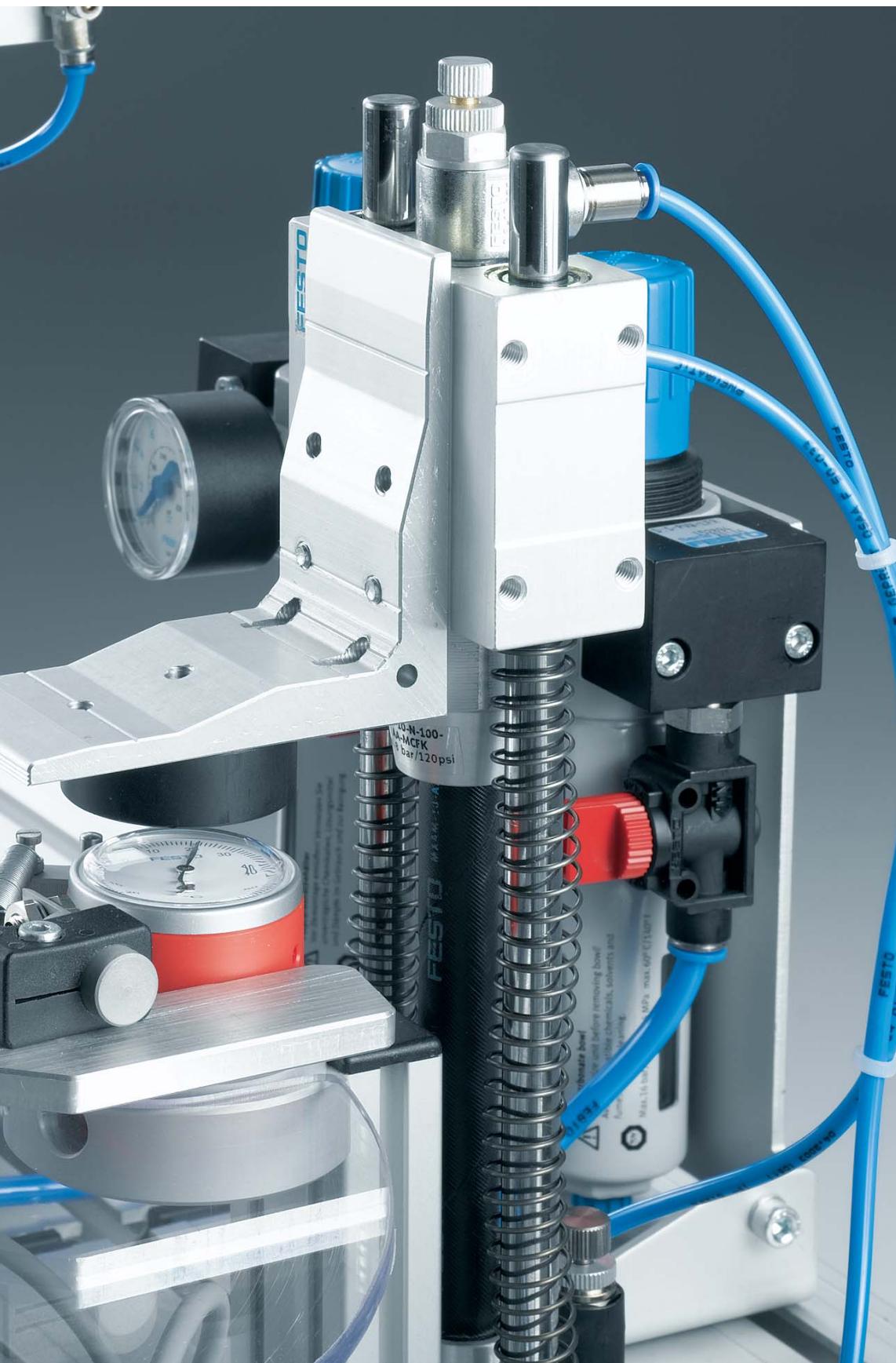


Learning Systems

Modular Systems for Mechatronics Training



FESTO

MPS Modular Production System
Model industrial automation systems at various levels of complexity

