MT 174
Sorting plant

Augmented reality interface available for mobile devices (tablet not included in scope of delivery)

Description

- **application example for preventive maintenance**
- **part of GUNT DigiSkills**
- **augmented reality for visualisation of maintenance work**
- **control of the experimental plant using a PLC, operated by touch screen**
- **smart colour sensor with IO-Link, configuration via PLC**

Preventive maintenance is an indispensable part of Industry 4.0 and helps to avoid unplanned production downtimes. The laboratory-scale MT 174 sorting plant comprises a separation process that serves as an application example for various maintenance tasks. The plant is equipped with standard industrial components.

The material to be sorted is separated into three size fractions using a drum screen. The fine fraction is next sorted by colour. Maintenance work is carried out on the drive trains of the individual elements. Different maintenance intervals are scheduled for the drive trains. Three different gear units are included. One gear unit is equipped with a heater and temperature sensor, which causes a maintenance message in case the limiting value is exceeded.

The plant is controlled by a PLC via touch screen. An operating mode and a training mode are available.

The training mode is used to simulate time- and sensor-controlled maintenance work. A signal lamp and messages in the PLC indicate the need for action. An augmented reality interface for mobile devices (Vuforia View) is available for visualising the maintenance work. The augmented reality interface also offers extensive additional functions, such as the display of exploded views and data sheets. For device-independent use of augmented reality, 3 miniature models of the sorting plant are included in the scope of delivery.

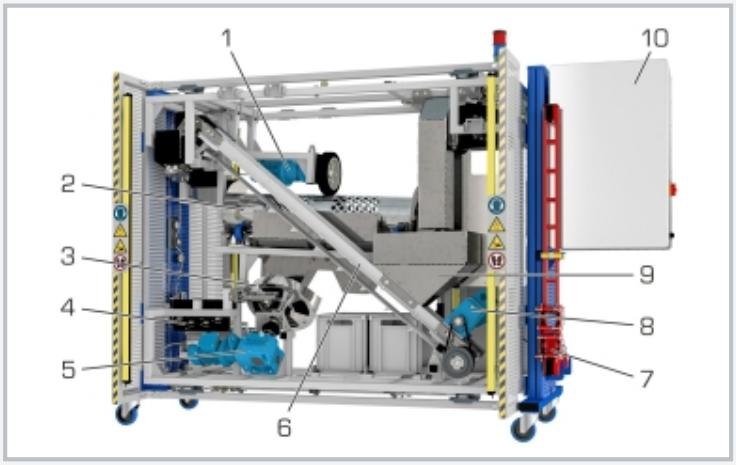
The process uses an open design so that all components are freely accessible. Extensive safety equipment, such as light barriers in accessible danger areas, ensure safe operation. For the removal and installation of the gear units, the plant has a crane that can be set up in three different positions.

Extensive technical information is available as didactic multimedia teaching materials in the GUNT Media Center, such as a complete set of drawings, 3D drawings or assembly videos. The assembly exercises MT 120 to MT 123 are available to teach the assembly/disassembly of the gear units themselves.

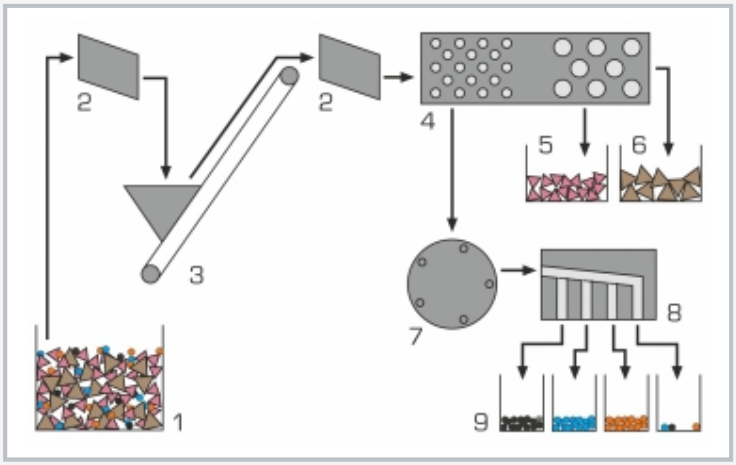
Learning objectives/experiments

- maintenance work on an industrial plant
  - time-controlled
  - sensor-controlled
  - supported by augmented reality
- familiarisation with the application of gear units in an industrial plant
  - spur gear
  - planetary gear
  - spur and worm gear
- investigate how various parameters affect the separation process
- familiarisation with various functional assemblies
  - vibrating trough
  - conveyor belt
  - drum screen
  - rotary storage table
  - colour sorting
- familiarisation with IO-Link as a communication interface for smart sensors
- develop digital skills
  - retrieve information from digital networks
  - use digital learning media
  - use visualisation systems, e.g. augmented reality, QR codes
- in conjunction with MT 120 – MT 123
  - assembly / disassembly of gears

