Modular and scalable automation concept for connector assembly
Key modules: Servo press kit and compact handling systems

Highlights

- Modular and scalable automation concept
- Easy commissioning and maintenance: Solution is based on modules using as many standard parts as possible: Compact handling system YXMx, servo press kit YJKP, controller CECC-X in combination with valve terminal CPX/MPA, common base plate
- Easy engineering and commissioning: System kits YXMx and YJKP comprising kinematics, controller and application software
- No programming skills requires
  - Graphic user interface (sequencer) for simple and reliable generation of program sequences in CODESYS
  - Festo Handling Motion Lib with predefined function elements

Customer

Harwin PLC Europe, located in Portsmouth, Great Britain, is a manufacturer of electornic connectors and mechanical components for PCBs.

Project

Highly automated assembly line for electronic connectors, capable of producing hundreds of thousand of connectors of the Gecko series a year with a wide range of connector cofigurations ranging from 4 to 50 pins per connector. The assembly line consists of three main stations:
(1) Inserting the pin contacts into the connector housings, (2) Press-fitting the pins and (3) bending the pins

Requirements

- Increase efficiency of manufacturing process
- High level of automation and high degree of flexibility were needed to be able to produce differently shaped and sized connectors on the same assembly line
- Precision, repetition accuracy, flexibility and reliability
- Modular concept to future-proof Harwin‘s assembly lines

Solution

- Built around the servo press kit YJKP and the compact handling system YXMx
- The handling systems YXMx takes care of the X/Y movements of the workpiece carries and the plasitc housings assembled in the system stations.
- The servo press kit YJKP provides easy-to-configure position and force-controlled movement in the Z plane and is used for press-fitting and bending the contact pins.
- The Festo solutions enable maximum standardisation and modularisation, as standard parts are used everywhere.

Modular and scalable automation concept for connector assembly

Customer Harwin is convinced by the Festo solution

Festo solution

„The Festo solution give us the accuracy, flexibility and reliability we need to produce high-end connectors for the electronics industry and reduces our engineering efforts significantly."

Paul McGuiness
Operations Director at Harwin

Modular and scalable automation concept for connector assembly

Assembly line for Gecko connectors consists of three key stations

1 ... 3 In all stations, the electric and pneumatic drivers are controlled by their own controller CECC-X together with a valve terminal CPX/MPA

1 **Inserting the pin contacts into the connector housings (pin shooter):**
The workpiece carriers are equipped with the required connector housings and are positioned by using the compact handling system YXMx so the contact pins can be inserted.

2 **Press-fitting the pins:**
The servo press presses the contact pins into the connector housing. The precision gripper HGPT from Festo locates the workpiece carriers holding the connector housings while the pins are fitted.

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Festo solution – Standard modules, common parts

