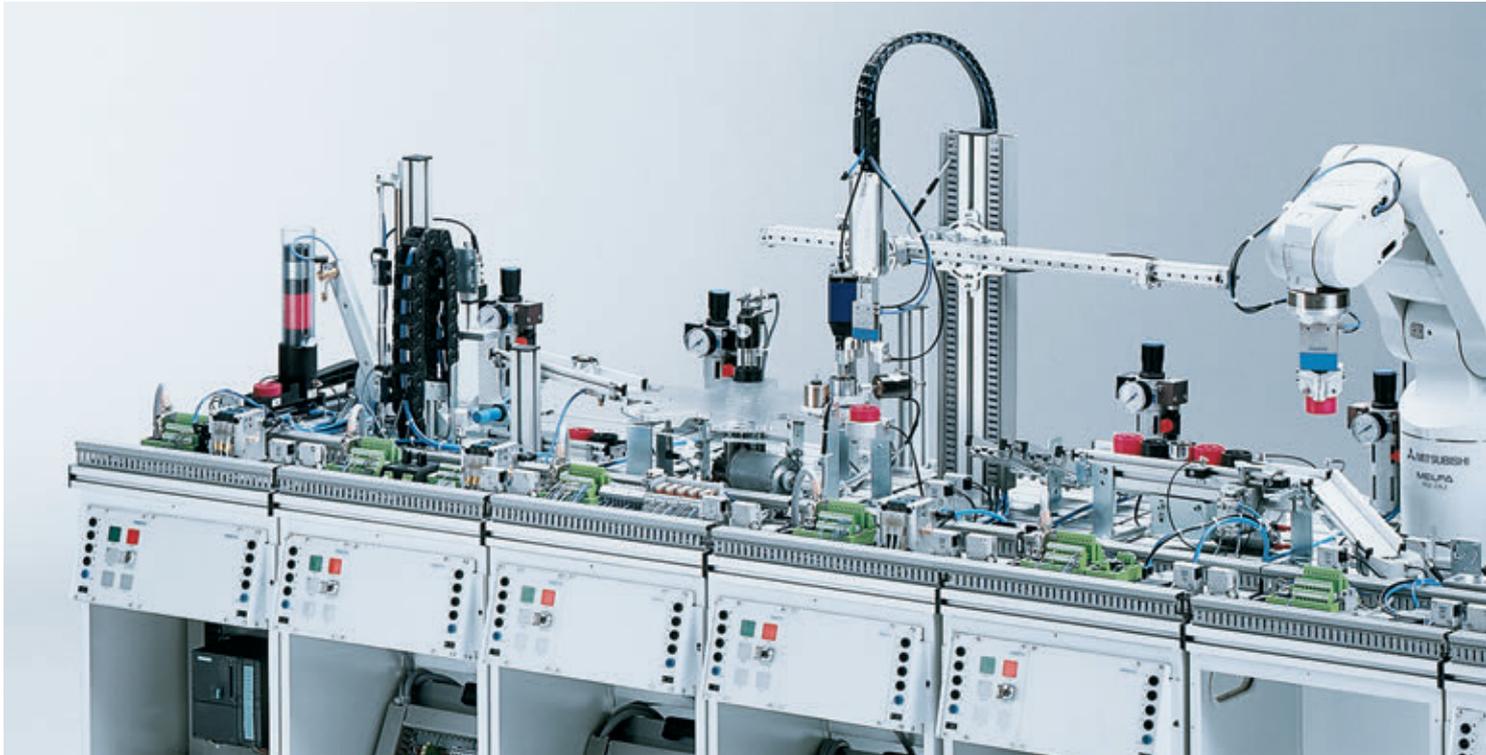


MPS[®]-D

FESTO

MPS® stations

Mechatronic systems for world champions



The MPS® makes history

Since 1991, the stations from the modular production system MPS® have been the “sporting equipment” at the mechatronics world championships. In national and international competitions, MPS® has demonstrated that its concept, the stations and control systems and its functionality involved provide exactly those features that characterise automated production throughout the world: Integration of mechanics, electrical engineering and information technology to create mechatronics.

Anyone who trains using MPS® can be confident that numerous companies, schools and universities all over the world are doing exactly the same. The stations in the modular production system are the origin and example for almost all mechatronic training systems.

The MPS® is the original.



