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Automation | Industry 4.0

Acquire practical and project-oriented laboratory skills and expertise:

Automation trainers, mechatronics trainers, PLC trainers

CIM Computer Integrated Manufacturing

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CNC programming and machining are key activities for many metalworking companys and demand a lot in terms of training. Lucas Nülle is now offering solutions for CNC training to match its IMS range.
The CIM training system meets the demands for modern further education and vocational training in the metalworking sector:

- High quality machines

- Professional software with simulation of operating procedures

- Design and quality are up to modern industrial standards

- Long lifetimes and consistently high precision of manufactured items over the long term

- Functionality in line with modern industrial machinery

- All machines are adapted to the particular needs of the educational curriculum

The optional automation accessories allow IMS stations to be connected together, e.g. CNC machines can be coupled with the IMS robot station, which can then handle loading and unloading of the CNC equipment.

CIM 1-2 Individual components used in machining

CIM 1-2 Individual components used in machining

Smaller projects involving machining and cutting technology can be carried out with individual components.

All production facilities are assembled out of individual IMS and CIM components. Sensible combinations can be found under the headings "Machining technology subsystems" or "Examples of complete production systems".

CIM 1 Lathe machine

CIM 1 Lathe machine

The compact lathe is optimally suited for educational purposes and is fully in line with industrial standards in terms of design and functionality. All essential processes in modern manufacturing can be explained and understood in a manner that reflects authentic practice. A few sensible simplifications, an easily understood machine design and ease of operation mean that students can learn rapidly and reliably.

Benefits to you:

- Compact CNC lathe

- Hardened cast bed in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- High-resolution axis motors

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Automatic 8-way tool bit changer

- Made in Germany

Basic equipment set, consisting of:

Basic equipment set, consisting of:

Pos.	Product name	Bestell-Nr.	Anz.
1	**CNC lathe with professional software**	LM9712	1
2	**Under-table cabinet for CNC lathe**	LM9718	1

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
3	**Set of tools with materials for turning machine**	LM9713	1
4	Set of cutting edges for turning machine	LM9714	1

Media:

Pos.	Product name	Bestell-Nr.	Anz.
5	**Manual CIM1: Commissioning a Lathe**	SH5004-9K	1
6	**Interactive Lab Assistant: CIM1 Basics Turning**	SO2800-4A	1

Optional Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
7	**Automation set for CNC lathe**	LM9715	1

8	**Compressor, low-noise**	SE2902-9L	1
9	**Tubing and accessory set for mechatronics systems**	LM9670	1
10	**IDG3 membrane dryer with rapid coupling and filter AF20 with water trap**	LM9671	1
11	**Set of Allen keys**	LM9716	1
12	**Vernier calliper**	LM9717	1
13	**Lathe machine programming software with 3D simulation**	SO4002-2A	1

CIM 2 Milling machine

CIM 2 Milling machine

The compact milling machine is optimally suited for educational purposes and is fully in line with industrial standards in terms of design and functionality. All essential processes in modern manufacturing can be explained and understood in a manner that reflects authentic practice. A few sensible simplifications, an easily understood machine design and ease of operation mean that students can learn rapidly and reliably.

Benefits to you:

- Compact CNC milling machine

- Stable, cast design in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Made in Germany

Basic equipment set, consisting of:

Basic equipment set, consisting of:

Pos.	Product name	Bestell-Nr.	Anz.
14	**CNC milling machine with professional software**	LM9720	1
15	**Under-table cabinet for CNC lathe**	LM9718	1

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
16	**Start set for milling machines**	LM9723	1
17	**USB-RS232 interface adapter with 9-pin SUB-D plug**	LM9062	1
18	**Serial interface cable 9/9 pole**	LM9040	1

Media:

Pos.	Product name	Bestell-Nr.	Anz.
19	**Manual CIM2: Commissioning a Milling Machine**	SH5004-9L	1

Optional Accessories:

Note:

For the fully automated solution a pneumatic tool change unit is required. This unit is still under development by the manufacturer.

Pos.	Product name	Bestell-Nr.	Anz.
20	**Automation kit for CNC milling machine**	LM9722	1
21	**Compressor, low-noise**	SE2902-9L	1

| 22	**Tubing and accessory set for mechatronics systems**	LM9670	1
23	**IDG3 membrane dryer with rapid coupling and filter AF20 with water trap**	LM9671	1
24	**Set of Allen keys**	LM9716	1
25	**Vernier calliper**	LM9717	1
26	**Milling machine programming software with 3D simulation**	SO4002-2B	1

CIM 11-23 Examples of complete production lines (incl. process control)

CIM 11-23 Examples of complete production lines (incl. process control)

The Computer Integrated Manufacturing System has a modular design that allows a wide variety of installations of any size to be designed, for any size of room and any budget. Typically these installations of 3 to 12 subsystems are logically combined with IMS subsystems that can be supplemented by a carrier return system.

CIM 11 Lathe machine production line with 3 stations
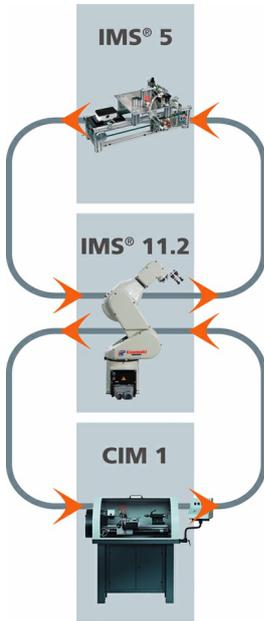
CIM 11 Lathe machine production line with 3 stations

The system can be used to manufacture the bolt used for the mechatronic system. CIM 11 consists of the stations processing, workpiece transfer with robot and lathe. The stations can be used individually or combined into a single system. For the transport of workpieces to the station a conveyor belt system on dual conveyor belts is used to transport the workpiece carrier. A robot is used for the transfer of the workpieces from the lathe to the IMS station.

With this training system industrial processes involving complex manufacturing can be realistically simulated. The manufacture of the workpiece, subsequent transfer and processing into the end product are performed fully automatically. There is no more intervention necessary in the machining process. Industrial-type PLC systems with Profibus and decentralised periphery are also used for the control of the production line. The system promotes skills learning while working within a team and empowers the students to acquire on their own the basics needed to master machining and mechatronic systems.

Each station is designed so that starting with simple automation and machining operations and sequences the student proceeds step by step to acquire the skills and know-how needed to create a complex automation program. The standardised interfaces permit the use of different industrial PLC control units.

- Transport system: dual conveyor belt transport system with DC drive motors and speed-variable three-phase drive motor.

- Identsystem: vision sensor can be used optionally to check whether workpiece has been finished correctly

- IMS 5 Processing station

- IMS 11.2 Robot

- CIM 1 Lathe

CIM 1 Lathe machine

CIM 1 Lathe machine

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Benefits to you:

- Compact CNC lathe

- Hardened cast bed in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- High-resolution axis motors

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Automatic 8-way tool bit changer

- Made in Germany

Pos.	Product name	Bestell-Nr.	Anz.
27	**CNC lathe with professional software**	LM9712	1

|			
28	**Automation set for CNC lathe**	LM9715	1
29	**Under-table cabinet for CNC lathe**	LM9718	1
30	**PROFIBUS DP Slave for conveyor belt**	SO9601	1
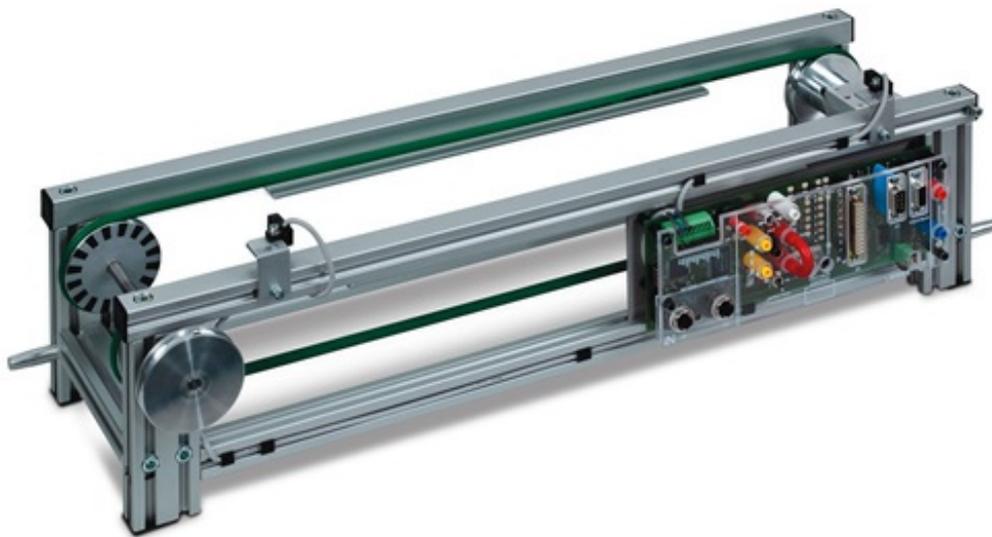
IMS 1 Transfer Systems