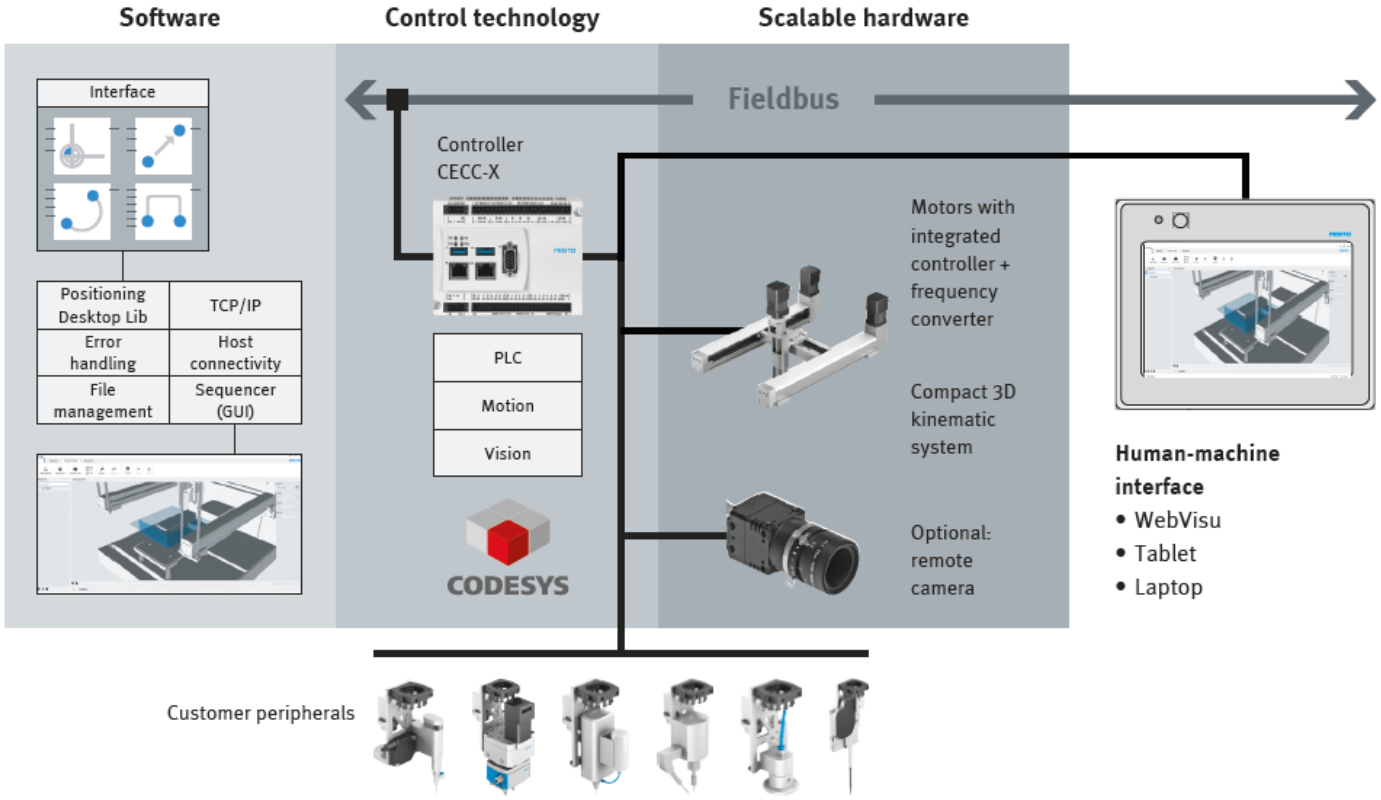
1 ... 3 In all stations, the electric and pneumatic drivers are controlled by their own controller CECC-X together with a valve terminal CPX/MPA

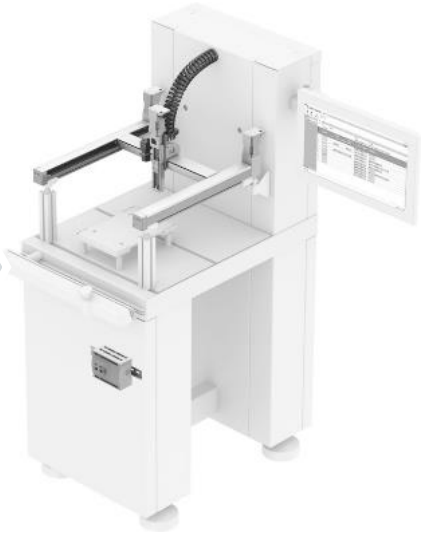
All stations are based on modules using as many standard parts as possible:

1. Servo Press Kit YJKP
2. Compact Handling System YXMx
3. Precision gripper HGPT
4. Motorcontroller CMMP-AS
5. Controller CECC-X (PLC)
6. Valve Terminal CPX/MPA
7. Common base plate

