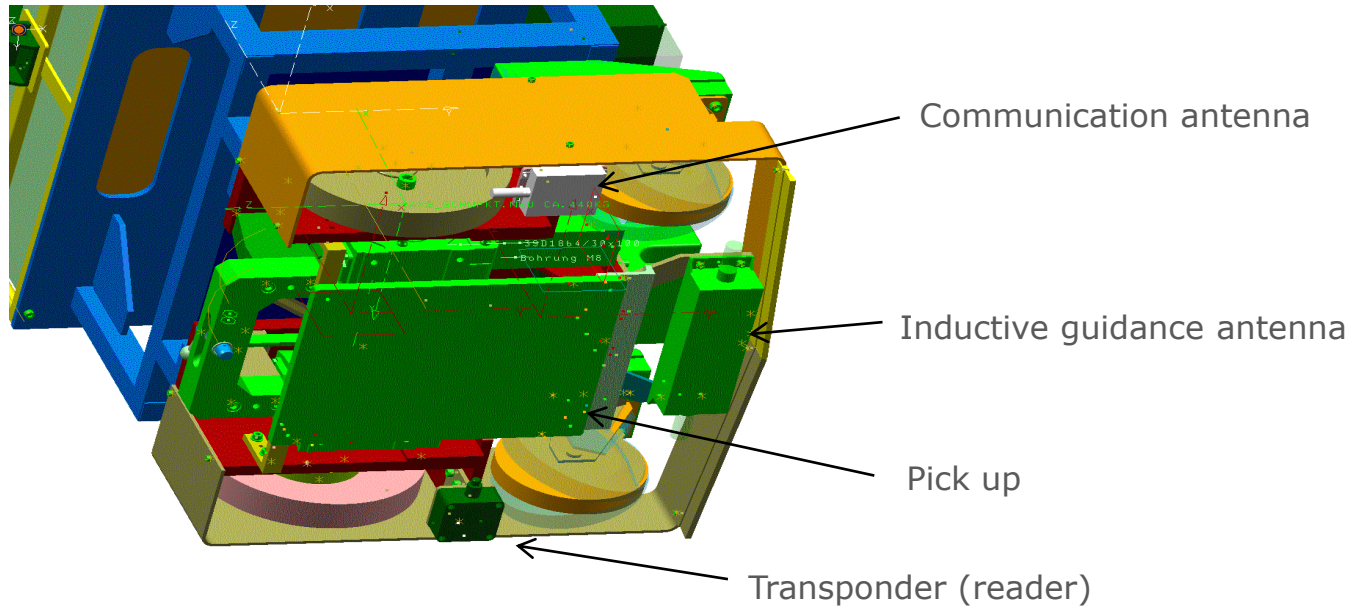// Fast charging via contactless energy transfer