Each station has its own focus Two stations are sufficient to represent a simple, industry like process for basic training in automation technology: distribution and sorting.

This simplest of all combinations provides numerous basic functions of automated production: separating, feeding, identifying, sorting. Each additional station adds new learning objectives and each station can be used to achieve a particular objective. This means that the transfer of knowledge to the actual operation of modern automated production is as efficient as possible.



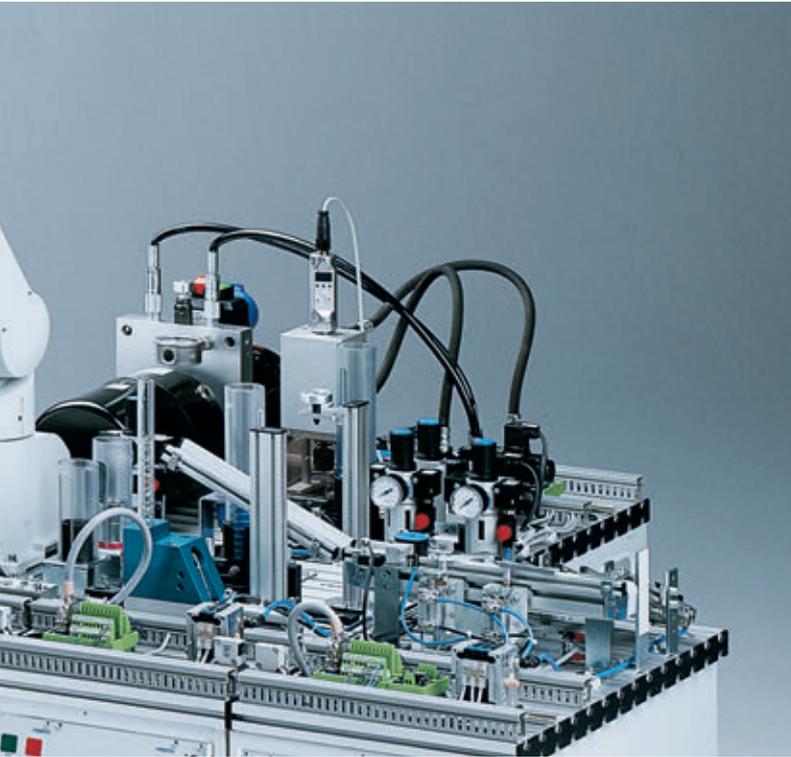
Combine in whatever way suits you! All stations can be combined with others to create systems. This adds learning content and increases the flow of material and information. It is up to you whether you network the stations or operate them in standalone mode with a separate PLC.

Combination with other processes is also possible, e.g. with the MPS® transfer system or the MPS® PA stations.



New, state of the art robot The assembly station with robot has always offered particular added value. It is both a sophisticated mechatronic system in the assembly process as well as a complete learning system for robotics.

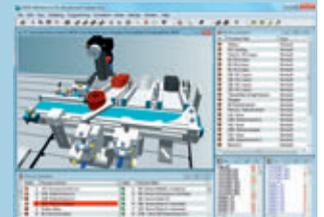
The new RV-2SDB represents the continuous development of the MPS®: With 6 axes and a 480° range of motion, it can scratch its own back. With an Ethernet and USB interface, it offers exceptional communication options, while integrated controllers provide scope for additional axes.



3D: reflecting reality

The MPS® stations provide plenty of material for varied training. But in practice not every station is always available.

That's why all MPS® stations are also available as a simulation. The virtual stations in CIROS® behave just like the real stations. There is no difference in commissioning and troubleshooting. The same PLC can be used for control.



CIROS®

The virtual CIROS® stations enable you to

- add more functions of an automated system to your learning scenario
- provide multiple learners with the same stations at the same time
- design more individual training without having access to all real stations



Reliable safety modules

Hardly any issue affects so many employees in a company as health and safety. Emergency stop, safety curtains, safety doors and failsafe control systems are all part of a system made up of MPS® stations.



Production and assembly

It depends what's important to you: If simple handling tasks are sufficient for your learning scenario, the workpiece set with bodies of various materials can be used. If you want handling to involve simple assembly, the bodies with measuring instruments or containers with covers are ideal. For complex assembly with robots, a symbolic single-acting cylinder provides just the right challenges.



Just what you want: choice of PLC

The PLC normally controls the individual stations, unless you are using the virtual mini control system in FluidSIM® for example.