Modular and scalable automation concept for connector assembly

Compact handling system – System structure





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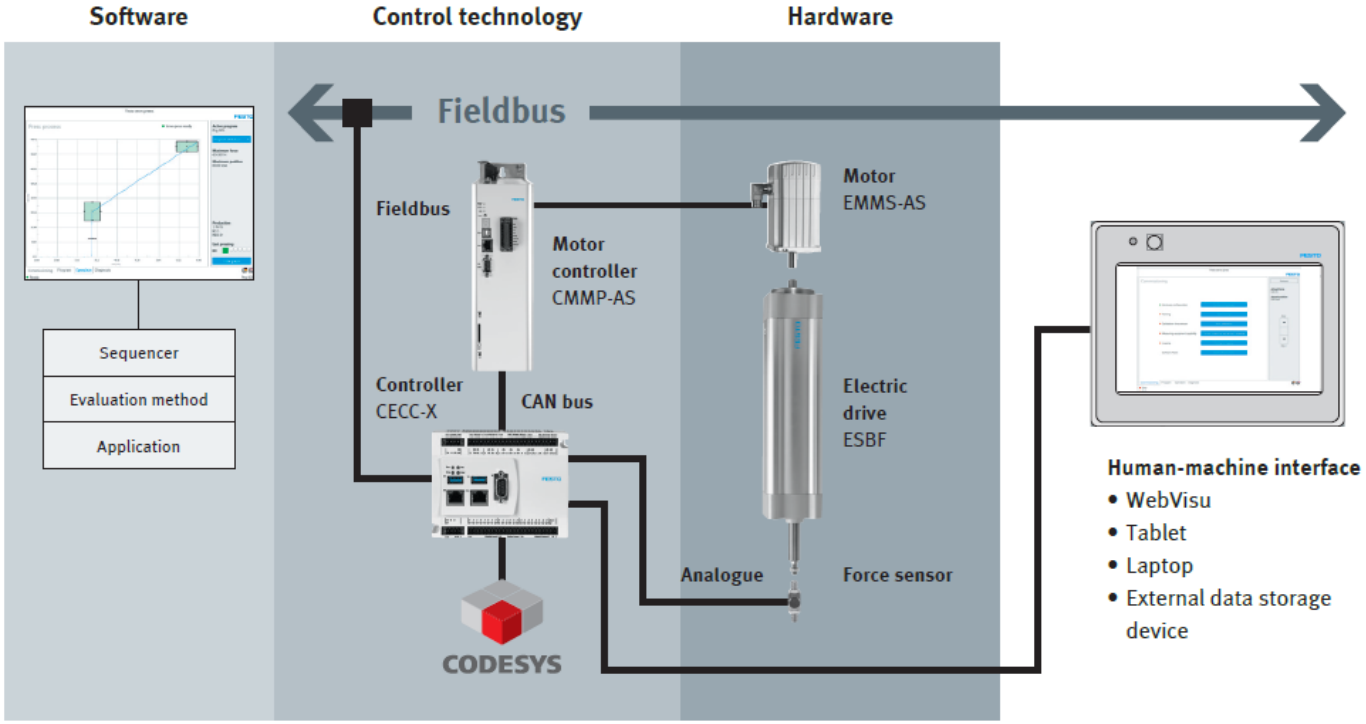
Compact handling system – System structure

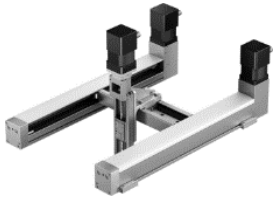


Handling solution for moving and positioning a dispensing head

Solution components in detail

Valve terminals CPX/MPA

- Proportional technology
- Integrated, convenient diganostics thanks to serial linking
- Up to 8 voltage zones
- Controlled via fieldbus or control block
- Max. 64 valve positions / max. 128 solenoid coils
- Digital inputs/outputs, Analogue inputs/outputs
- Parameterisation of inputs and outputs
- Integrated convenient diagnostic system
- Preventive maintanccce concepts



Compact planar surface gantry EXCM-30

- Rated load for maximum dynamic response: 3kg
- Stroke length X-axis: 100 ... 700 mm
- Stroke length Y-axis: 110, 160, 210, 260, 360
- Maximum acceleration: 10 m/s²
- Maximum speed: 0.5 m/s
- Stepper motors with integrated controller and frequency converter

Electric cylinder ESBF and Servo motor EMMS-AS

- Feed forces of up to 17 kN
- Size 32, 40, 50, 63, 80, 100
- Stroke length 30 ... 1500 mm
- Force 600 ... 1700 N
- Motor can be mounted using axial or parallel kit
- Linear drive with ball screw in Clean Design
- Including guide unit EAGF
- For protecting electric cylinders ESBF and EPCO against torsion at high torque loads
- Recirculating ball bearing guide

Parallel grippers HGPT

- Size 16,20, 25, 35,40, 50, 63, 80
- Gripping Force (Standard) 106 ... 3120 N
- Gripping Force (Heavy-Duty) 192 ... 6300N
- Repetition Accuarcy: ±0,01 ... ±0,025

Controller CECC-X

- Large number of functions in a very compact space
- High performance (dual-core processor)
- Interface variety
- Programming based on CODESYS V3
- Future-safe for Industry 4.0 thanks to OPC UA interface