Mechanical characteristic of the vehicle AGV
The vehicle's mechanical configuration changes with the application
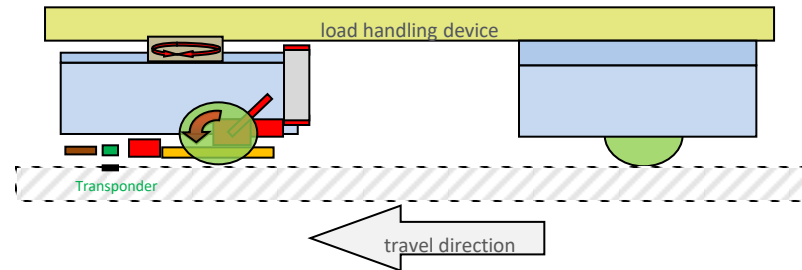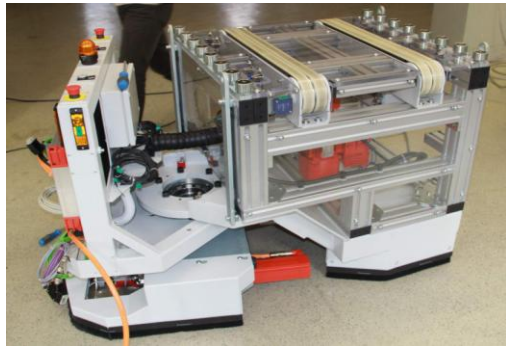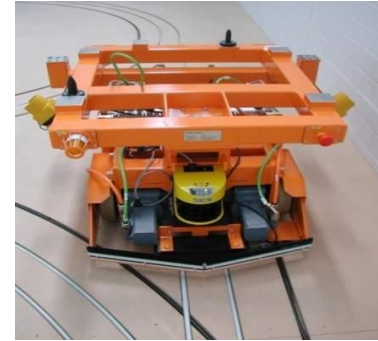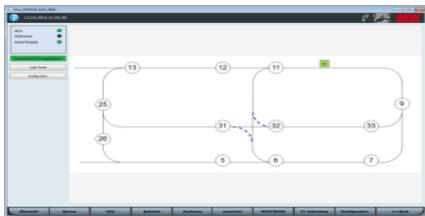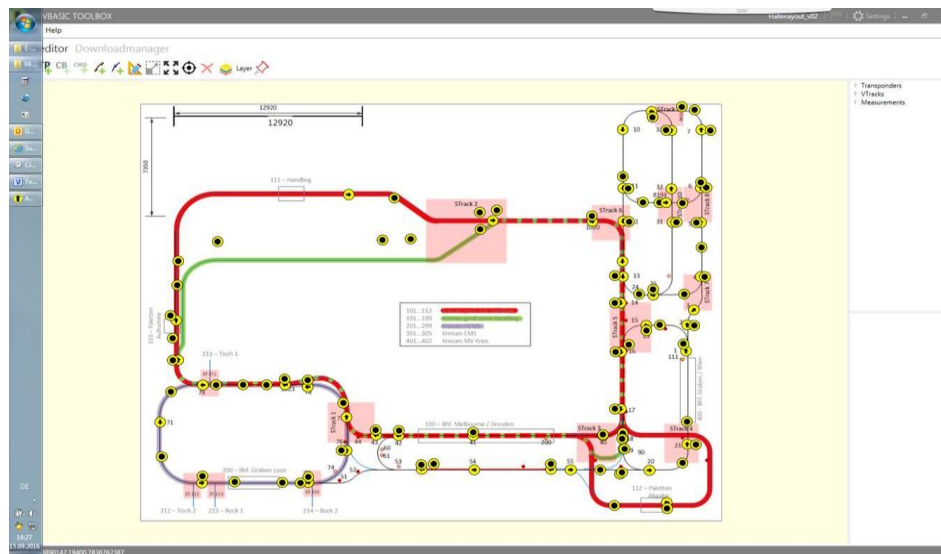
AGV positioning component lower side

Communication antenna

Inductive guidance antenna

Pick up

Transponder (reader)

The software framework:

Flexible and easy sw
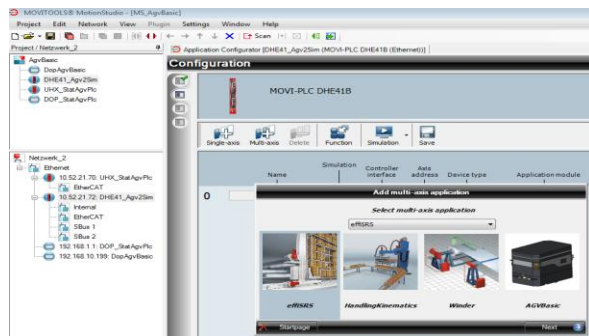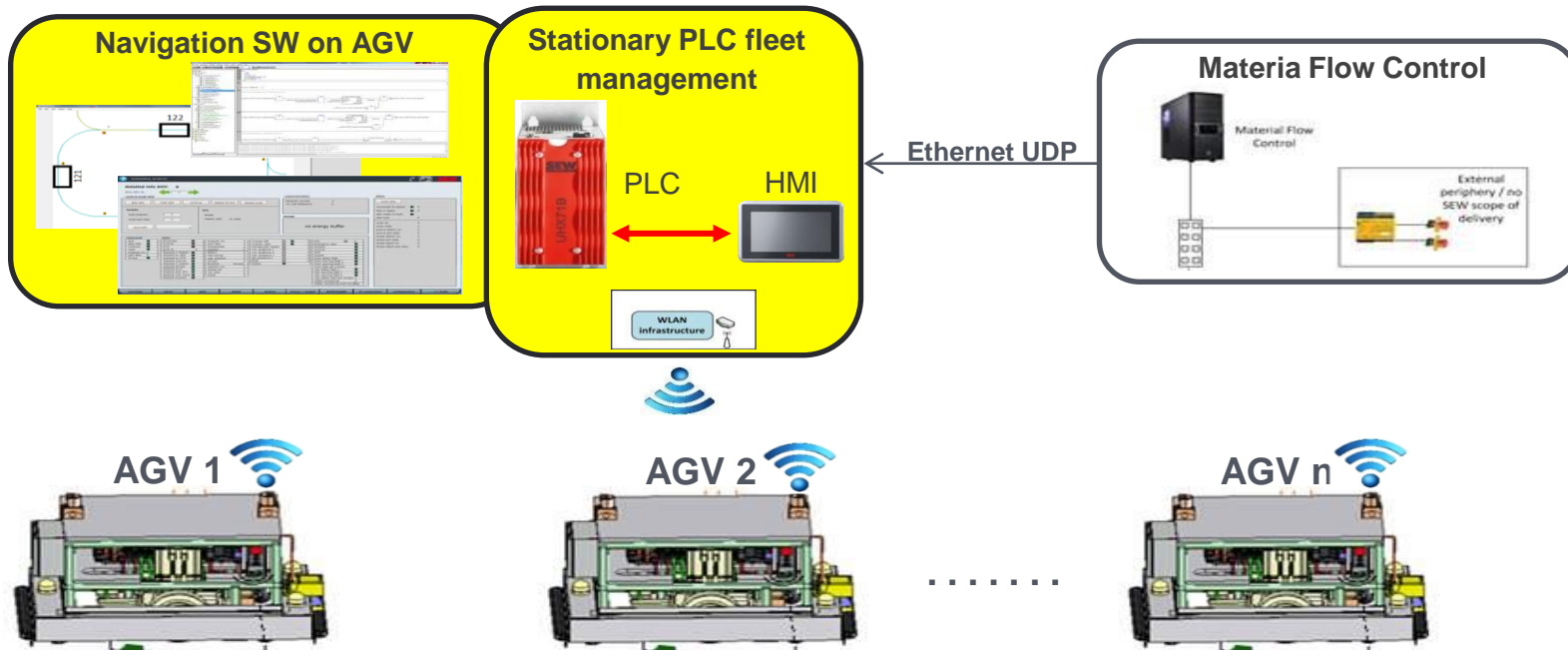