IMS 1 Transfer Systems

The conveyor belt system is the element that connects all of the subsystems and thus forms the backbone of the entire production line. In the IMS® production line the conveyor belt systems are self-contained modules, which can be integrated with the sub-systems as needed. Basic processes like "positioning" and "speed" can be demonstrated with just this simple system.

Pos.	Product name	Bestell-Nr.	Anz.
31	**Double conveyor belt segment, 24V motor**	LM9606	2

IMS 5 Processing
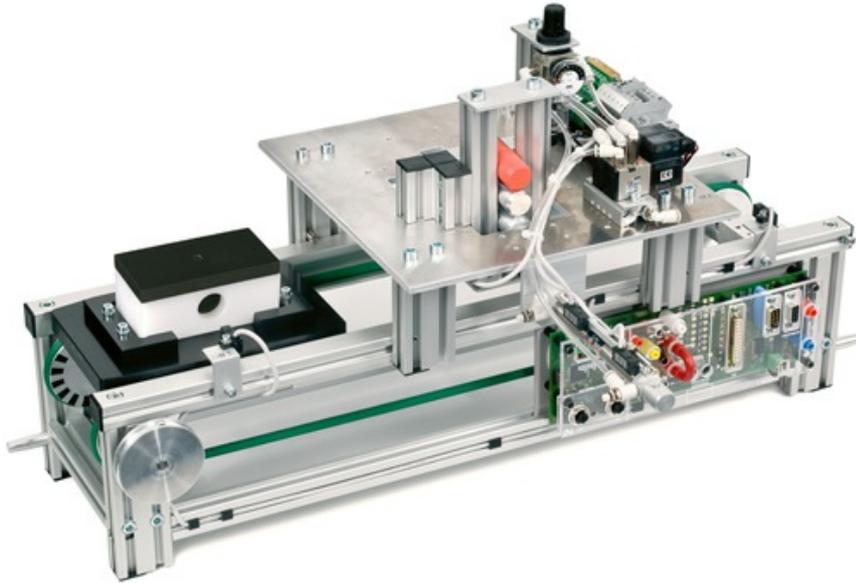
IMS 5 Processing

A workpiece carrier is located on the conveyor belt. It is loaded with a fully assembled two-component workpiece (top and bottom pieces). The carrier and its load are positioned beneath the process module. The workpiece is clamped for processing. A bolt from the gravity-feed magazine is pressed into the hole in the workpiece. The clamp opens and the carrier and load are conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
32	**Processing station**	LM9682	1

IMS11.2 Robot subsystem

IMS11.2 Robot subsystem

The robot subsystem is a versatile unit. Not only can the industrial-type robot assemble and disassemble workpieces, it can also load and unload machines and other subsystems. The robot can be connected to mechatronics systems via the control unit. Using interfaces on the control unit that were designed especially for these applications the robot can communicate with a PLC and a safety light curtain can be implemented to protect the robot's operating area.

Pos.	Product name	Bestell-Nr.	Anz.
33	**Industrial-type robot RS03N (modified version), 6 axes, 3kg**	LM9661	1

Pos.	Product name	Bestell-Nr.	Anz.
34	**Parallel finger gripper for LM9661/LM9691**	LM9662	1
35	**CIM Mounting plate for robot**	LM9666	1

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
36	**Set of tools with materials for turning machine**	LM9713	1
37	**Set of cutting edges for turning machine**	LM9714	1
38	**Serial interface cable 9/9 pole**	LM9040	1
39	**25-pin serial interface cable, Sub-D plug/socket**	LM9061	2
40	**USB-RS232 interface adapter with 9-pin SUB-D plug**	LM9062	1
41	**Workpiece transport pallet**	LM9520	1
42	**Workpiece, top section, white**	LM9521	1
43	**Workpiece, bottom section, black**	LM9525	1
44	**Bolt workpiece, metal**	LM9527	1
45	**Bolt workpiece, plastic, red**	LM9528	1
46	**Compressor, low-noise**	SE2902-9L	1
47	**Tubing and accessory set for mechatronics systems**	LM9670	1

| 48 | **Initial programming and calibration setup of IMS23 before leaving the factory** | LA9711 | 1 |

| 49 | **IDG3 membrane dryer with rapid coupling and filter AF20 with water trap** | LM9671 | 1 |

Programmable logic control (PLC) for IMS Production Lines

Pos.	Product name	Bestell-Nr.	Anz.
50	**SIMATIC S7-313C 2DP, 16 DI, 16 DO, Profibus, 24 V / 6 A power supply**	CO3713-8C	1
51	**IMS interface module for PLC**	CO3713-7F	1
52	**Software for training systems 1x STEP 7, S7-Graph, S7-SCL, PLC-Sim(D,GB,F,E,I)**	SO6002-1Q	1
53	**PLC-S7 PC-adapter with USB/MPI converter**	SO3713-5E	1
54	**Connection cable for PROFIBUS, per metre**	LM9181	5
55	**Connection plugs for PROFIBUS with PG socket and terminating resistor**	LM9182	4
56	**Wire stripper for PROFIBUS cables**	LM9184	1
57	**Safety measurement cable (4mm), 100cm/40", blue**	SO5126-9A	4
58	**Safety measurement cable (4mm), 100cm/40", red**	SO5126-8U	4

IMS furniture

IMS furniture

The IMS furniture system is used together with the Industrial Mechatronics System. The mobile trolleys can be used for individual components or sub-systems. In order to build complex, mechatronics systems, the trolleys can be lined up alongside one another and can be supplemented by frames to accommodate training panels. A power console allows the trolley to be equipped with a wide variety of 3 HU modules. The trolleys can be extended by means of various add-ons attachable to the aluminium rails to make up a multi-function PC experiment trolley.

| Pos.	Product name	Bestell-Nr.	Anz.
59	**SybaPro mobile IMS experiment trolley with experiment frame, 1200mm, 2 levels**	ST7200-3T	1
60	**Mechatronics aluminium profile carriage without table-top frame**	ST7200-3R	1

Media:

Pos.	Product name	Bestell-Nr.	Anz.
61	**Interactive Lab Assistant: IMS 1 Conveyor belt (DC)**	SO2800-5A	1
62	**Interactive Lab Assistant: IMS 5 Processing station**	SO2800-5E	1
63	**Manual CIM1: Commissioning a Lathe**	SH5004-9K	1
64	**Manual IMS 11.2: Putting a Robot into Operation**	SH5004-9M	1
65	**Interactive Lab Assistant: CIM1 Basics Turning**	SO2800-4A	1
66	**QuickChart, IMS 1.2 Conveyor belt with DC drive**	SO6200-1A	1
67	**QuickChart, IMS 5 Mechatronics Process sub-system**	SO6200-1E	1

Optional Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
68	**Set of batteries for industrial robot RS03N (E-Controller)**	LM9664	1
69	**Set of Allen keys**	LM9716	1
70	**Vernier calliper**	LM9717	1
71	**Lathe machine programming software with 3D simulation**	SO4002-2A	1