As the PLC, we recommend an EduTrainer® Universal. We will fit the PLC of your choice, as well as fieldbus components if required. The advantage of the EduTrainer® in the MPS® station is clear: you can remove the controller and use it for other processes or in laboratory furniture.



Since 1991, the modular production system MPS® has been the competition platform for the mechatronics world championships.

Distributing/Conveyor station



Function

The Distributing/Conveyor station separates workpieces stored in the magazine tube of the stacking magazine. A double-acting cylinder pushes the workpieces out one at a time. The Conveyor module transports the workpiece to the right or left. If required, the workpiece can be stopped and separated on the conveyor.

Topic: Separating

Both simple and complex programming topics are communicated using the simple magazine structure. Different workpieces can be used in the MPS® Stacking magazine module.

Topic: Conveying

The MPS® Conveyor module offers a range of training subjects including clockwise/anticlockwise rotation, stopping, separating and opto-electrical sensors.

Part no.

8034566

Pick & Place station



Function

The Pick&Place station is equipped with a two-axis Pick&Place module and a Conveyor module. Optical diffuse sensors or through-beam sensors detect workpiece housings placed on the conveyor. The conveyor transports workpieces to the electric feed separator. The Pick&Place module picks up a workpiece insert from the chute and places it on the workpiece housing. The complete workpiece (housing and insert) is released by the separator and transported to the end of the conveyor.

Topic: Linear slide units

Slide units from Festo can be used to further extend the versatility of the Pick & Place module. Variable stops, silencers and an attachment that can be adjusted in all directions provide the ideal solution for every Pick & Place task. This permits a wide range of projects to be implemented.

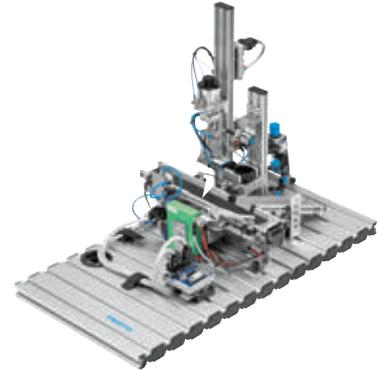
Topic: Vacuum technology

The vacuum components vacuum generators, pressure switches, vacuum filters and suction cups are harmonised for optimum performance. They clearly demonstrate the principle behind vacuum applications: vacuum generation using a generator, the correct suction cup with matching filter and the teach-in electronic pressure switch with freely programmable switching points for pressure sensing.

Part no.

8034567

Measuring station



Functions

The Measuring station picks workpieces out of the running process in order to place them on a measuring table and determine their height. The belt transports the workpieces to the rotary/lifting module. The workpiece is placed under the diffuse sensor by a lifting and swivelling motion. Then it is returned to the process. Depending on the result of the measurement, the workpiece is separated out onto a slide by an electric semi-rotary drive or is moved to the end of the belt. Opto-electrical sensors with fiber-optic cables monitor the material flow on the belt. The belt can be operated in both directions.

Topic: Analog and digital

The diffuse sensor supplies both an analog and a binary output signal. This facilitates different training levels. The binary switching output can be adapted to the measurement requirement by means of a simple teach-in process.

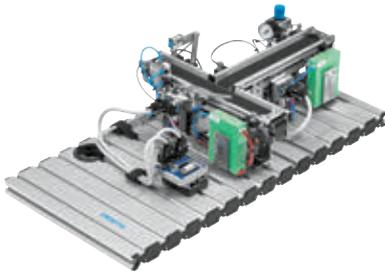
Topic: Pneumatic drives

The rotary/lifting module features a linear and swivel motion as well as a pneumatic gripper. Statistical measuring tasks can be automated, or random samples taken from the process.

Part no.

8038623

Separating station



Functions

The Separating station differentiates workpieces based on their drilled hole depth and separates them into two different material flow directions. Workpieces placed on the belt are transported to the depth measurement point. An analog diffuse sensor checks the hole depth. Workpieces with a deep hole are transported to the end of the belt. Workpieces with a shallower hole or a skewed workpiece are directed towards the rear via the second belt using an electric deflector with semi-rotary drive. Fiber-optic through beam sensors with opto-electrical sensors monitor the material flow on the belts.

The Separating station can be supplemented with MPS® downstream stations in two directions and the belts can be operated in both directions.