MPS Combinations
Model specific combinations of automation functions with blended learning packages

Automated Processes and Flexible Manufacturing
Fully integrated automation training combining mechanics, pneumatics, electrical engineering, PLC control and communication interfaces

Software
Simulation software to model and teach automation processes

Create an Effective Learning Environment

www.festo.com/uslearningsystems

Automation Training with

MPS: Modular Production Systems

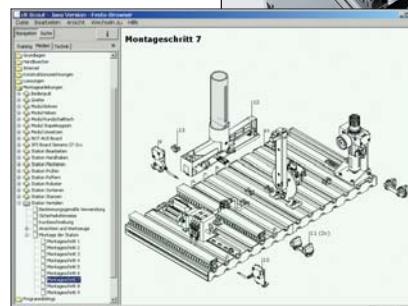
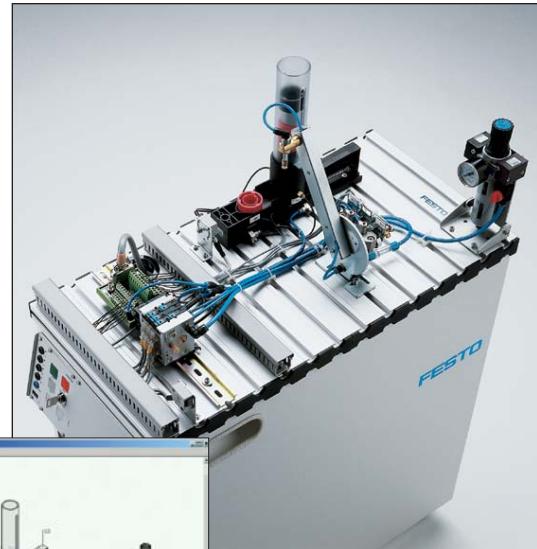
Use individual stations to teach a variety of technologies and automation principles.

Teach Technology Fundamentals:

- Pneumatics
- Hydraulics
- PLC controls
- Robotics
- Sensors

Teach Automation Processes:

- Pick & Place
- Testing & Quality Inspection
- Workpiece Processing
- Workpiece Sorting
- Robotic Assembly
- Workpiece Storage & Retrieval



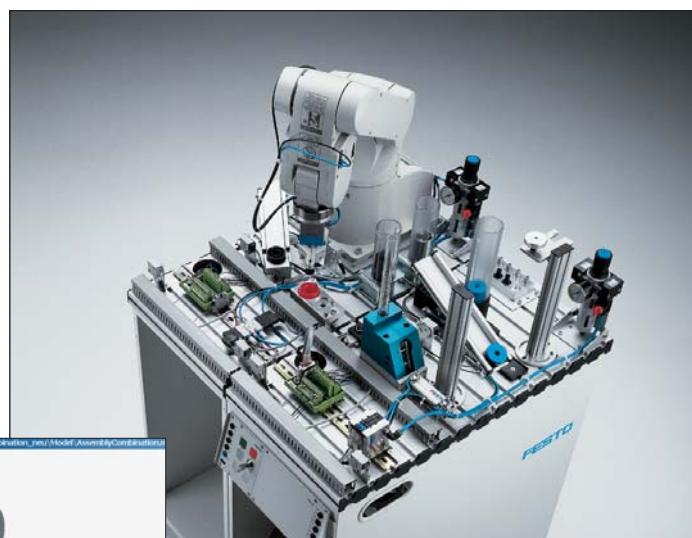
Project Work

Mechatronics Assistant software contains project exercises for each MPS station that enhance training in Mechatronics.

MPS Combinations

MPS System Modularity

- Combine various individual stations to expand the number of subjects to be taught.
- Mix and match station combinations to enhance the learning process.
- Build your learning lab capability within budgetary guidelines.



Blended Learning Packages

Each MPS® 200 system includes a package of web based training programs, as well as teaching resources, FluidSIM Pneumatics and Mechatronics Assistant.