CIM 12 Milling machine production line with 3 stations
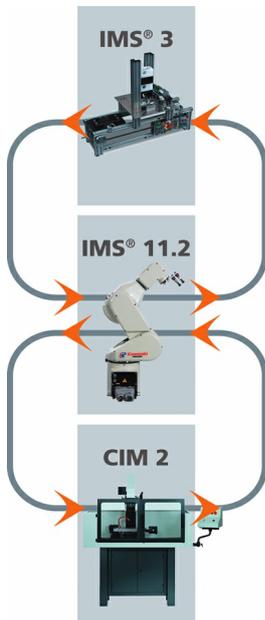
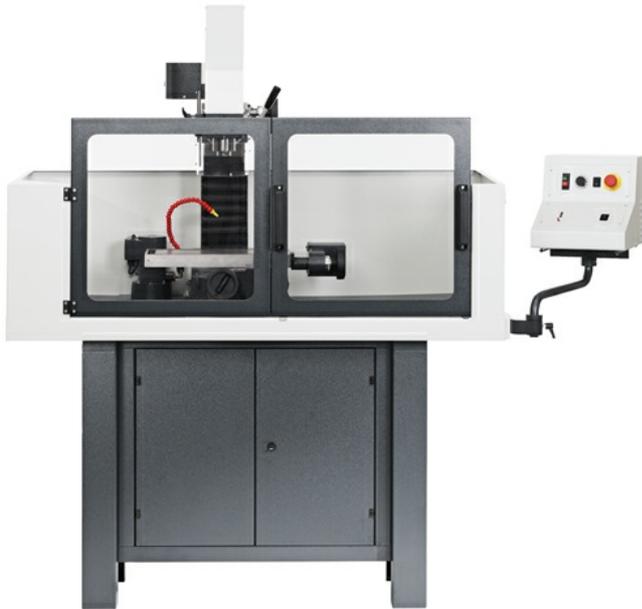**CIM 12 Milling machine production line with 3 stations**

The system can be used for the manufacture of the workpiece subsection for the mechatronic system. CIM 12 consists of the stations sorting, workpiece transfer with robot and milling machine. The stations can be used individually or combined into a single system. For the transport of workpieces to the station a conveyor belt system is used to transport the workpiece carrier on dual conveyor belts. A robot is used for the transfer of the workpieces from the milling machine to the IMS station.

With this training system industrial processes involving complex manufacturing can be realistically simulated. The manufacture of the workpiece, subsequent transfer and processing into the end product are performed fully automatically. There is no more intervention necessary in the machining process. Industrial-type PLC systems with Profibus and decentralised periphery are also used for the control of the production line. The system promotes skills training while working within a team and empowers the students to acquire on their own the basics needed to master machining and mechatronic systems.

Each station is designed so that starting with simple automation and machining operations and sequences the student proceeds step by step to acquire the skills and know-how needed to create a complex automation program. The standardised interfaces permit the use of different industrial PLC control units.

- Transport system: dual conveyor belt transport system with DC drive motors and speed-variable three-phase drive motor.

- Identsystem: vision sensor can be used optionally to check whether workpiece has been finished correctly

- IMS 5 Processing station

- IMS 11.2 Robot station

- CIM 2 Milling machine

CIM 2 Milling machine

CIM 2 Milling machine

The compact milling machine is optimally suited for educational purposes and is fully in line with industrial standards in terms of design and functionality. All essential processes in modern manufacturing can be explained and understood in a manner that reflects authentic practice. A few sensible simplifications, an easily understood machine design and ease of operation mean that students can learn rapidly and reliably.

Benefits to you:

- Compact CNC milling machine

- Stable, cast design in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Made in Germany

Pos.	Product name	Bestell-Nr.	Anz.
72	**CNC milling machine with professional software**	LM9720	1
73	**Automation kit for CNC milling machine**	LM9722	1

74	**Under-table cabinet for CNC lathe**	LM9718	1

| 75	**PROFIBUS DP Slave for conveyor belt**	SO9601	1

IMS 1 Transfer Systems

IMS 1 Transfer Systems

The conveyor belt system is the element that connects all of the subsystems and thus forms the backbone of the entire production line. In the IMS® production line the conveyor belt systems are self-contained modules, which can be integrated with the sub-systems as needed. Basic processes like "positioning" and "speed" can be demonstrated with just this simple system.

Pos.	Product name	Bestell-Nr.	Anz.
76	**Double conveyor belt segment, 24V motor**	LM9606	2

IMS 3 Sorting
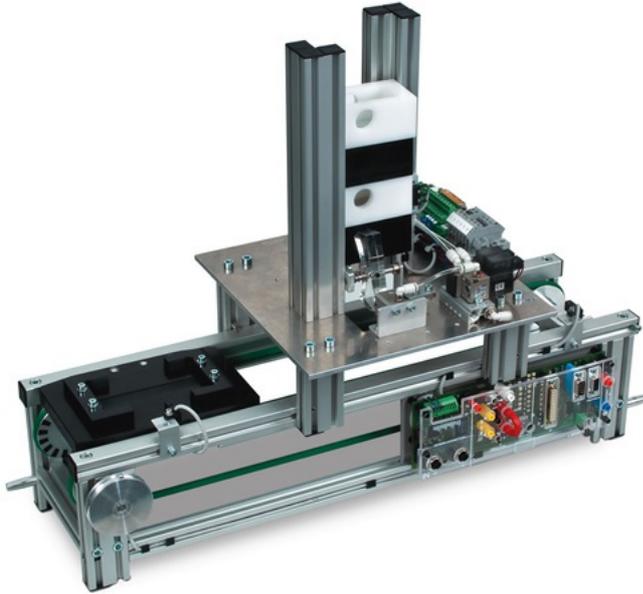
IMS 3 Sorting

A workpiece carrier is located on the conveyor belt. The carrier is positioned under the shaft for the gravity-feed magazine. The sorting station has a magazine that accommodates six bottom pieces. One piece is selected and placed in the carrier. The carrier and its load are then conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
77	**Sorting station**	LM9680	1

IMS11.2 Robot subsystem

IMS11.2 Robot subsystem

The robot subsystem is a versatile unit. Not only can the industrial-type robot assemble and disassemble workpieces, it can also load and unload machines and other subsystems. The robot can be connected to mechatronics systems via the control unit. Using interfaces on the control unit that were designed especially for these applications the robot can communicate with a PLC and a safety light curtain can be implemented to protect the robot's operating area.

Pos.	Product name	Bestell-Nr.	Anz.
78	**Industrial-type robot RS03N (modified version), 6 axes, 3kg**	LM9661	1
79	**Parallel finger gripper for LM9661/LM9691**	LM9662	1

80	**CIM Mounting plate for robot**	LM9666	1

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
81	**Start set for milling machines**	LM9723	1
82	**Serial interface cable 9/9 pole**	LM9040	1
83	**25-pin serial interface cable, Sub-D plug/socket**	LM9061	2
84	**USB-RS232 interface adapter with 9-pin SUB-D plug**	LM9062	1
85	**Workpiece transport pallet**	LM9520	1
86	**Compressor, low-noise**	SE2902-9L	1
87	**Tubing and accessory set for mechatronics systems**	LM9670	1
88	**Initial programming and calibration setup of CIM12 before leaving the factory**	LA9712	1
89	**IDG3 membrane dryer with rapid coupling and filter AF20 with water trap**	LM9671	1

Programmable logic control (PLC) for IMS Production Lines

Pos.	Product name	Bestell-Nr.	Anz.
90	**SIMATIC S7-313C 2DP, 16 DI, 16 DO, Profibus, 24 V / 6 A power supply**	CO3713-8C	1

91	**IMS interface module for PLC**	CO3713-7F	1

92	**Software for training systems 1x STEP 7, S7-Graph, S7-SCL, PLC-Sim(D,GB,F,E,I)**	SO6002-1Q	1

93	**PLC-S7 PC-adapter with USB/MPI converter**	SO3713-5E	1

94	**Connection cable for PROFIBUS, per metre**	LM9181	5

95	**Connection plugs for PROFIBUS with PG socket and terminating resistor**	LM9182	4