Topic: Analog and digital

The diffuse sensor supplies both an analog and a binary output signal. This facilitates different training levels. The binary switching output can be adapted to the measurement requirement and the signal type by means of a simple teach-in process.

Topic: Flexible assembly line

The Separating station permits the creation of flexible assembly lines using MPS® stations. Combined assembly processes such as cylinder assembly and assembly of workpiece inserts in the housing can be realized using the Separating station.

Part no.

8038802

Storing station



Functions

The Storage station can differentiate amongst workpieces based on their color and store up to 48 workpieces across six levels in two rows. The product on the receiving slide is identified based on color with the help of a combination of sensors, and stored on one of six storage levels. A Cartesian handling system with stepper motors and robotic functionality is positioned to this end. A pneumatic gripper mounted on a stepper motor with spindle axis picks the workpiece from the holder and places it in the storage area. The storage area can be located both at the start (removal from storage) and at the end (placement into storage) of a production line, or as a buffering station within a production line, by means of appropriate programming. There is also a slide on the goods issuing side.

Topic: Material detection

Inductive and opto-electrical sensors detect the color and material of workpieces. These can be placed into storage as appropriate to the workpiece type.

Topic: Workpiece sorting

Actuated stepper motors transport the workpiece into the appropriate storage positions.

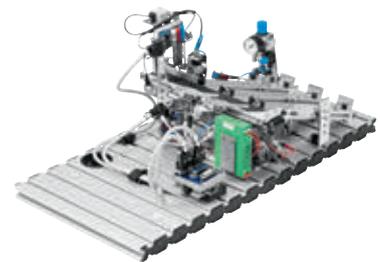
Topic: Embedded systems

The warehouse is operated using a Cartesian handling system with stepper motors, robotic functionality, and a pre-programmed controller with a web interface. The command is provided by external control signals.

Part no.

8049013

Sorting station



Functions

This station sorts workpieces onto three slides. Workpieces placed on the start of the conveyor are detected by a diffuse sensor. A pneumatic stopper with integrated valve stops the workpiece before the sorting process. Sensors upstream of the stopper detect the workpiece features (black, red, metal). The cylindrical workpieces are sorted onto the appropriate slides via electric deflectors. A retro-reflective sensor monitors the fill levels of the slides.

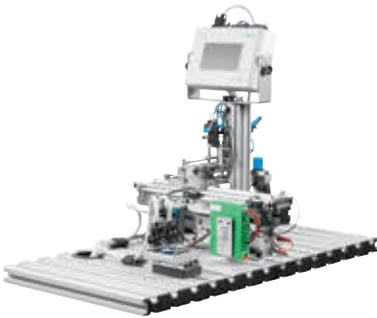
Topic: Material detection

Inductive and opto-electrical sensors detect the color and material of workpieces. A short-stroke cylinder stops the workpieces on the moving conveyor and passes them on for sorting onto one of three slides.

Part no.

8046325

Programming station



Functions

The Programming station transports and programs the EasyKit workpiece attachment. The Conveyor module transports the workpiece attachment to the loading position of the programming module. The module control unit loads, aligns, programs and ejects the workpiece attachment.

The control unit stores up to seven different programs for the EasyKit microcontroller system. The integrated Touch Panel or an external PLC actuates the control unit of the module.

The EasyKit programmed is transported to the end of the conveyor.

Topic: Workpiece detection and transport

Optical proximity sensors detect the position of the workpiece. The Conveyor module transports the workpiece through the station. A double-acting cylinder loads and unloads the programming module.

Topic: Workpiece alignment

A capacitive proximity sensor identifies the orientation of the EasyKit workpiece attachment. A DC motor rotates the EasyKit into the correct position for programming.

Part no. 8059892

Packaging station



Functions

The Packaging station is responsible for packaging workpieces fully automatically. A conveyor carries the object into the collecting position to the two-axis handling module. A box is then separated and folded in the Packaging module. The box is then prepared for loading. The workpiece is placed into the box with the two axis handling module via a stepper motor into the x-axis and a cylinder connected in steps in the z-axis. The box is then sealed and transported back to the Conveyor module. The fully packaged workpiece is transported to the end of the conveyor.

