

# TÜNKERS AGVs

Ratingen 2017

## **History of Automated Guided Vehicles**



"Automated Guided Vehicles" (AGV) have been used in the automotive industry since the 1980s.

While this technology has become established in gear and engine manufacturing, it is rarely used in body assembly because it was quite unreliable in the beginning and extremely expensive, too. It is only in truck cabin assembly (e.g. Daimler Wörth) that AGVs are used on a larger scale.

The current demand for more flexibility with the aim of a "freely programmable" plant – software systems instead of hardware systems – made AGVs and drones an interesting topic also for body assembly.

This trend is fuelled by dropping prices, a more reliable technology and new navigation systems. These AGV-driven plant layouts are a real challenge because they replace conveyor belts and shuttle systems that are currently also offered by TÜNKERS.

# TÜNKERS Expertise in Electric Vehicles



TÜNKERS has manufactured electric vehicles for rehabilitation and logistics for more than 40 years now. Our most important product in this segment is the Airport Scooter which is used for transporting baggage trolleys on the airports of Frankfurt, Düsseldorf, Singapore, Paris and Dubai.





## **New Cooperation SINOVA**



SINOVA Sistemas de Movimentação is developing solutions for automated guided vehicles (AGVs) for the Latin American market. SINOVA was established in 2005 and its headquarters are based in Sao Paulo, Brazil.

The AGVs are used in various industries including automotive, consumer goods and general manufacturing. The focus, however, is on the automotive industry.

TÜNKERS and SINOVA cooperate closely, which means that TÜNKERS takes care of sales of AGVs and the development of proprietary concepts for the European market.



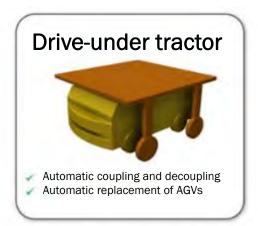
### **Customers:**



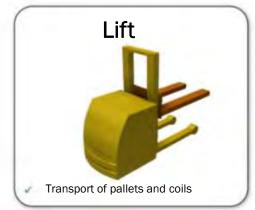
## Models

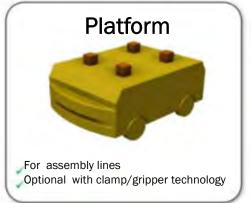












# Navigation



## Induction navigation

#### Infrastructure:

- Floor-mounted cables with a frequency of 7 to 12kHz
- Cut in the floor ca. 4x30mm sealed with resin

#### AGV:

 Navigation antenna and PLL module (Phase Lock Loop)



## Optical navigation

#### Infrastructure:

- Ca. 25mm wide track on the floor
- RFID Tags for position detection

#### AGV:

Camera with LED



## Laser navigation

#### Infrastructure:

• Strategically placed reflection mirror along the route

#### AGV:

• Opto-electronic laser scanner (minimum height: 2m)



# Controlling the AGV

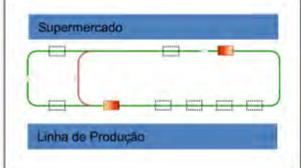


## Stop & Go operation

- · Manual start of the AGV
- Manual selection of the route

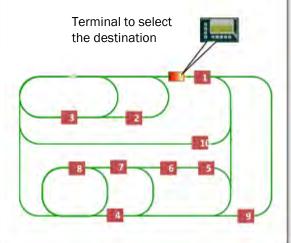
#### Optional:

 External start by frequency controller in the floor



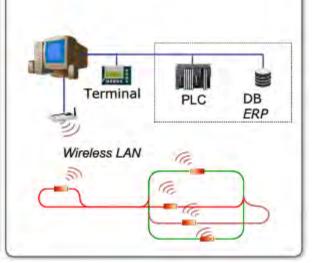
## "Taxi" operation

- Automatic navigation to the destination
- Selelction of the destination on AGV terminal



### **Central controller**

- Integration of SPS, ERP and peripheral devices of the AGVs
- WLAN-based communication



: AGV

# Loading process



### Car batteries

#### Features:

- Capacity: 90 to 170Ah
- Product life: ca. 2 years



### Electric vehicle batteries

#### Features:

- Capacity: 170 to 1500Ah
- Product life: ca. 5 years



## Loading device

#### Features:

- · Incl. microprocessor
- Power 220V/6A



### On-board loading device

Loading of the batteries in periods during production



## **Charging contacts**

· Charging process possible during standstill, e.g. for loading/unloading



### Rechargeable batteries

Regular replacement of rechargeable batteries



## Inductive power transmission (IPT)

· Loading through induction





# **Examples of application**



## Supply AGVs:

Transport of parts between warehouse and assembly line. (Point-to-point, taxi or milkrun)













# **Examples of application**



## Transport AGVs:

Safe transport of parts through hallways and corridors, in spite of the presence of people and other vehicles.