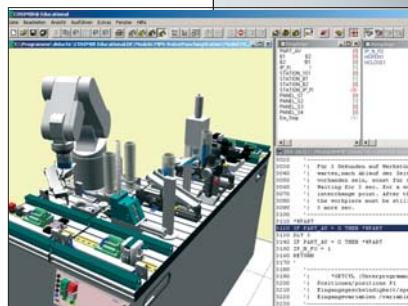
Choose your own station or let us recommend a solution from our pre-configured packages.

Flexibility and Modularity

Automation Processes

Fully integrated automation training, combining mechanics, pneumatics, electrical engineering, PLC control, and communication interfaces.

- Individual stations can be combined into a linear production line.
- Data transfer via PLC control signals.
- “Hand-shaking” signals utilizing infrared sensors to process workpieces through the production line.
- System communications via standard I/O protocols.
- PLCs from various manufacturers can be utilized.



Simulation Software

Cosimir PLC for PLC training, Cosimir Robotics for robot simulation. Students programming projects can be exported to operate external hardware after simulation review.

Flexible Manufacturing

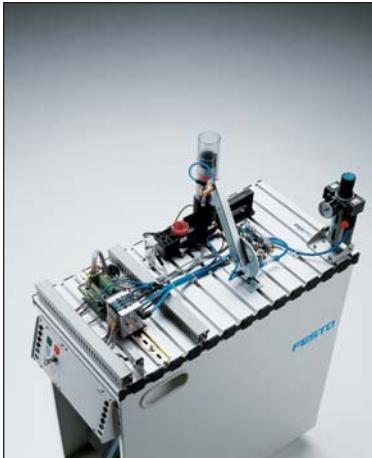
- MPS stations can be combined into flexible manufacturing workcells.
- Workcells can be arranged in various sequences as desired.
- Conveyor system is utilized to transport “workpieces” among workcells.
- Workcells can be removed for individualized training.
- PLCs from various manufacturers can be utilized concurrently.



Process Visualization and Control

Process visualization and control
System visualization and operation with
industrial SCADA (Supervisory/System Control)
software. Communications via Fieldbus, Ethernet,
ProfiBus or DeviceNet.

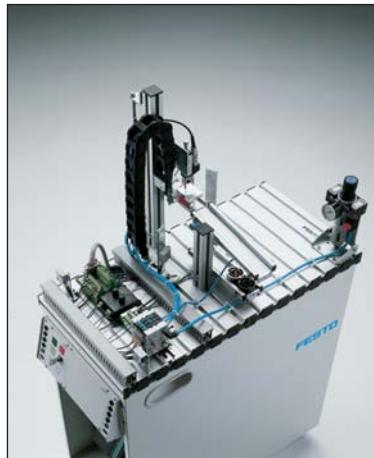
MPS Stations: Teaching Mechatronics Through Practice



Distribution

Separating parts from a stack and feeding into a process.

- Linear actuators
- Semi-rotary actuators
- Vacuum technology
- Optical, proximity and contact sensors
- PLC programming



Testing

Material recognition and Quality Control.

- Rodless cylinders
- Air table for frictionless motion
- Flow control
- Optical and capacitive sensors
- Analog technology
- Correct wiring of electrical components
- PLC programming



Robot

Removal of part from a pickup point and sorting by color.

- Robot functioning
- Programming a robot
- Safety considerations
- Gripper (electrical or pneumatic)
- Optical sensors
- Use of robot controller as I/O processor



Hydraulic Punch

Removes part from a stack and uses hydraulic forces to punch a hole.

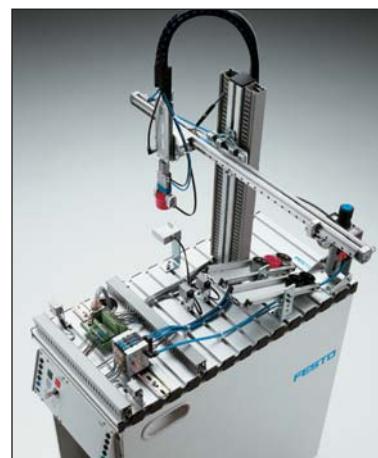
- Linear motion
- Hydraulic applications
- Sensors for part positions and pressure



Sorting

Sorts parts by color and moves them via an electrical conveyor belt.

