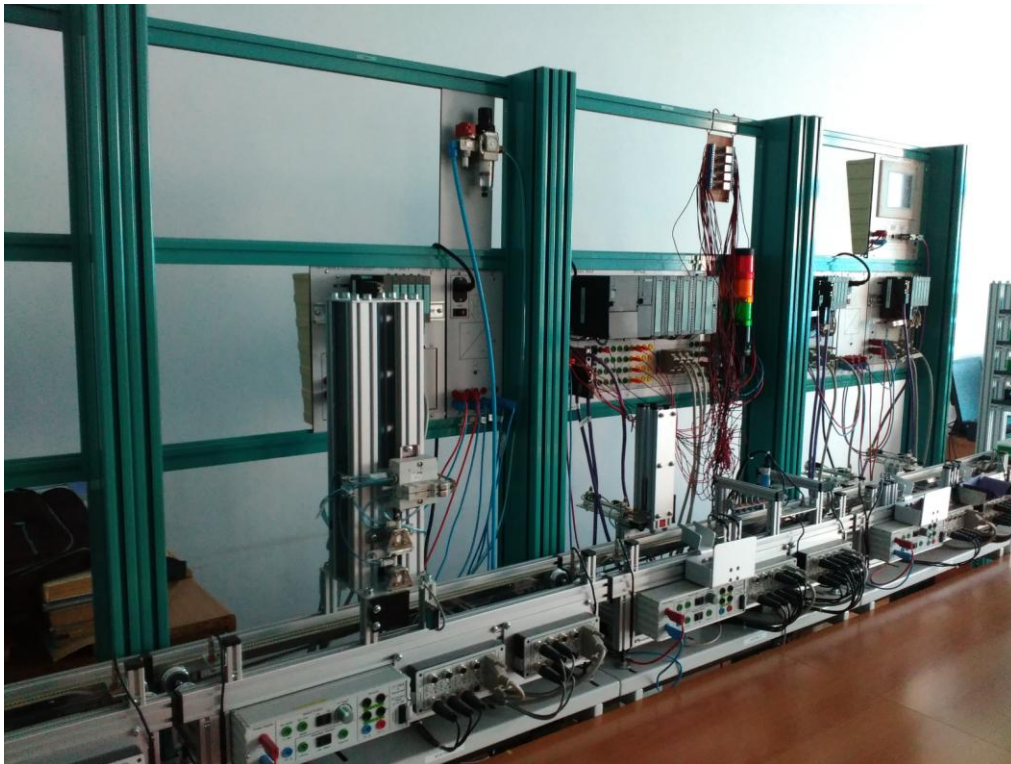


Asembling/disassembling mecatronics line, Hera & Horstman

#### CONFIGURATION EXAMPLES

Complete Manufacturing Line:

- Support from the 3D Planning until Start-Up.
- Modular configured Mechatronic Mobiles with Training System Frames for the Control Units.
- Component Magazines, Assembly and Disassembly, Sorting Station, Sensor - and Camera Test Station and Stacker Rack.



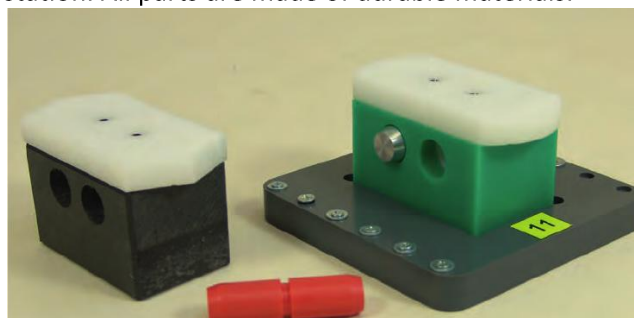
#### WORKPIECE CARRIER AND 4-PART WORKPIECE

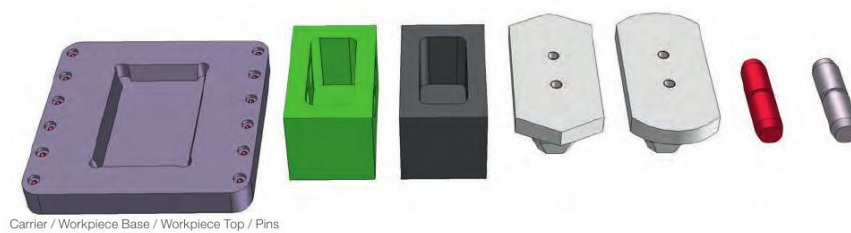
The task of the workpiece carrier is to carry the 4-part workpiece on the transfer line.