Stepper motor

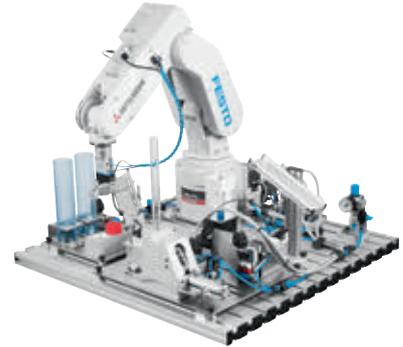
The stepper motor with controller moves the linear axis to various positions with a high positioning accuracy.

Pneumatic control system

Pneumatic limit sensors detect the position of the cylinder, controlling the box's closing mechanism.

Part no. 8062644

Robot station



Function

This equipment level is created based on the basic design of the MPS® robot station and the two robot handling and robot assembly modules as a introduction to industrial robotics. The upstream station feeds the bodies of the pneumatic cylinders to be assembled to the robot via a slide. The robot determines the orientation of the bodies and places them in the assembly holder in the correct orientation. It takes the piston from the pallet and assembles it in the body. Controlled magazines feed the piston springs and cylinder end caps to the robot. The fully assembled pneumatic cylinder is then placed on a slide.

Topic: Handling and assembly

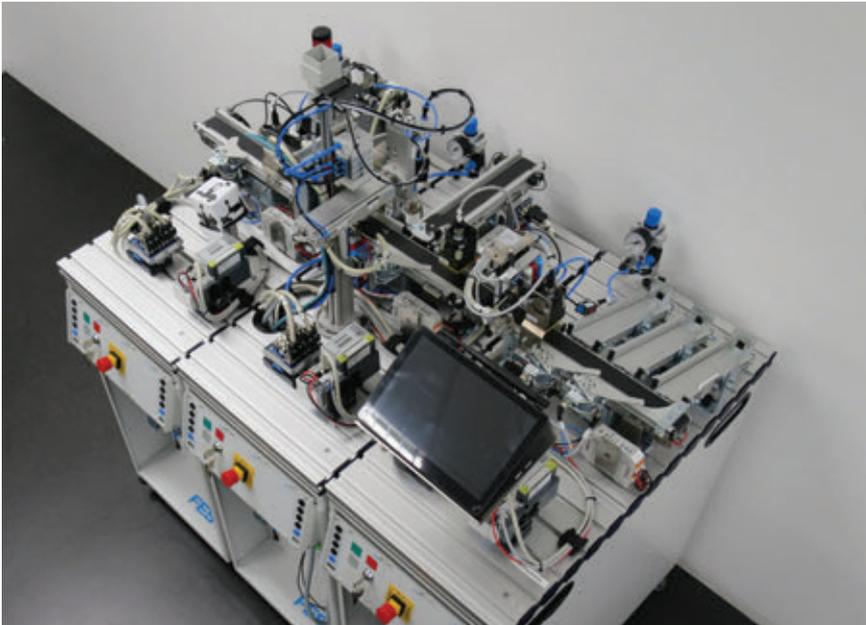
In many industrial applications, robots handle and assemble workpieces and modules. Getting to know these areas of application is an essential part of an introduction to robotics.

Developed in accordance with the EU Machinery Directive 2006/42/EC in compliance with DIN EN 60204-1 and DIN EN ISO 12100.

Part no. 8039313

MPS® System 203 I4.0

Fundamentals of the new technologies up to self-sufficient systems



Function

The MPS® 203 I4.0 system is a small production line from the slightly adapted standard stations Distributing/Conveyor, Joining and Sorting. The entire system is networked and equipped with several RFID write/read heads.

The system produces orders which are generated in the MES system.

In the first station, a workpiece is separated and then written using an RFID sensor.

The subsequent Joining station reads this RFID tag, decides what is to happen with this workpiece based on the order and writes a result back.

In the Sorting station, the workpieces are distributed to three slides depending on the information saved on them.

MES / IoT / Big Data

These are the top topics of the digitization trend. Production control, combining systems, modularity, data security and intelligent data processing are just a few important topics for the future, for efficient and individual manufacturing.

The following services are available via MES:

- System configuration
- Product configuration/routing
- Order entry and management
- Order tracking
- Order data storage
- Web services for various user groups

Data collection and tracking

In this way, you are informed of the location and the status of the product at all times.

Existing MPS® stations can be extended using the RFID module in project work.

Control and operation

By breaking down the operation and control to individual stations, this makes them individual workstations for a project team. The basic operating functions and individual applications in IT technology are available.