- Sensor array to distinguish colors
- Linear motion to set deflectors
- Proximity sensors verify process completion
- Optical sensors monitor number of parts in each slide



Handling

Modern pick-and-place application that moves part from pick-up point to one of several drop-off locations.

- Double-acting rodless cylinder
- Proximity switches sense cylinder positioning
- Pneumatic gripper technology

Industrial Applications



Processing

Electrical rotary table models common industrial processes.

- Sensors locate parts at pickup as well as varying processing points
- Proximity sensors locate correct alignment of rotary table.
- Sample applications such as machining and quality control can be taught



Fluid Muscle Press

Presses parts together using pneumatics.

- Pressure can be regulated via analog or digital signal
- Combined linear-rotary actuator provides flexible motion
- Features Fluid Muscle, latest in membrane technology



Separator

The separating station permits the creation of flexible assembly lines.

- Differentiate workpieces and flow
- Analogue diffuse sensors check hole depth and supply analogue and binary output signals
- Fiber-optic through beam sensors and optical sensors monitor material flow on the conveyors



Buffer

Insures steady supply of parts for processing.

- Optical sensors sense location of parts
- DC electrical conveyor moves parts
- Standard pickup and dropoff points allow this station to be used anywhere in the process.
- Linear cylinder provides motion to stop parts or allow them to pass
- Teach process optimization and sensors
- Teach the use of PLCs to count products



Pick and Place

Moves parts to or from a conveyor belt.

- Three axis gantry device is typical of industrial products
- Sensors detect a part is present
- DC electrical conveyor moves parts



Electric Storage

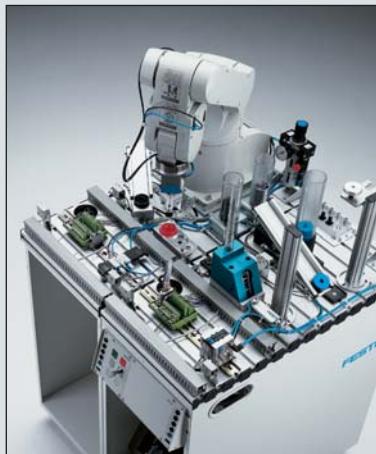
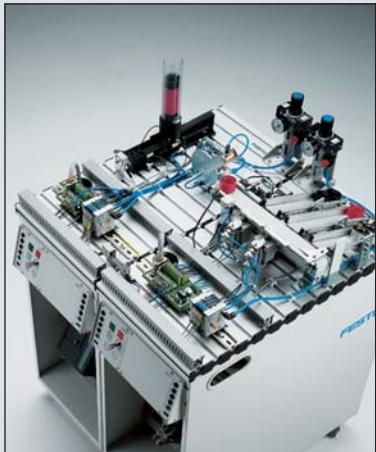
Teach electric drive technology and PLC controls.

- Parts storage using electric drives and PLC control
- Linear movement executed using a cylinder
- Rotary movement performed by electrical servo drive and integrated controller
- Stroke movement executed using electrical linear axis with separate controller

MPS: Teaching Automation Processes

MPS Combinations

Modular production systems combine automated functions with blended learning packages.



Blended Learning

- MPS stations are designed to be used individually or in any custom combination
- Standard mechanical dimensions permit stations to be physically connected
- Capstone projects can be developed for advanced training
- Pre-designed combinations packaged with additional resource materials, Mechatronics Assistant, and FluidSIM®
- Infrared handshaking utilized to move workpieces through the production process
- Pick-up & drop-off points align to allow workpieces to transfer seamlessly



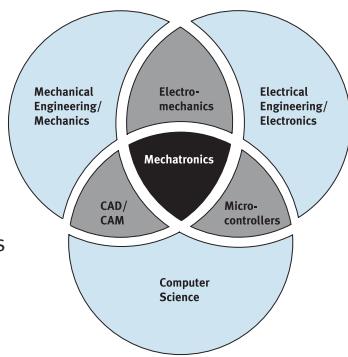
Mechatronics

Mechatronics is the synergistic combination of mechanical engineering, electrical engineering, electronics, information technology and systems thinking, utilized in the design of products and automation processes.