# **Examples of application**



### Process line AGVs:

Safe handling and assembly is possible directly on the AGV.















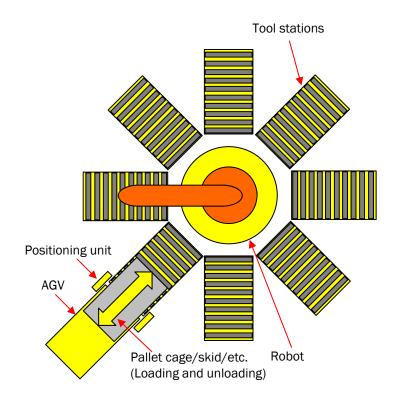
## Body conveyor AGV



- Component is fixed to the AGV by skid/carrier
- In the workstation (here in ring arrangement), the component with the carrier is moved by the AGV into the station and positioned mechanically



[III.12.1] Skid conveyor AGV from SINOVA being assembled



# Body conveyor AGV





# Pallet conveyor AGV



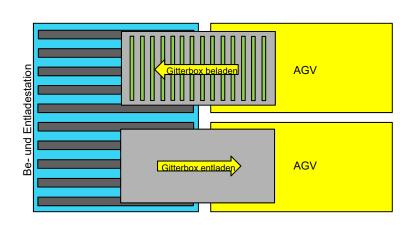


## Concept of Lift containers/cages



Transport of small parts in lift containers/cages where the individual parts are placed in a defined position

- Loading and unloading of the components by worker or robot
- Docking station for AGV in robotic cell
  - Handover system for cage at loading and unloading station

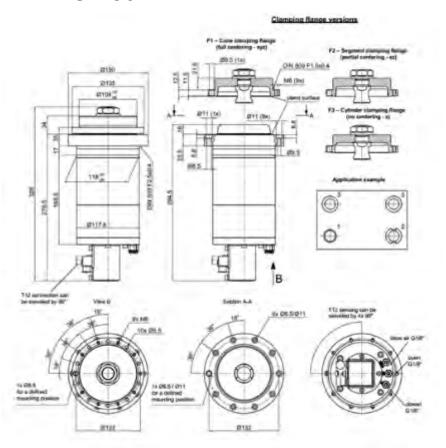




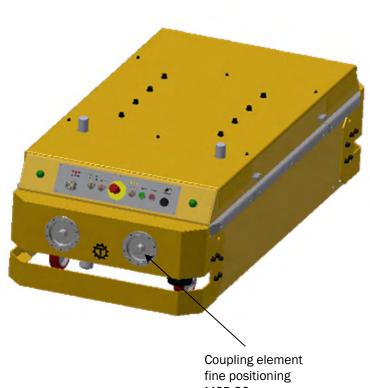
# Pneumatic fine positioning system



## MCP 80:



Туре	Pull-in force at 6 bar	Holding force max. at 6 bar
MCP 80	10.5 kN	35 kN



MCP 80

## Safety



### Laser safety scanner:

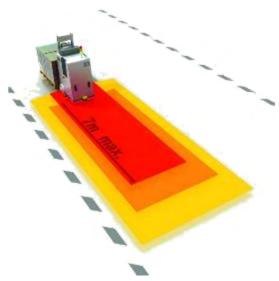
- One safety laser scanner allows for the definition of up to four safety zones, see [III. 18.2.]
- The size of the objects to be detected can be defined flexibly.
- The laser beam may point forwards, backwards or central with 360° panoramic view.
- Safety relays provide for safe stop function of the electronic devices.
- The zones are defined in a software programme.

#### Your benefits:

- Reliable slow-down or stop of the AGV
- Several safety zones can be defined
- No interference from dirt, light, heat etc.
- Suitable for outdoor use



[III. 18.1] Laser scanner Sick S300 Expert (Source: Sick.com)



[III. 18.2] Application example Sick S300 Expert (Source: Sick.com)

## Contact



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