Each workpiece carrier is identified by 6-Bit-Code, that could be read-out by inductive sensors.

The 4-part workpiece is for demonstration of typical industrial operations like assembly, disassembly, testing, sorting and storing.

Parts of the workpiece are in different colours, shapes or materials and could be identified with the sensor - and camera test station. All parts are made of durable materials.

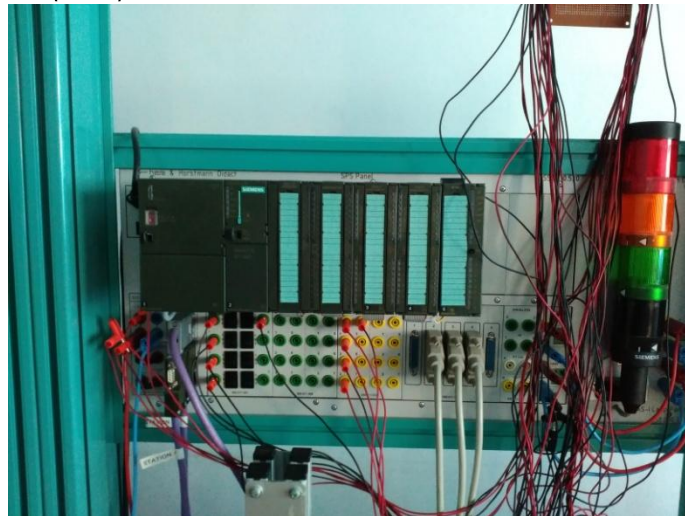




## 1. BASICS PLC

The PLC Panel is the ideal base for trainings with different CPUs of the Siemens S7/300-series. The PLC panel can be adapted to the desired CPU and can be modified if the system should be enhanced.

Dimensions: 532 x 297mm (WxH).



## 2. SIMATIC S7-314C-2PN/DP

Upgrade for TIA portal consisting of:

1x SIMATIC S7-300, CPU314C-2PN/DP with 192kByte main memory, 24DI/16DO, 4AO, 2AO, PT100, 4 high-speed counter, 1. interface. MPI/DP 12MBit/s, 2. interface. Ethernet Profi Net.

1x SIMATIC S7, Micro Memory Card for S7-300, 512kByte.

1x SIMATIC S7-300, Digital Module SM 323, SIMATIC electrically S7-300: isolated, Power 16DI Supply and 16DO.

3x SIMATIC S7-300, front connector.

1x Ethernet cable, length: 6m.



SIMATIC S7-300, CPU314C-2PN/DP



Power Supply

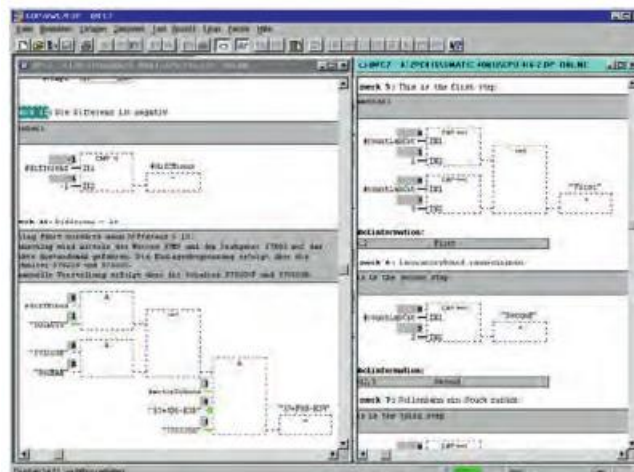
### 3. MODULES FOR PLC PANEL

The modules are equipped with 4mm safety jacks and are completely wired to the PLC with ribbon cable.