96	**Wire stripper for PROFIBUS cables**	LM9184	1

97	**Safety measurement cable (4mm), 100cm/40", blue**	SO5126-9A	4

98	**Safety measurement cable (4mm), 100cm/40", red**	SO5126-8U	4

IMS furniture

IMS furniture

The IMS furniture system is used together with the Industrial Mechatronics System. The mobile trolleys can be used for individual components or sub-systems. In order to build complex, mechatronics systems, the trolleys can be lined up alongside one another and can be supplemented by frames to accommodate training panels. A power console allows the trolley to be equipped with a wide variety of 3 HU modules. The trolleys can be extended by means of various add-ons attachable to the aluminium rails to make up a multi-function PC experiment trolley.

| Pos.	Product name	Bestell-Nr.	Anz.
99	**SybaPro mobile IMS experiment trolley with experiment frame, 1200mm, 2 levels**	ST7200-3T	1
100	**Mechatronics aluminium profile carriage without table-top frame**	ST7200-3R	1

Pos.	Product name	Bestell-Nr.	Anz.
101	**Interactive Lab Assistant: IMS 1 Conveyor belt (DC)**	SO2800-5A	1
102	**Interactive Lab Assistant: IMS 3 Sorting station**	SO2800-5C	1
103	**Manual CIM2: Commissioning a Milling Machine**	SH5004-9L	1
104	**Manual IMS 11.2: Putting a Robot into Operation**	SH5004-9M	1
105	**QuickChart, IMS 3 Mechatronics Sorting sub-system**	SO6200-1C	1

Optional Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
106	**Set of batteries for industrial robot RS03N (E-Controller)**	LM9664	1
107	**Set of Allen keys**	LM9716	1
108	**Vernier calliper**	LM9717	1
109	**Milling machine programming software with 3D simulation**	SO4002-2B	1

CIM 21 Flexible Production Plant with 9 stations
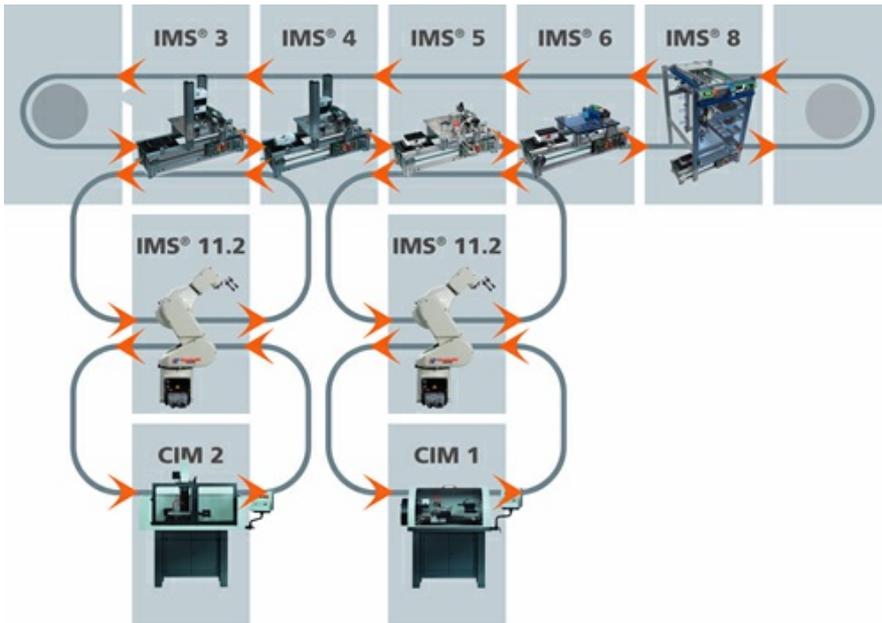
CIM 21 Flexible Production Plant with 9 stations

The system can be used for the fully automatic manufacture of a three-part workpiece for up to eight different end products. CIM 21 consists of the stations sorting, assembly, processing, testing, storage, workpiece transfer with robot, lathe and milling machine. The stations can be used individually or combined into a single system. For the transport of workpieces to the station a conveyor belt system is used to transport the workpiece carrier on dual conveyor belts. A robot is used for the transfer of the workpieces from the milling machine to the IMS station.

With this training system industrial processes involving complex manufacturing can be realistically simulated. Industrial type actuators and sensors are used exclusively. Industrial-type PLC systems with Profibus and decentralised periphery are also used for the control of the production line. Optional expansions of additional, modern, industrial communications systems are planned. The system promotes skills training while working within a team and empowers the students to acquire on their own the basics needed to master machining and mechatronic systems.

Each station is designed so that starting with simple automation and machining operations and sequences the student proceeds step by step to acquire the skills and know-how needed to create a complex automation program. The standardised interfaces permit the use of different industrial PLC control units.

- Transport system: dual conveyor belt transport system with DC drive motors and speed-variable three-phase drive motor.

- Identsystem: as an option an RFID identifcation system can be installed

- Identsystem: vision sensor can be used optionally to check whether workpiece has been finished correctly

- Control level: to complete manufacturing orders at the process control console PC; process visualisation and operational data capture

- Connection link of the process control console to TCP/IP

- IMS 3 Sorting station

- IMS 4 Assembly station

- IMS 5 Processing station

- IMS 6 Testing station

- IMS 8 Storage station

- IMS 11.2 Robot station

- CIM 1 Lathe machine

- CIM 2 Milling machine

CIM 1 Lathe machine

CIM 1 Lathe machine

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Benefits to you:

- Compact CNC lathe

- Hardened cast bed in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- High-resolution axis motors

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Automatic 8-way tool bit changer

- Made in Germany

Pos.	Product name	Bestell-Nr.	Anz.
110	**CNC lathe with professional software**	LM9712	1

111	**Automation set for CNC lathe**	LM9715	1
112	**Under-table cabinet for CNC lathe**	LM9718	1
113	**PROFIBUS DP Slave for conveyor belt**	SO9601	1

CIM 2 Milling machine

CIM 2 Milling machine

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Benefits to you:

- Compact CNC milling machine

- Stable, cast design in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Made in Germany

Pos.	Product name	Bestell-Nr.	Anz.
114	**CNC milling machine with professional software**	LM9720	1
115	**Automation kit for CNC milling machine**	LM9722	1

116	**Under-table cabinet for CNC lathe**	LM9718	1
117	**PROFIBUS DP Slave for conveyor belt**	SO9601	1
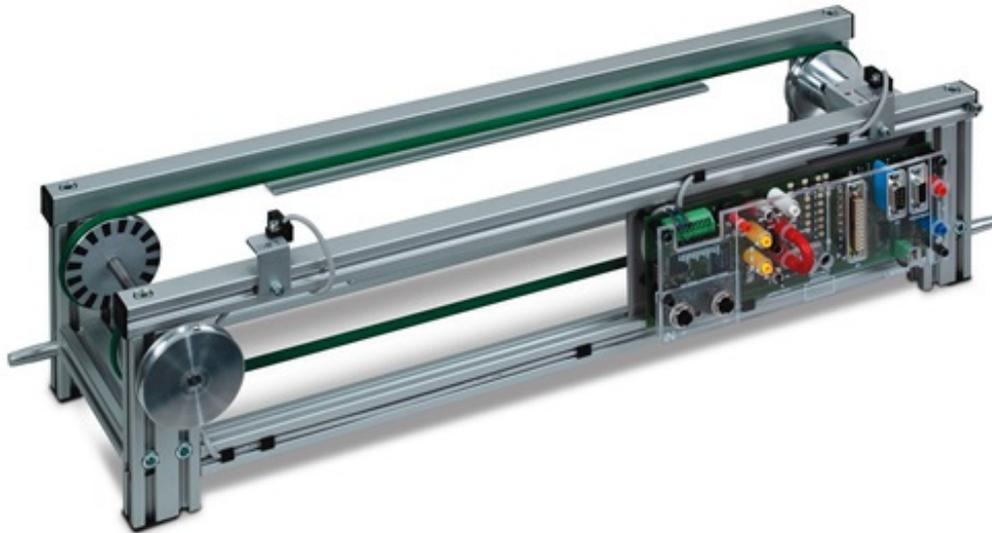
IMS 1.2: DC transport system

IMS 1.2: DC transport system

Conveyor belts form the basis for all sub-systems and installations. They are used for transferring workpieces on carriers.

