Modular and scalable automation concept for connector assembly

Key modules: Servo press kit and compact handling systems

Customer
Harwin PLC Europe, located in Portsmouth, Great Britain, is a manufacturer of electronic 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 configurations 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 plastic 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.

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
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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
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Assembly line for Gecko connectors consists of three key stations

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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In all stations, the electric and pneumatic drivers are controlled by their own controller CECC-X together with a valve terminal CPX/MPA.
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Festo solution – Standard modules, common parts

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

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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 diagnostics 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 maintenance 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 Accuracy: ±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

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