### 4. SIMATIC STEP7 SOFTWARE

For educational purpose in schools and training centers we offer SIMATIC STEP7 software. This software supports its user in all construction phases of automation projects, e.g.:

- Set-up and administration for projects.
- Configuration and parametrizing hardware and communication.
- Administration of symbols.
- Creation of programs for SIMATIC S7 target systems.
- Loading programs to target systems.
- Test of automation systems.
- Diagnosis of system malfunction.



### 5. Touch Panel KTP700:

7" wide screen Touch Panel with colour display and 8 buttons for functions.

The KTP700 Basic is an operator panel for simple HMI with medium requirements to the visualization functionality of applications with S7-122 controllers or other logics.

The KTP700 Basic is available in 2 versions: KTP700 Basic DP for MPI/ProfiBus DP connection and KTP700 Basic with Ethernet Interface for ProfiNet environment.

NOTE:

System requirement for the KTP700 is WIN CC Basic V 13 SP1. The software is included in STEP 7 Basic V13 SP1 and STEP 7 Professional V13 SP1.

7" wide screen Touch Panel with colour display for touch operation with following interfaces:

2 x RJ 45 Ethernet for ProfiNet (mit integriertem Switch)

1 x RS 485/422 for ProfiBus/MPI

2 x USB-host, 1 x USB- device



## TRANSFER SYSTEM

The Transfer System is for the transportation of the 4-part workpiece. As the height is variable, the transfer system could even be combined with existing systems.

Technical Details:

- Dimensions: 750 x 225 x 165mm (LxWxH)
- Slip- and wear-free toothbelt system
- Flange-mounted pulleys for the connection of conveyor belt and curve without motor.

Choice of Motors for the Transfer System:

- Small gear motor with operation panel (speed and direction selector).
- Gear motor DC 24V with operation panel (speed and direction selector and sensor connectors).
- 3 phase motor 230/400V AC (suitable for frequency converter).
- Servo motor incl. power supply, ProfiBus DP adapter and comprehensive parametrize - and control software.

Features of Transfer Systems with Motor:

- 2x inductive sensors (opener) with adjustable holder for end position.
- Integrated encoding disk with optic sensor for path measurement.
- 3x inputs with M12 plug connector for I/O interface.
- 3x outputs with M12 plug connector for I/O interface.
- I/O interface with Sub-D 25pole plug connector for direct control with the PLC panel and 8x M12 plug connector variably useable for in- or output.



Choice of Interfaces for the Transfer System:

- AS-i (Slave) with 4x digital In- and Outputs (AS-I Master and AS-I power supply is required for operation).
- ProfiBus DP (Slave) with 8x digital In- and outputs (ProfiBus Master is required for operation).
- ProfiNet (Slave) with 8x digital in- and 4x digital outputs (ProfiBus Master is required for operation).



Transfer System with Small Gear Motor and Operation Panel



Encoding Disk with optic Sensor



End Position Sensor

## TRANSFER JUNCTION

The transfer junction has the function of a crossing, that could distribute the workpiece to all 4 directions. This is realized with a revolable conveyor unit with separate motor.

Technical Details:

- Revolving unit with small gear motor DC 24V.
- Conveyor unit with small gear motor DC 24V.
- Inductive sensor (opener) for carrier indication.
- 2x end position sensor for revolving unit.
- Operation panel (speed and direction selector).
- I/O Interface with Sub-D 25poles plug connector and 8x M12 plug connector.
- Overwinding protection.
- Dimensions: 455 x 225 x 410mm (WxHxD).



## COMPONENT MAGAZINES

There are component magazines for the workpiece carrier and all the components of the 4-part workpiece. The magazines are installed on the transfer system. Up to 3 stations could be placed on one conveyor belt.