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Training objectives for DC transport system

- Principle and function of various sensors

- Making controlled movements on a single axis

- Incremental positioning of a workpiece carrier

- Disabling movement forwards or backwards

- Program for monitoring slip and whether a machine is stopped

- Safe handling of various safety circuits and locks.

Pos.	Product name	Bestell-Nr.	Anz.
118	**Double conveyor belt segment, 24V motor**	LM9606	7
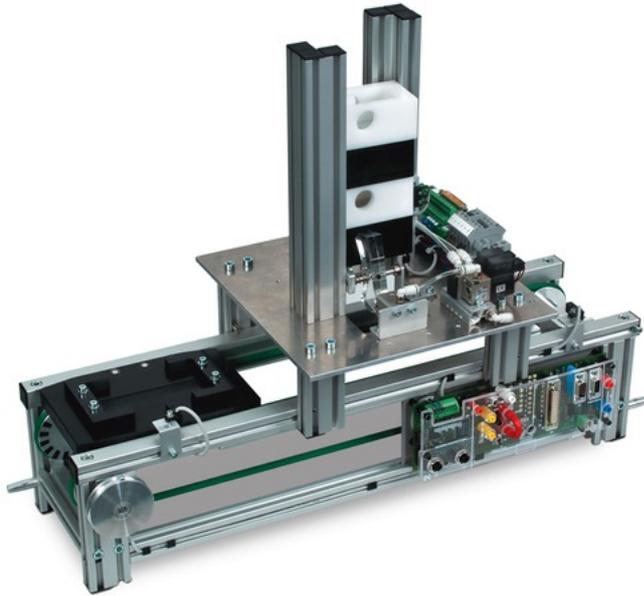
IMS 3 Sorting

A workpiece carrier is located on the conveyor belt. The carrier is positioned under the shaft for the gravity-feed magazine. The sorting station has a magazine that accommodates six bottom pieces. One piece is selected and placed in the carrier. The carrier and its load are then conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
119	**Sorting station**	LM9680	1

IMS 4 Assembly
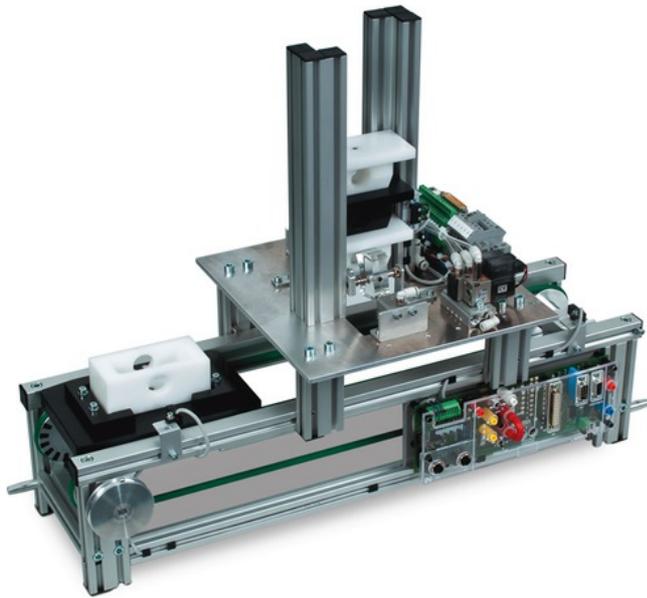
A workpiece carrier is located on the conveyor belt. The carrier is positioned under the shaft for the gravity-feed magazine. The sorting station has a magazine that accommodates six top pieces. One piece is selected and placed in the carrier. The carrier and its load are then conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
120	**Assembly station**	LM9681	1
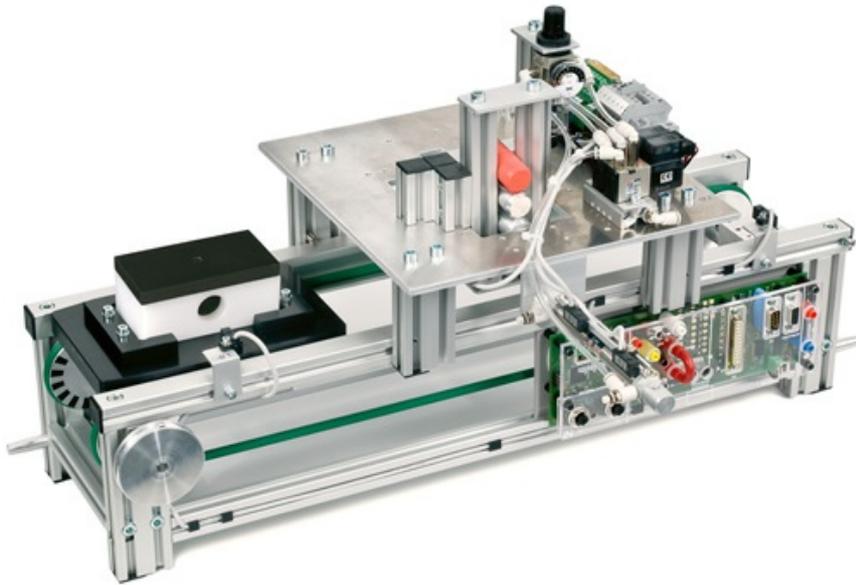
IMS 5 Processing

A workpiece carrier is located on the conveyor belt. It is loaded with a fully assembled two-component workpiece (top and bottom pieces). The carrier and its load are positioned beneath the process module. The workpiece is clamped for processing. A bolt from the gravity-feed magazine is pressed into the hole in the workpiece. The clamp opens and the carrier and load are conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
121	**Processing station**	LM9682	1
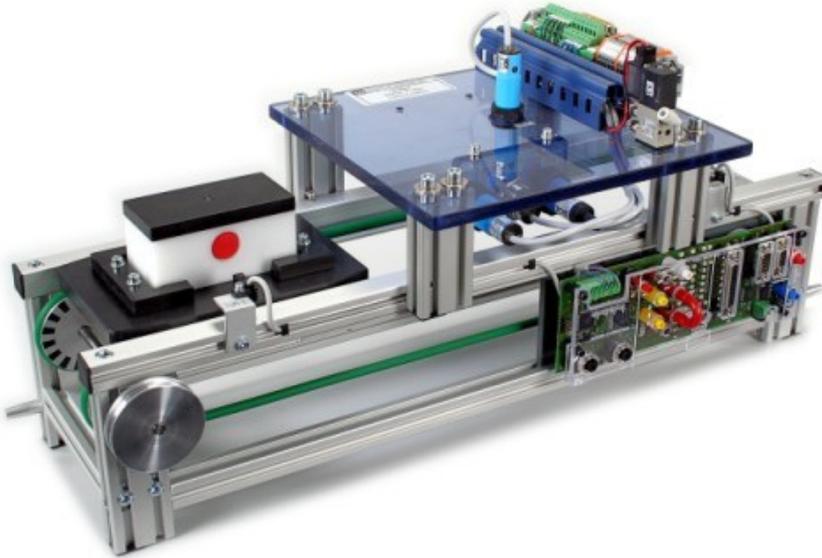
IMS 6 Testing

A carrier with a fully assembled workpiece is located on the conveyor belt. A stopper positions the piece alongside the sensors. The sensors detect the colour of the piece, its material and optionally its height. Test data will be saved for subsequent processes. After each successfully completed test the carrier is conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
122	**Testing station**	LM9684	1

IMS 8 Storage

IMS 8 Storage

A carrier with a fully assembled and tested workpiece is located on the conveyor belt. The carrier is stopped at the removal position. The handling module lifts up the workpiece and transfers it to one of twenty possible storage positions. The storage positions can be chosen according to the production task and test results. The empty carrier is conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
123	**High rack storage station with 20 storage cells**	LM9641	1

IMS11.2 Robot subsystem

IMS11.2 Robot subsystem

The robot subsystem is a versatile unit. Not only can the industrial-type robot assemble and disassemble workpieces, it can also load and unload machines and other subsystems. The robot can be connected to mechatronics systems via the control unit. Using interfaces on the control unit that were designed especially for these applications the robot can communicate with a PLC and a safety light curtain can be implemented to protect the robot's operating area.