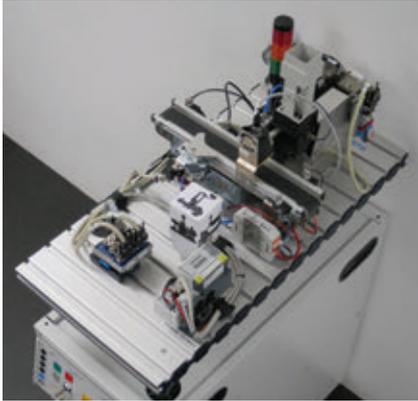
Expandable

Extending the process with additional stations like Storing and Packaging or Programming of microcontrollers offers even more training content and allows them to be expanded to larger production plants for training purposes.

Part no.

8064835

Distributing station



Function

The Distributing/conveyor station is a feeder unit. Feeder units fulfil the function of holding, sorting and feeding workpieces. In addition, feeder units also enable workpieces to be sorted according to several characteristics (workpiece shape, weight etc.).

Feeder units include:

- Magazines with separator function
- Vibratory hopper conveyors
- Inclined conveyors
- Hoppers with feed separators

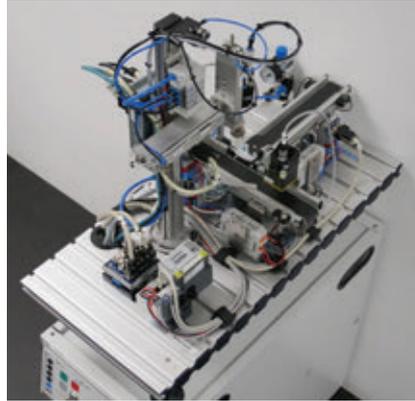
Workpieces which can be handled by feeder units include:

- Electroplated parts
- Moulded plastic parts
- Stamped parts
- Turned parts

The station has been expanded for the MPS® System 203 Industry 4.0 to include a signal column which is connected to the control panel and the RFID module.

After the workpiece base has been pushed out of the stacking magazine module, the RFID read/write head writes the work order number, the item number and the functions to the RFID tag in the workpiece base.

Joining station



Function

The Joining station consists of a Separating station which has been expanded with a Pick&Place module and a bus node. The Pick&Place module is equipped with a suction gripper for joining the workpiece caps and the MPS® workpiece bases.

The station can remove workpiece bases from, or place them into the flow of materials. The workpiece base is held in the joining position at the deflector.

Thanks to the bus node expansions, the Pick&Place module can be used with various protocols depending on the controller.

The function of the Joining station Industry 4.0 is to:

- Remove workpieces from the flow of materials
- Place workpieces into the flow of materials
- Mount workpiece caps on the MPS® workpiece bases

This station has been expanded for the MPS® System 203 Industry 4.0 to include the RFID module. The RFID tag in the workpiece is read by the RFID read/write head and, depending on the results, the Pick&Place module will decide to mount or not to mount the cap.

Sorting station



Function

According to VDI 2860, sorting is a more specific term of the handling function "change quantity". The conveyor is equipped with branches for sorting the workpieces. Various deflectors are set, depending on the workpiece.

The workpieces must travel individually so as not to interfere with the switching operations of the deflectors.

Workpieces are sorted at the Sorting station Industry 4.0 according to the content of the RFID tag. If negative results are obtained during quality inspection, the workpieces are sorted out to a scrap chute.

This station has been expanded for the MPS® System 203 Industry 4.0 to include the RFID module. The RFID tag in the workpiece is read by the RFID read/write head and, depending on the results, the workpiece is ejected.

The function of the Sorting station Industry 4.0 is to:

- Sort workpieces according to their characteristics
- Sort workpieces according to RFID tag content

Simply build it yourself



Each MPS® station is supplied fully assembled and tested on the profile plate. For efficient operation, we recommend:

- MPS® trolley with lockable castors. This simplifies project work and accommodates the newly designed control console and an EduTrainer® Universal, size 1
- Control console with membrane keyboard
- EduTrainer® Universal