### Carrier Magazine:

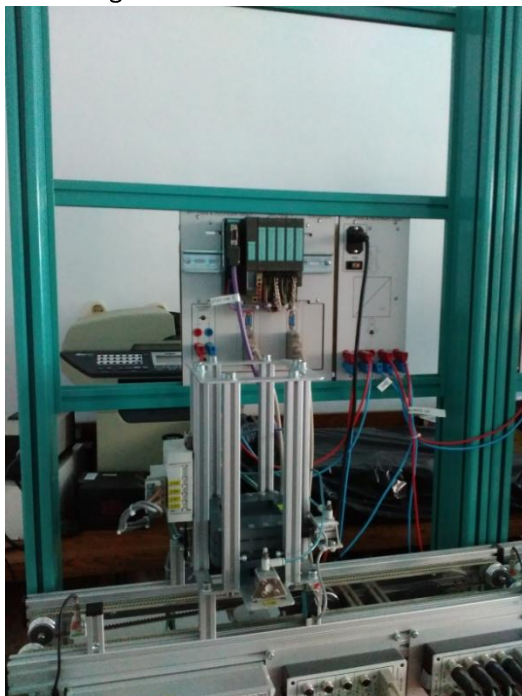
- Drop-down magazine for 16 carriers.
- 3x pneumatic one-way cylinder to separate the carriers
- Valve terminal with 4x 5/2-way valves with 8mm pressured air connector.
- Reflective sensor for carrier cognition.
- Adjustable light barrier for identification of the magazine fill-level.
- Pneumatic 2-way cylinder with vacuum filter.
- 4x inputs with M12 plug connector for an I/O interface.
- 4x outputs with M12 plug connector for an I/O interface.
- Dimensions: 255 x 270 x 342mm (LxWxH).
- Voltage DC 24V.

### Magazine for Workpiece Top and - Base:

Drop-down magazines for 10x top and 10x base for workpiece.

Each with 3x pneumatic one-way cylinder to separate the workpieces.

- Stop cylinder with magnetic valve.
- Valve terminal with 4x 5/2-way valves with 8mm pressured air connector.
- Reflective sensor for carrier cognition.
- Adjustable light barrier for identification of the magazine fill-level.
- 2x inputs with M12 plug connector for an I/O interface.
- 2x outputs with M12 plug connector for an I/O interface.
- Dimensions: 255 x 130 x 558mm (LxWxH).
- Voltage DC 24V.



## **PIN ASSEMBLY AND REMOVAL**

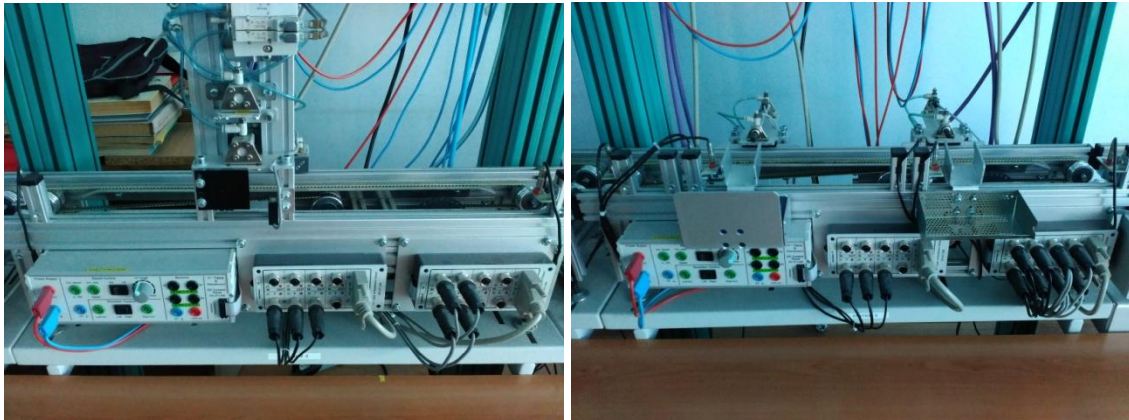
There are two pneumatic stations for pin assembly and pin removal. The stations are installed on a transfer system. Up to three stations could be placed on one conveyor belt.