Pos.	Product name	Bestell-Nr.	Anz.
124	**Industrial-type robot RS03N (modified version), 6 axes, 3kg**	LM9661	2
125	**Parallel finger gripper for LM9661/LM9691**	LM9662	2

Pos.	Product name	Bestell-Nr.	Anz.
126	**CIM Mounting plate for robot**	LM9666	2
127	**PROFIBUS DP Slave for conveyor belt**	SO9601	2

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
128	**Double conveyor belt segment, passive**	LM9603	3
129	**180° conveyor belt segment**	LM9611	2
130	**Workpiece transport pallet**	LM9520	5
131	**Workpiece, top section, white**	LM9521	5
132	**Workpiece, top section, black**	LM9522	5
133	**Workpiece, bottom section, white**	LM9524	5
134	**Workpiece, bottom section, black**	LM9525	5
135	**Bolt workpiece, metal**	LM9527	5
136	**Bolt workpiece, plastic, red**	LM9528	5
137	**IMS manual control unit**	LM9638	1
138	**Compressor, low-noise**	SE2902-9L	1
139	**Tubing and accessory set for mechatronics systems**	LM9670	1

Pos.	Product name	Bestell-Nr.	Anz.
140	**Serial interface cable 9/9 pole**	LM9040	2
141	**25-pin serial interface cable, Sub-D plug/socket**	LM9061	9
142	**USB-RS232 interface adapter with 9-pin SUB-D plug**	LM9062	2
143	**Initial programming and calibration setup of CIM21 before leaving the factory**	LA9721	1
144	**Set of tools with materials for turning machine**	LM9713	1
145	**Set of cutting edges for turning machine**	LM9714	1
146	**Start set for milling machines**	LM9723	1
147	**IDG3 membrane dryer with rapid coupling and filter AF20 with water trap**	LM9671	1

IMS/IPA Tester and Fault Simulator

Pos.	Product name	Bestell-Nr.	Anz.
148	**IMS/IPA test and fault simulator**	CO3713-7V	1
149	**Serial interface cable 9/9 pole**	LM9040	2
150	**25-pin serial interface cable, Sub-D plug/socket**	LM9061	2
151	**QuickChart IMS test and fault simulator**	SO6200-1Z	1

Programmable logic control (PLC) for IMS Production Lines

Pos.	Product name	Bestell-Nr.	Anz.
152	**SIMATIC S7-313C 2DP, 16 DI, 16 DO, Profibus, 24 V / 6 A power supply**	CO3713-8C	1
153	**IMS interface module for PLC**	CO3713-7F	1
154	**Touch panel TP700 Comfort Trainer Package**	CO3713-4P	1
155	**Software for training systems 1x STEP 7, S7-Graph, S7-SCL, PLC-Sim(D,GB,F,E,I)**	SO6002-1Q	1
156	**PLC-S7 PC-adapter with USB/MPI converter**	SO3713-5E	1
157	**Connection cable for PROFIBUS, per metre**	LM9181	20
158	**Connection plugs for PROFIBUS with PG socket and terminating resistor**	LM9182	12
159	**Wire stripper for PROFIBUS cables**	LM9184	1
160	**Safety measurement cable (4mm), 100cm/40", blue**	SO5126-9A	8
161	**Safety measurement cable (4mm), 100cm/40", red**	SO5126-8U	8

IMS furniture

The IMS furniture system is used together with the Industrial Mechatronics System. The mobile trolleys can be used for individual components or sub-systems. In order to build complex, mechatronics systems, the trolleys can be lined up alongside one another and can be supplemented by frames to accommodate training panels. A power console allows the trolley to be equipped with a wide variety of 3 HU modules. The trolleys can be extended by means of various add-ons attachable to the aluminium rails to make up a multi-function PC experiment trolley.

| Pos.	Product name	Bestell-Nr.	Anz.
162	**Mechatronics aluminium profile carriage without table-top frame**	ST7200-3R	2
163	**SybaPro mobile IMS experiment trolley with experiment frame, 1200mm, 2 levels**	ST7200-3T	1
164	**SybaPro mobile IMS experiment trolley, 1200mm**	ST7200-3U	3

Media:

Pos.	Product name	Bestell-Nr.	Anz.
165	**Interactive Lab Assistant: CIM1 Basics Turning**	SO2800-4A	1
166	**Interactive Lab Assistant: IMS 1 Conveyor belt (DC)**	SO2800-5A	1
167	**Interactive Lab Assistant: IMS 3 Sorting station**	SO2800-5C	1
168	**Interactive Lab Assistant: IMS 4 Assembly station**	SO2800-5D	1
169	**Interactive Lab Assistant: IMS 5 Processing station**	SO2800-5E	1
170	**Interactive Lab Assistant: IMS 6 Testing station**	SO2800-5F	1

171	**Interactive Lab Assistant: IMS 8 Storage station**	SO2800-5H	1
172	**Interactive Lab Assistant: Production line with 5 stations**	SO2800-5R	1
173	**Manual CIM1: Commissioning a Lathe**	SH5004-9K	1
174	**Manual CIM2: Commissioning a Milling Machine**	SH5004-9L	1
175	**Manual IMS 11.2: Putting a Robot into Operation**	SH5004-9M	1
176	**QuickChart, IMS 1.2 Conveyor belt with DC drive**	SO6200-1A	1
177	**QuickChart, IMS 3 Mechatronics Sorting sub-system**	SO6200-1C	1
178	**QuickChart, IMS 4 Mechatronics Assembly sub-system**	SO6200-1D	1
179	**QuickChart, IMS 5 Mechatronics Process sub-system**	SO6200-1E	1
180	**QuickChart, IMS 6 Mechatronics Testing sub-system**	SO6200-1F	1
181	**QuickChart, IMS 8 Mechatronics Storage sub-system**	SO6200-1H	1
182	**QuickChart, IMS 11.2 Kawasaki FS003N Teach Pendant**	SO6200-1M	1
183	**QuickChart, IMS 25 Production line with 5 stations**	SO6200-1R	1
184	**QuickChart IMS Manual operating device**	SO6200-1V	1

Optional Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
185	**Set of batteries for industrial robot RS03N (E-Controller)**	LM9664	2
186	**Set of Allen keys**	LM9716	1
187	**Vernier calliper**	LM9717	1
188	**Software, STEP 7 Trainer package 6xSTEP 7, S7-Graph, S7-SCL, PLC-Sim (D,GB,F,E,I)**	SO6002-1X	2
189	**Lathe machine programming software with 3D simulation**	SO4002-2A	1
190	**Milling machine programming software with 3D simulation**	SO4002-2B	1

CIM 22 Flexible Production Plant with 10 stations
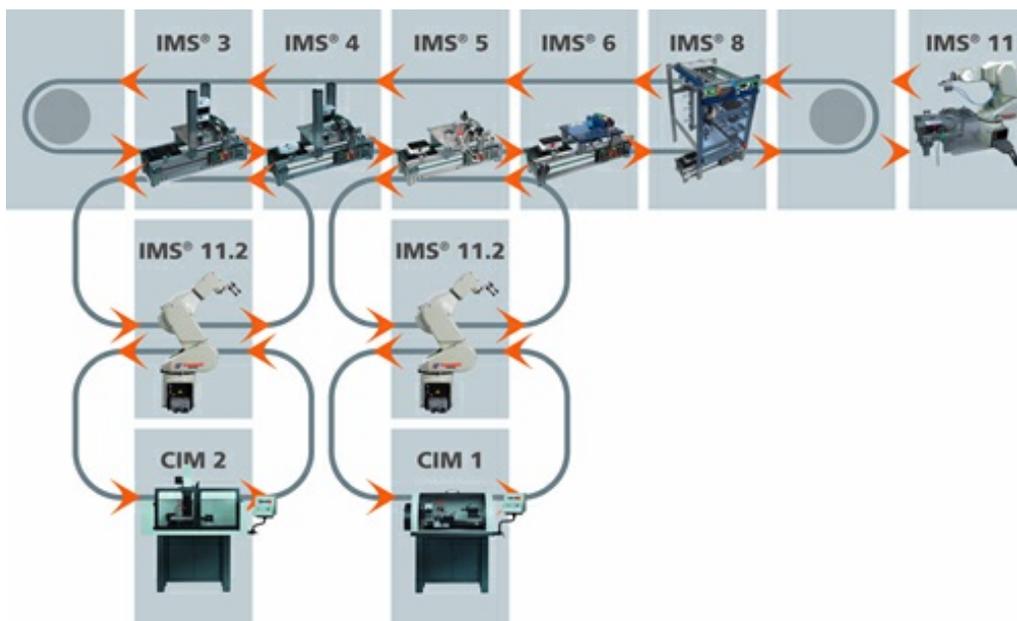
CIM 22 Flexible Production Plant with 10 stations