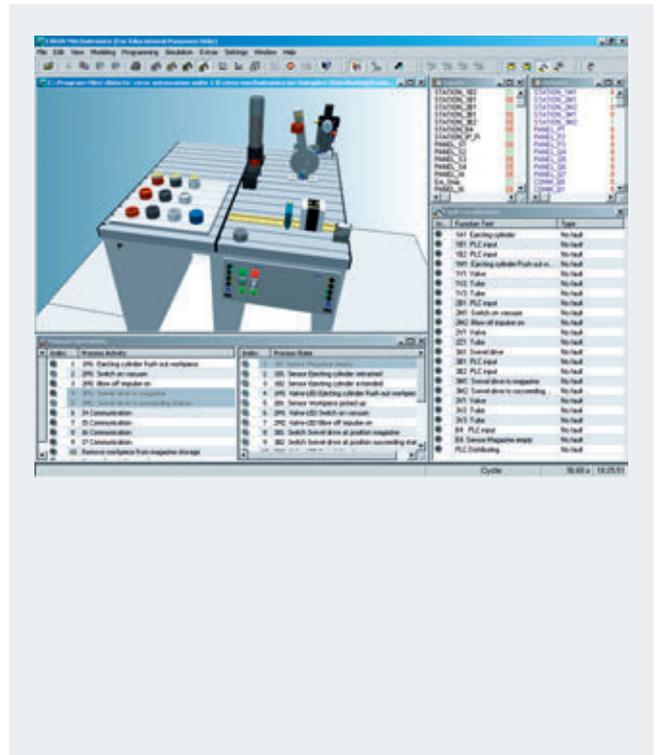
Alternatively, the stations can also be operated without the trolley – and can even be controlled with electrical signal input units and the EduTrainer® from the training packages.

Simply commission it:

- Attach the control console to the trolley with two bolts
- Insert the EduTrainer® Universal into the trolley
- Connect the EduTrainer® Universal to the control console and the
- station using our universal SysLink connector
- ... and you're ready to go!

On request, we can also commission systems for you – particularly in the case of larger systems.

Software CIROS®



CIROS® is the industrially tested, extremely powerful development platform for creating and using 3D simulation systems for automation technology. The virtual learning environment allows students to create realistic 3D simulations even for the most complex of automation systems. The participants discover the kinetic dynamism of mechatronic systems using virtual reality – without any risk to human or equipment.

While virtually commissioning industry control systems and robots, students are able to use the system simulation to develop sequencing and motion programs which can then be transferred to the control systems actually in

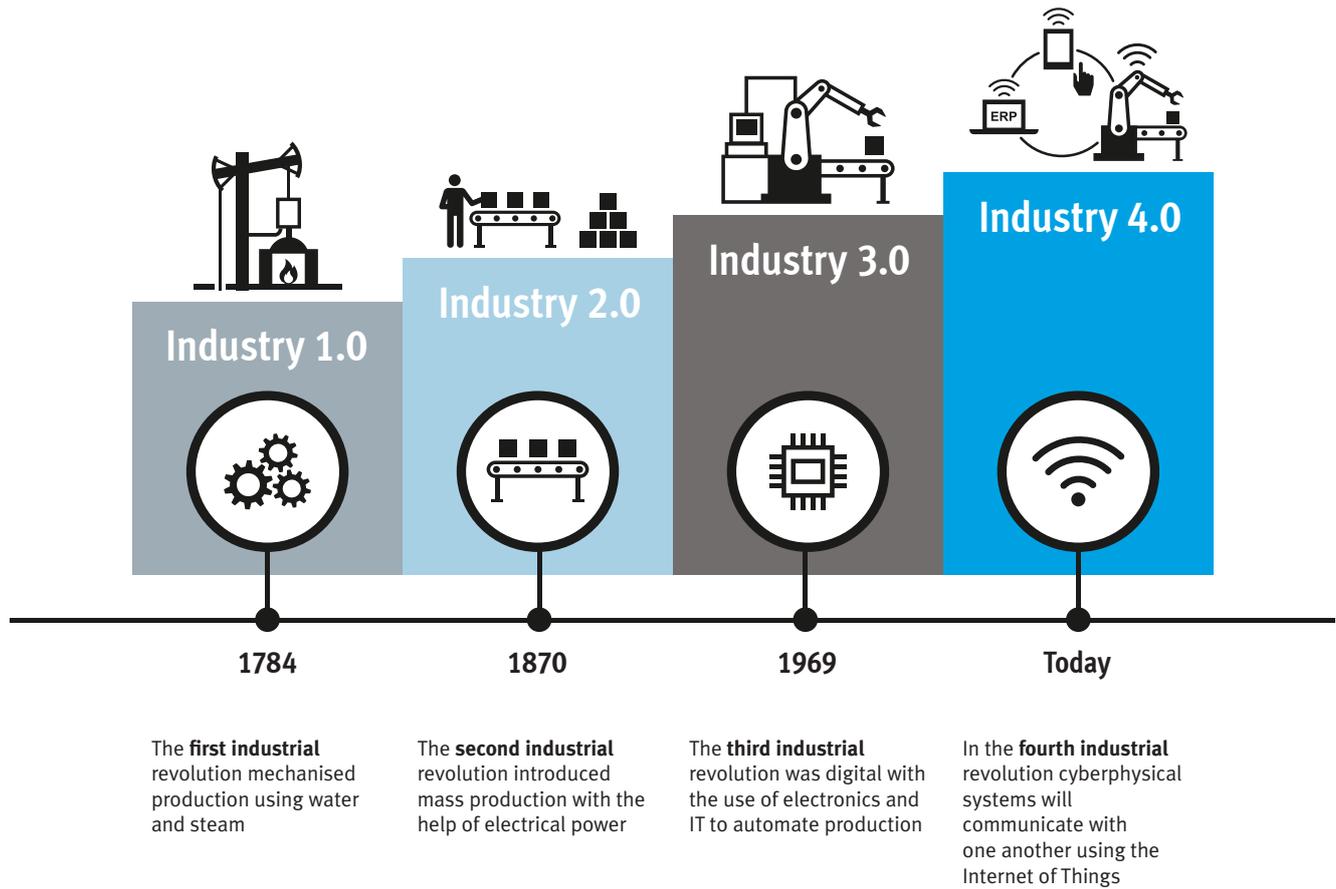
place. The complete and affordable CIROS® training program provides 150 ready-to-use models from the factory and process automation sector, including 3D process models of selected MPS stations, robot workcells, transportation, and storage systems.