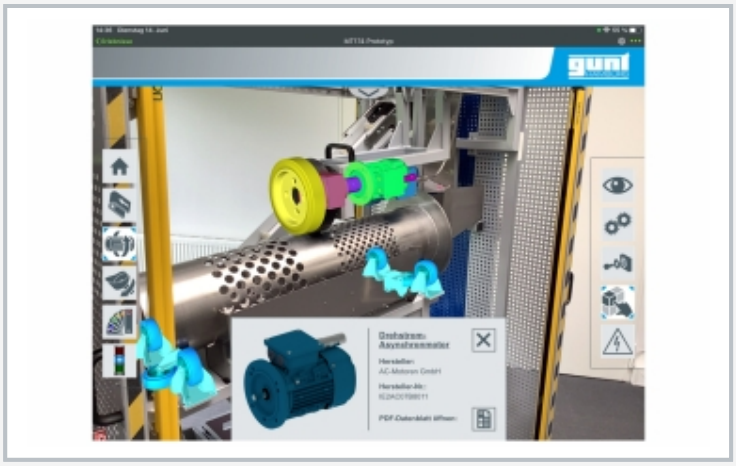
MT 174
Sorting plant



1 drive train of drum screen with planetary gear, 2 drum screen, 3 rotary storage table, 4 colour sorting, 5 drive train of rotary storage table with spur-worm gear, 6 conveyor belt, 7 crane, 8 drive train of conveyor belt with spur gear, 9 dosing hopper, 10 switch cabinet



1 storage tank, 2 vibrating trough, 3 dosing hopper with conveyor belt, 4 drum screen, 5 box with medium size fraction, 6 box with coarse size fraction, 7 rotary storage table, 8 colour sorting, 9 boxes with colour fractions, incorrect discharge



Augmented reality user interface

Specification

[1] laboratory scale sorting plant with standard industrial components
[2] real application example for preventive maintenance, time- and sensor-controlled
[3] augmented reality: visualisation of maintenance work in individual steps, display of exploded views and data sheets, safety technology
[4] control of the experimental plant using a PLC, operated by touch screen
[5] crane for disassembly and assembly of the gear units, can be used in 3 positions
[6] signal lamp to indicate machine status
[7] continuous dosing of the mixture by dosing hopper with conveyor belt, drive via spur gear
[8] class. process: separation into 3 size fractions with drum screen and level sensor, drive via planetary gear
[9] rotary storage table to separate the particles for colour sorting, drive via spur and worm gear
[10] sorting process: colour sorting of the fine fraction into 3 colour fractions
[11] smart colour sensor with IO-Link interface, configuration via PLC
[12] multimedia teaching material for all three gear units: PDF, CAD/STEP files, videos
[13] online access to the GUNT Media Center

Technical data

PLC: Siemens S7-1200
Conveyor belt
- drive: three-phase motor with spur gear

Drum screen
- Ø outer: 254mm, length: 1136mm
- mesh width: 17mm, 28mm
- drive: three-phase motor with planetary gear

Rotary storage table
- outer diameter: 400mm
- drive: three-phase motor with spur and worm gear (heatable oil sump and temperature sensor)

Smart colour sensor
- communication interface: IO-Link

Bulk material
- coloured balls Ø: 12mm
- pyramids edge length: 20mm, 30mm

Measuring ranges
- temperature: 0...100°C
- level: 1x 20...150mm

230V, 50Hz, 1 phase; 230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
LxWxH: 3100x1220x2162mm (operation), 3100x790x1927mm (transport); Weight: approx. 650kg

Required for operation

Vuforia View for augmented reality application

Scope of delivery

experimental plant, 3 packing units of bulk material, 1 set of accessories, 3 miniature models, 1 set of instructional material

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Optional accessories

MT 120	Assembly exercise: spur gear
MT 122	Assembly exercise: planetary gear
MT 123	Assembly exercise: spur and worm gear