The system can be used for the fully automatic manufacture of a three-part workpiece for up to eight different end products. CIM 22 consists of the stations sorting, assembly, processing, testing, storage, disassembly, workpiece transfer with robot, lathe and milling machine. The stations can be used individually or combined into a single system. For the transport of workpieces to the station a conveyor belt system is used to transport the workpiece carrier on dual conveyor belts. A robot is used for the transfer of the workpieces from the lathe/milling machine to the IMS station.

With this training system industrial processes involving complex manufacturing can be realistically simulated. Industrial type actuators and sensors are used exclusively. Industrial-type PLC systems with Profibus and decentralised periphery are also used for the control of the production line. Optional expansions of additional, modern, industrial communications systems are planned. The system promotes skills training while working within a team and empowers the students to acquire on their own the basics needed to master machining and mechatronic systems.

Each station is designed so that starting with simple automation and machining operations and sequences the student proceeds step by step to acquire the skills and know-how needed to create a complex automation program. The standardised interfaces permit the use of different industrial PLC control units.

- Transport system: dual conveyor belt transport system with DC drive motors and speed-variable three-phase drive motor.

- Identsystem: as an option an RFID identifcation system can be installed

- Identsystem: vision sensor can be used optionally to check whether workpiece has been finished correctly

- Control level: to complete manufacturing orders at the process control console PC; process visualisation and operational data capture

- Connection link of the process control console to TCP/IP

- IMS 3 Sorting station

- IMS 4 Assembly station

- IMS 5 Processing station

- IMS 6 Testing station

- IMS 8 Storage station

- IMS 11 Disassembly station

- IMS 11.2 Robot station

- CIM 1 Lathe machine

- CIM 2 Milling machine

CIM 1 Lathe machine

CIM 1 Lathe machine

The compact lathe is optimally suited for educational purposes and is fully in line with industrial standards in terms of design and functionality. All essential processes in modern manufacturing can be explained and understood in a manner that reflects authentic practice. A few sensible simplifications, an easily understood machine design and ease of operation mean that students can learn rapidly and reliably.

Benefits to you:

- Compact CNC lathe

- Hardened cast bed in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- High-resolution axis motors

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Automatic 8-way tool bit changer

- Made in Germany

Pos.	Product name	Bestell-Nr.	Anz.
191	**CNC lathe with professional software**	LM9712	1

192	**Automation set for CNC lathe**	LM9715	1
193	**Under-table cabinet for CNC lathe**	LM9718	1
194	**PROFIBUS DP Slave for conveyor belt**	SO9601	1

CIM 2 Milling machine

CIM 2 Milling machine

The compact milling machine is optimally suited for educational purposes and is fully in line with industrial standards in terms of design and functionality. All essential processes in modern manufacturing can be explained and understood in a manner that reflects authentic practice. A few sensible simplifications, an easily understood machine design and ease of operation mean that students can learn rapidly and reliably.

Benefits to you:

- Compact CNC milling machine

- Stable, cast design in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Made in Germany

Pos.	Product name	Bestell-Nr.	Anz.
195	**CNC milling machine with professional software**	LM9720	1
196	**Automation kit for CNC milling machine**	LM9722	1

197	**Under-table cabinet for CNC lathe**	LM9718	1

198	**PROFIBUS DP Slave for conveyor belt**	SO9601	1

IMS 1.2: DC transport system

IMS 1.2: DC transport system

Conveyor belts form the basis for all sub-systems and installations. They are used for transferring workpieces on carriers.

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Training objectives for DC transport system

- Principle and function of various sensors

- Making controlled movements on a single axis

- Incremental positioning of a workpiece carrier

- Disabling movement forwards or backwards

- Program for monitoring slip and whether a machine is stopped

- Safe handling of various safety circuits and locks.

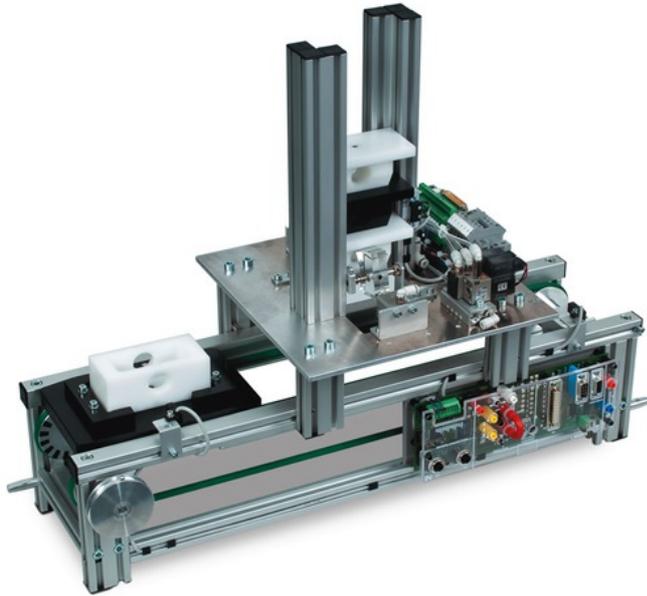| Pos.	Product name	Bestell-Nr.	Anz.
199	**Double conveyor belt segment, 24V motor**	LM9606	7
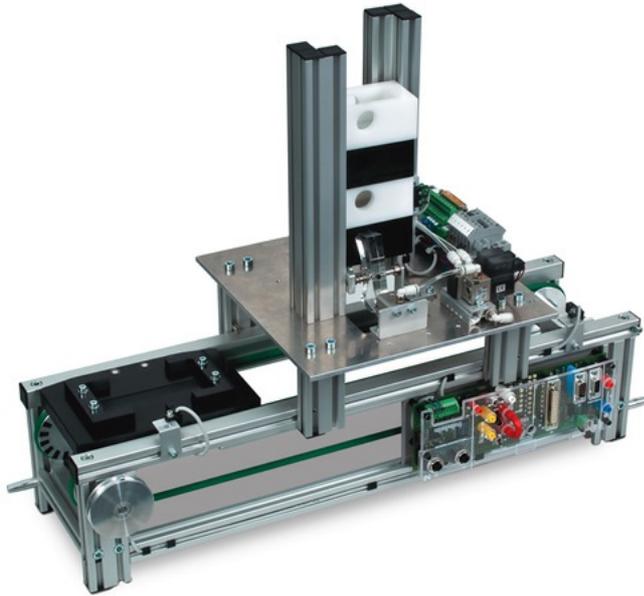
IMS 3 Sorting

A workpiece carrier is located on the conveyor belt. The carrier is positioned under the shaft for the gravity-feed magazine. The sorting station has a magazine that accommodates six bottom pieces. One piece is selected and placed in the carrier. The carrier and its load are then conveyed to the end of the belt to be passed on to the next sub-system.