The flexibility provided by CIROS® makes it suitable for many different fields of application and is convenient to use on a daily basis as a complement to the actual laboratory equipment, or as a stand-alone product.

Part no. 8038980

Industry 4.0 – the future of production

What changes can industry expect?



The answer to this question lies in the new ways in which people, machines and data can interact. Industry 4.0 combines the real world of production with the virtual world of information and communication technology; therefore traditional industrial processes are supplemented and optimised by the digital world. This creates the foundation for the series manufacturing of individual products to a high standard of quality.

In order to establish Industry 4.0 in a company, the training and qualifications of its skilled workers must be adapted to meet the new requirements of this interdisciplinary approach.

For example, service technicians not only need practical mechatronics experience but also knowledge of IT infrastructures so that they can work at a high level to rectify machine standstills as quickly as possible.

Industry 4.0 means that the tasks to be carried out are becoming more demanding, in both technological and organisational terms. Interdisciplinary competencies are growing in importance, which is why it is necessary to adapt the skills and abilities that are taught for the various trades. As the boundaries between the different functional levels are becoming ever more fluid, the need to adapt affects all technical professions.

From industry for industry

Thanks to Festo Didactic's industrial roots in automation technology, we can, as your partner, address two needs at once: on the one hand, we work very closely together with industry and know its needs, which we incorporate directly into our training material. On the other hand, we are part of many Industry 4.0 committees such as Smart Factory-KL and the Plattform Industrie 4.0. We are thus able to play an active part in shaping this project and integrating the latest trends in our learning systems.

Modular entry to the world of training

To facilitate a successful change in the world of industrial training, we offer you products on several levels, from individual workstations to a complete training factory. This allows you, depending on the material that you select, to present your trainees with various scenarios for Industry 4.0 in a clear and practical way. Since learning areas and needs are constantly changing, our products are modular and can be adapted and developed further at any time to meet your individual requirements.

Support for your teaching

We support you with industry-relevant seminars, workshops and teachware to ensure that you have the most current information at all times. This enables you to teach about the Industry 4.0 project in all its various facets. We offer our customers a managed forum for Industry 4.0 so that you can exchange views with colleagues on current questions, project ideas and teaching materials. In addition to your tutorials, trainees can use our web-based training courses to read and learn more about a broad range of topics. If there are any specific problems, the advisors from our Training and Consulting department will be happy to help you.

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