### ***Pin Assembly Station:***

- Drop-down magazine for 17 pins.
- Counter holder and collection container for pins.
- Double acting cylinder with end position sensors.
- 5/2-way valve with 4mm pressured air connector.
- Reflex light barrier to identify if pins are in the magazine
- 2x inductive sensors for position cognition of the workpiece carrier.
- 5x inputs with M12 plug connector for an I/O interface.
- 1x output with M12 plug connector for an I/O interface.
- Dimensions: 268 x 120 x 345mm (LxWxH).
- Voltage DC 24V.

### ***Pin Removal Station:***

- Double acting cylinder with end position sensors.
- 5/2-way valve with 4mm pressured air connector.
- Slide with collection container for pins.
- 2x inductive sensors for position cognition of the workpiece carrier.
- 4x inputs with M12 plug connector for an I/O interface.
- 1x output with M12 plug connector for an I/O interface.
- Dimensions: 175 x 140 x 132mm (LxWxH).
- Voltage DC 24V.



## **SENSOR TEST STATION**

The Sensor Test Station indicates with inductive, capacitive and optical sensors the configuration of the 4-part workpiece.

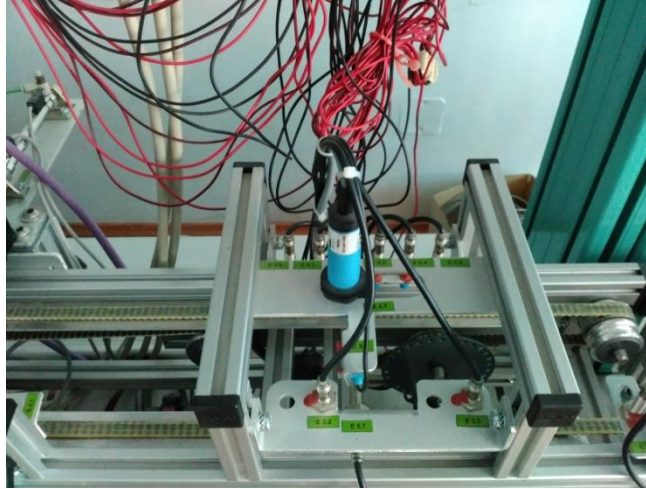
Evaluation unit (6x inductive sensors with M12 plug connector) reads in the 6-bit code of the work-piece carrier. The test station is mounted on a transfer system.

Up to three stations could be placed on one conveyor belt.

Technical Details:

- 2x inductive sensors for the positioning.
- Optical sensor for pin cognition.
- Inductive sensor for the material cognition of the pin.

- Capacitive sensor for the cognition of the workpiece top.
- 5x inputs with M12 plug connector for an I/O interface.
- Dimensions: 182 x 180 x 170mm (LxWxH)
- Voltage DC 24V.



#### STACKER RACK

Training System for the storage of the carriers, with or without the 4-part workpiece.

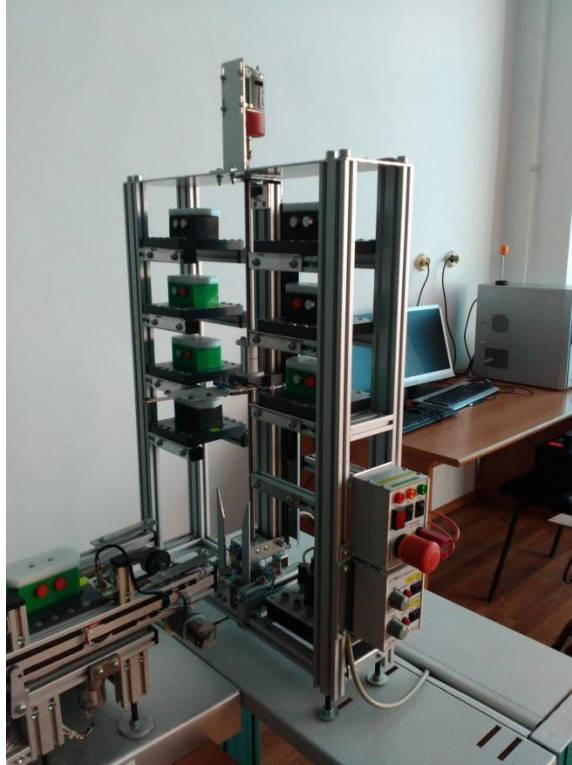
The stacker rack is mounted on a transfer system.