AGV parametrization

Track designer

Process emulator

# Higher system fleet managment:
Fleet coordination by stationary plc

Laser Guided Vehicles:

Principle:
- Reflector data will be detected by the laser scanner
- Reflector data (distance and angle) will be measured and are the basis for position calculation
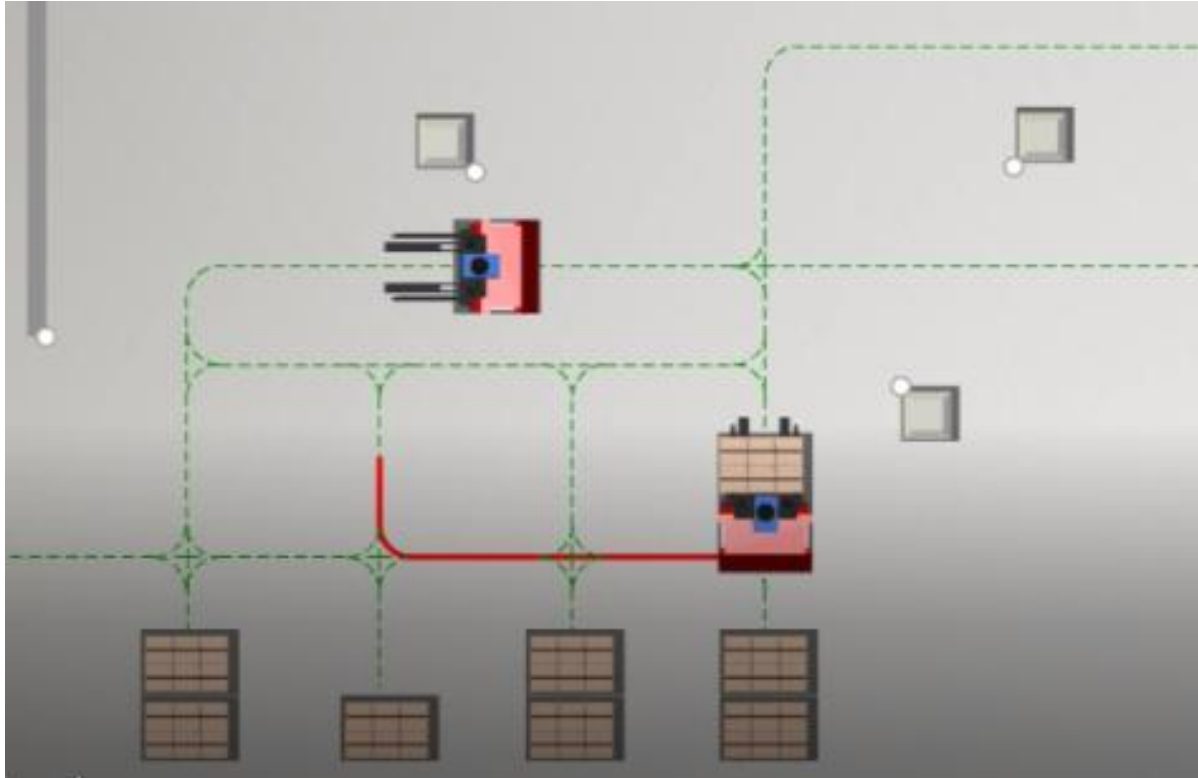
SW Architecture:

Traffic Management System coordinates fleets of AGV operating in industrial environments.
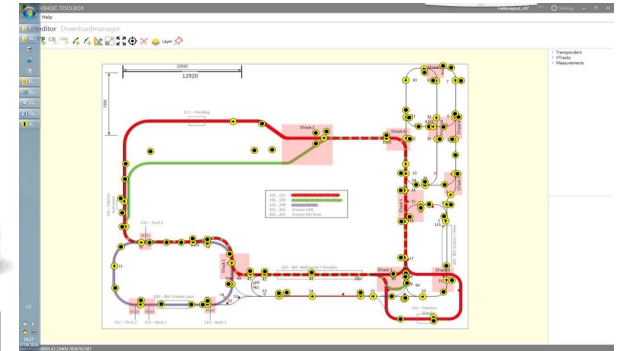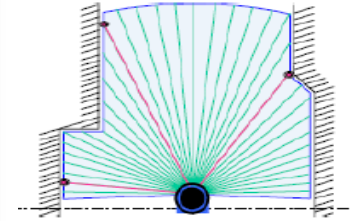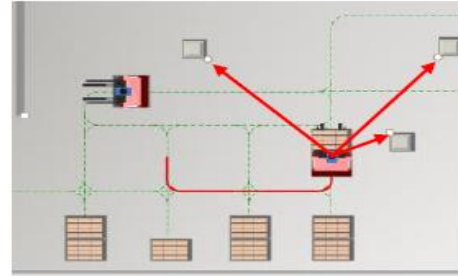
Host System
Traffic Management
Driveway Layout System
Mission controller

Laser Guided Vehicles:

Coordination of fleets of AGV trough Traffic Management system

Safety on AGVs:

Objectives of protection

on AGVs :

☑ **Protect persons from accidents**
(for details refer to EN1525/ ISO3691-4)

☑ **Avoid damage of equipment and goods**

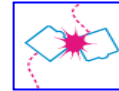☑ **Minimize downtimes**

☑ **Reduce maintenance costs**

Hazardous area protection

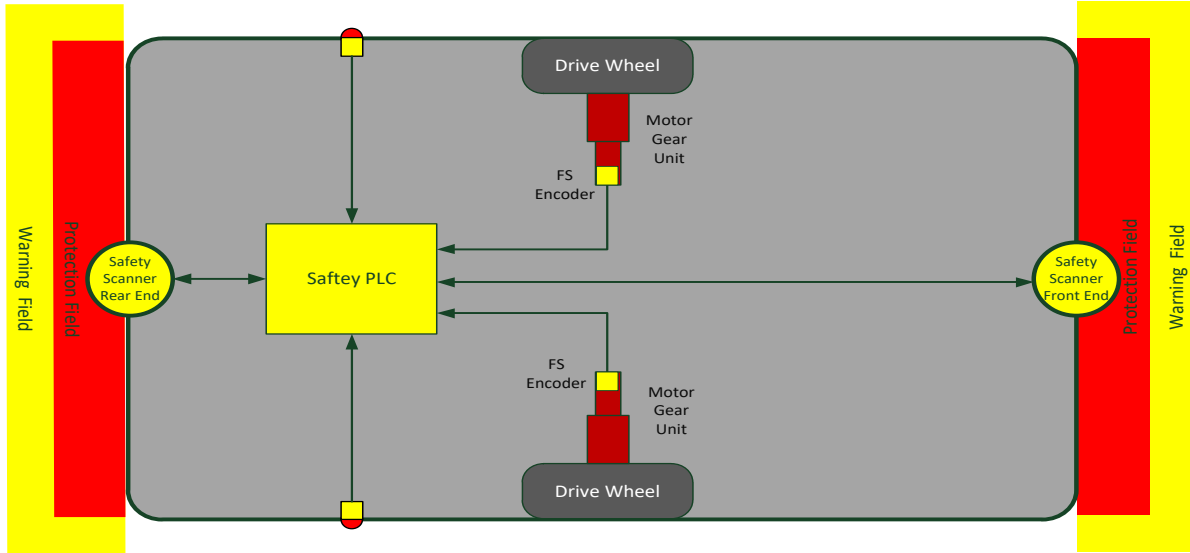Hazardous point protection
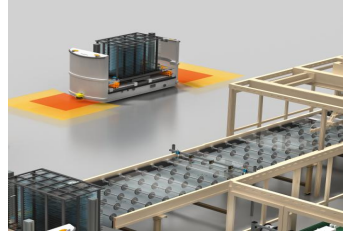
Access safeguarding
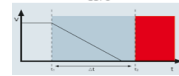
Collision prevention