Festo Learning Systems products provide the ideal environment for Mechatronics training. Our broad array of products including hardware, simulation software, web based training products and a broad array of curriculum, combine to provide the educator with the most comprehensive industrial based training programs available worldwide.

Technical training objectives include the ability to:

- Analyze functional relationships in mechatronic systems
- Manufacture mechanical components
- Follow information and energy flow in electrical, pneumatic and hydraulic sub-systems
- Plan and organize work flow
- Commission, troubleshoot and repair mechatronic systems
- Communicate using industrial network protocols, including DeviceNet™ and ProfiBus



MPS: Teaching Flexible Manufacturing

Expand Your Mechatronics Training with Factory Simulations



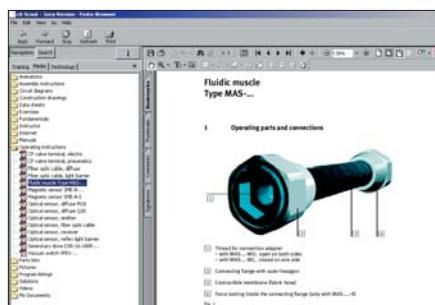
Adding a conveyor to existing MPS stations enables training in flexible manufacturing:

- Network communication among workcells
- Production planning and optimization
- Production controlled by PLCs
- Workcells can be configured to your aims and budgets

Harness the full capacity of your factory training with the addition of:

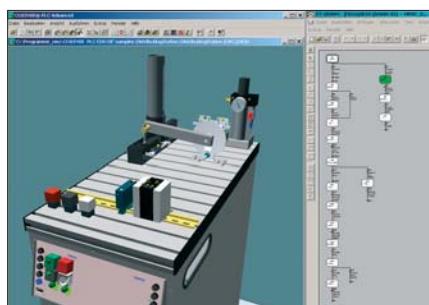
- Multi-axis robots
- Hydraulic operations
- Vision systems
- Servo-electric drives
- Supervisory software lets students watch their programs in action
- Storage and retrieval system

Simulation and Control Software



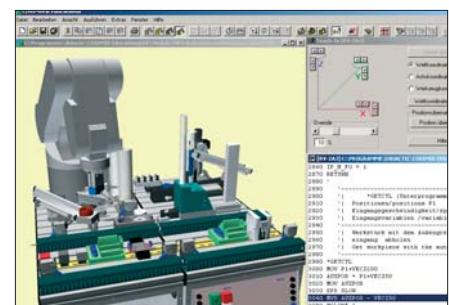
Mechatronics Assistant:

- Resource for teaching Mechatronics
- Full documentation and programs for all MPS stations
- Contains assembly drawings, schematics and data sheets for each station
- Pre-designed student exercises can be printed as needed
- Students can research information on their own



COSIMIR® PLC:

- Simulation models of each MPS station
- Teach PLC programming and master troubleshooting using software instead of hardware
- Student written programs can drive external hardware
- Flexible troubleshooting mode records student activities



COSIMIR® for Robotics:

- Simulation software to teach robotics
- Learn the history and vocabulary of robots.
- Understand what makes a robot work
- Write programs and position lists for robots in pre-designed workcells
- Extended versions operate with robots of major manufacturers

Contact your local Festo representative for a customized quotation.

Learning Systems

Modular Systems for Mechatronics Training

Festo Modular Systems seamlessly integrate with:



Learning Systems Software Simulation

- EasyVeep PLC controls and technology training
- FluidSIM Fluid Power training aid for instructors and a design tool for engineers
- COSIMIR PLC 3D simulation tool for practical PLC training
- COSIMIR for Robotics 3D simulation software for modeling and programming robotic workcells



MPS® won the Worlddidac Award in 1998, 2000, 2002



Learning Systems Roadmap to Mechatronics

- Hardware and simulation software to teach mechatronics
- Fluid power, PLC control, robotics and sensors
- ICIM and FMS flexible manufacturing training systems



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