Up to three stations could be placed on one conveyor belt.

Technical Details:

- Storage for 8 workpiece carriers.
- Fork for lifting the carrier.
- Threaded lifting spindle with individual motor for the fork movement.
- Motor for fork rotation.
- Optical sensor for carrier cognition.
- 5x mechanic end position switches for the level cognition.
- 6x inputs with M12 plug connector for an I/O interface.
- 4x inputs with M12 plug connector for an I/O interface.
- I/O interface with Sub-D 25poles plug connector for direct control with the PLC panel.
- Control for the regulation of both motors.
- Rotation unit with overwinding protection.
- Dimensions: 210 x 485 x 850mm (LxWxH).
- Voltage DC 24V.





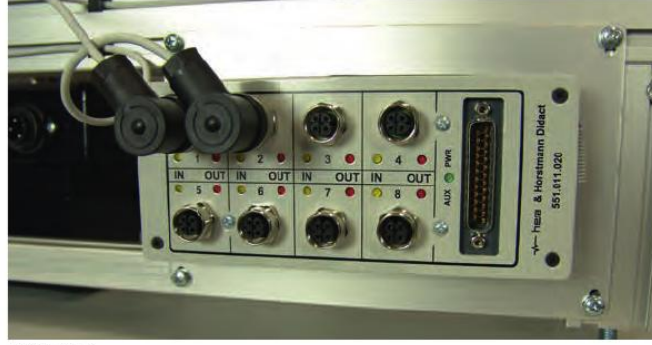
#### **OPERATION - AND INTERFACE OPTIONS**

All basic systems (transfer system, curve, etc.) and top- mount stations could be equipped with an operation unit with emergency off and below mentioned interfaces:

- **Operation unit with emergency off (3x inputs, 4x outputs), equipped with:**
  - Emergency off button, connected with safety jacks.
  - 2x switches (2x inputs)
  - Illuminated switch (input + output)
  - 3x indicator lamp red/orange/green (3x outputs)
  - I/O interface with Sub-D 25poles plug connector for the direct control with the PLC panel and 8x M12 plug connectors, variable assignment with input or output.
  - AS-i (Slave) with 4x digital inputs and 4x digital outputs (AS-I master and AS-I power supply is required for operation).
  - ProfiBus DP (Slave) with 8x digital inputs and 8x digital outputs (ProfiBus master is required for operation).
  - ProfiNet (Slave) with 8x digital inputs and 4x digital outputs (ProfiNet master is required for operation).



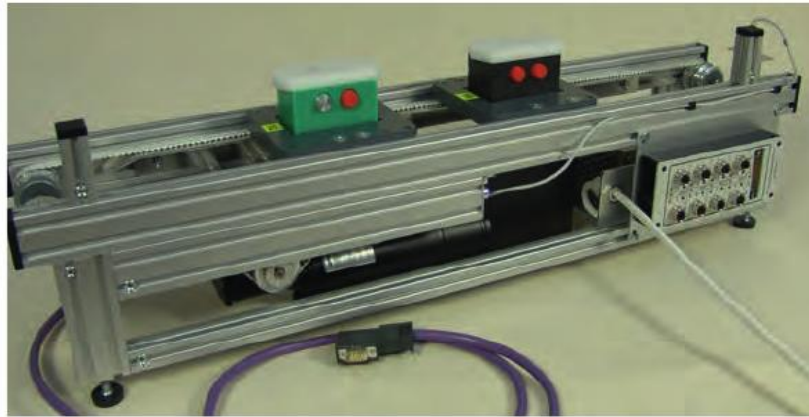
Operation Unit with Emergency Off



I/O Interface



AS Interface



Transfer System with Servo Motor and ProfiBus Interface