Emergency stop function

Safety automation

Safety on AGVs:
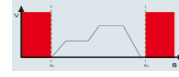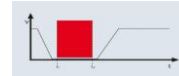## Advanced Safety features

STO - Safe Torque OFF

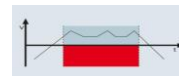SS1c - Safe Stop according Category 1

SLS – Safe Limit Speed Maximum Speed Control

SCA- Protection Field Switching

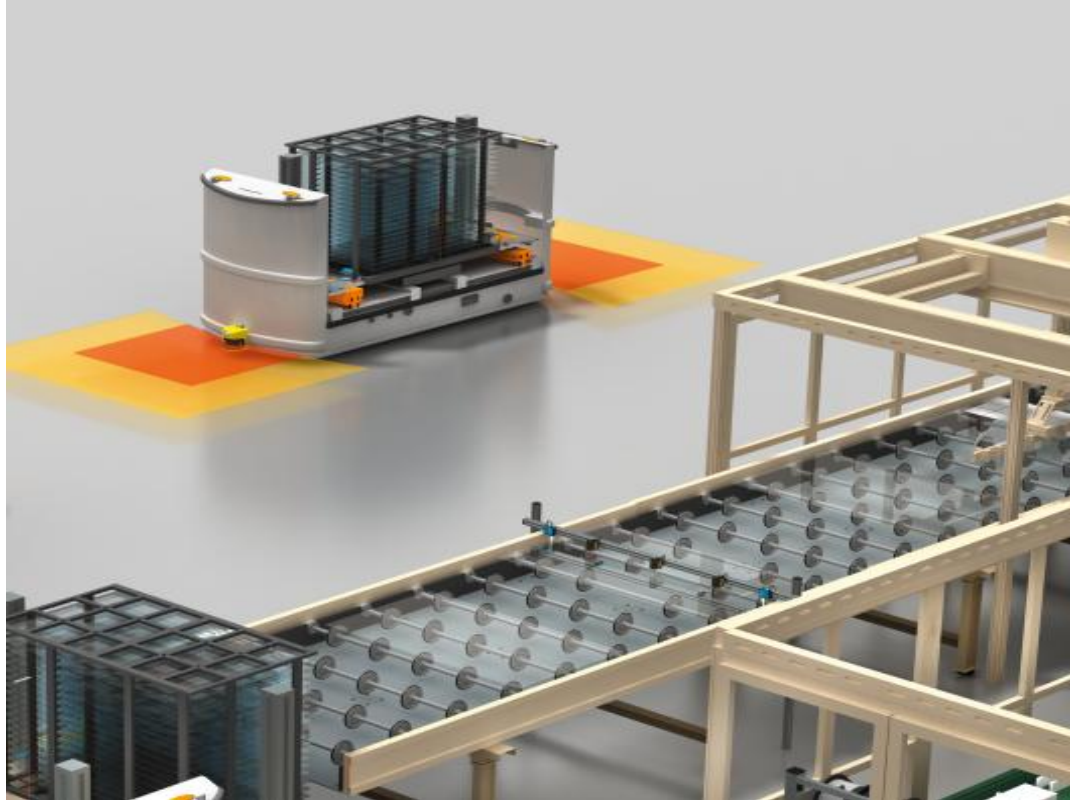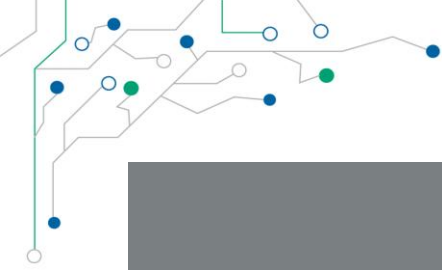SOS – Safe Operation Speed

SDI- Safe Direction

Safety on AGVs:
Advanced Safety features

Thanks for your attention!