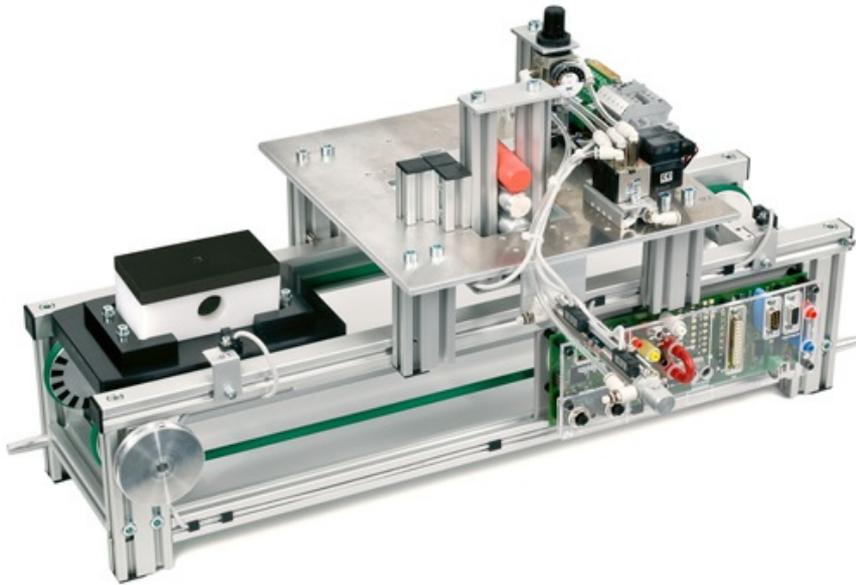| Pos.	Product name	Bestell-Nr.	Anz.
200	**Sorting station**	LM9680	1

IMS 4 Assembly

A workpiece carrier is located on the conveyor belt. The carrier is positioned under the shaft for the gravity-feed magazine. The sorting station has a magazine that accommodates six top pieces. One piece is selected and placed in the carrier. The carrier and its load are then conveyed to the end of the belt to be passed on to the next sub-system.

| Pos.	Product name	Bestell-Nr.	Anz.
201	**Assembly station**	LM9681	1

IMS 5 Processing

A workpiece carrier is located on the conveyor belt. It is loaded with a fully assembled two-component workpiece (top and bottom pieces). The carrier and its load are positioned beneath the process module. The workpiece is clamped for processing. A bolt from the gravity-feed magazine is pressed into the hole in the workpiece. The clamp opens and the carrier and load are conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
202	**Processing station**	LM9682	1
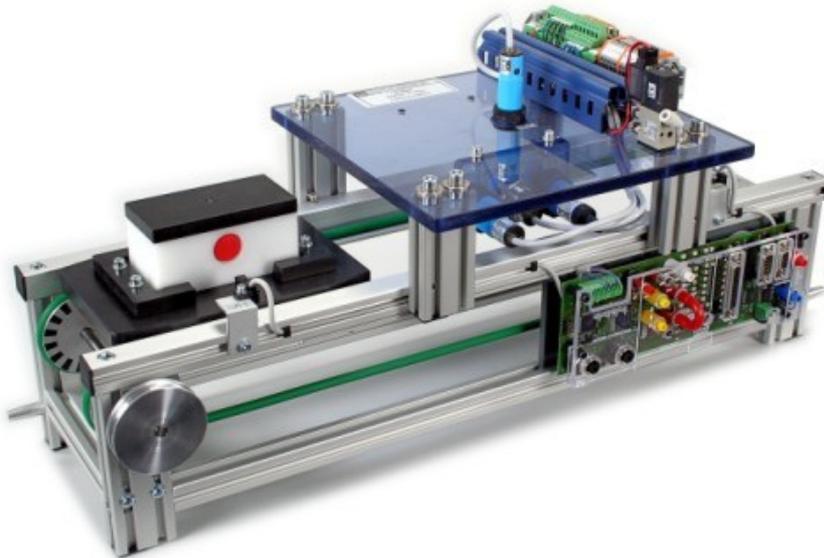
IMS 6 Testing

A carrier with a fully assembled workpiece is located on the conveyor belt. A stopper positions the piece alongside the sensors. The sensors detect the colour of the piece, its material and optionally its height. Test data will be saved for subsequent processes. After each successfully completed test the carrier is conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
203	**Testing station**	LM9684	1

IMS 8 Storage

A carrier with a fully assembled and tested workpiece is located on the conveyor belt. The carrier is stopped at the removal position. The handling module lifts up the workpiece and transfers it to one of twenty possible storage positions. The storage positions can be chosen according to the production task and test results. The empty carrier is conveyed to the end of the belt to be passed on to the next sub-system.

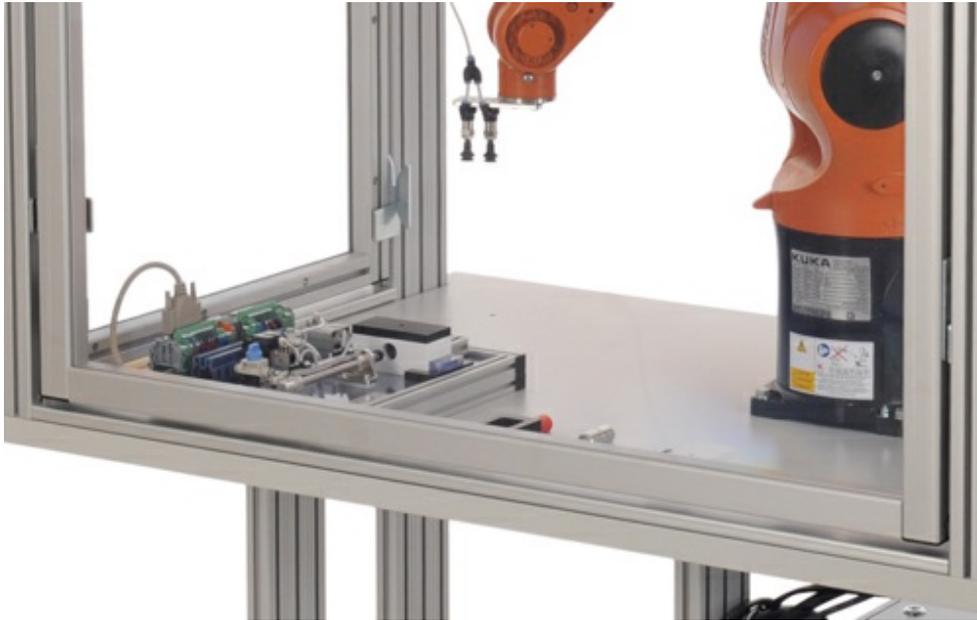| Pos.	Product name	Bestell-Nr.	Anz.
204	**High rack storage station with 20 storage cells**	LM9641	1

IMS 11 Disassembly by robot

A carrier with a fully assembled and tested workpiece is located on the conveyor belt. The carrier is stopped at the removal position. The robot lifts up the workpiece and transfers it to the dismantling station. The workpiece is clamped in place. The individual pieces of the workpiece are taken apart. The robot sorts the individual components into pre-defined storage places.

Pos.	Product name	Bestell-Nr.	Anz.
205	**Disassembly station for robots**	LM9637	1
206	**Industrial-type robot RS03N (modified version), 6 axes, 3kg**	LM9661	1
207	**Pneumatic gripper for LM9661/LM9691**	LM9663	1
208	**IMS Mounting plate for robot**	LM9667	1

IMS11.2 Robot subsystem

The robot subsystem is a versatile unit. Not only can the industrial-type robot assemble and disassemble workpieces, it can also load and unload machines and other subsystems. The robot can be connected to mechatronics systems via the control unit. Using interfaces on the control unit that were designed especially for these applications the robot can communicate with a PLC and a safety light curtain can be implemented to protect the robot's operating area.

Pos.	Product name	Bestell-Nr.	Anz.
209	**Industrial-type robot RS03N (modified version), 6 axes, 3kg**	LM9661	2
210	**Parallel finger gripper for LM9661/LM9691**	LM9662	2
211	**CIM Mounting plate for robot**	LM9666	2
212	**PROFIBUS DP Slave for conveyor belt**	SO9601	2

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
213	**Double conveyor belt segment, passive**	LM9603	3
214	**180° conveyor belt segment**	LM9611	2
215	**Workpiece transport pallet**	LM9520	5
216	**Workpiece, top section, white**	LM9521	5
217	**Workpiece, top section, black**	LM9522	5
218	**Workpiece, bottom section, white**	LM9524	5

219	**Workpiece, bottom section, black**	LM9525	5
220	**Bolt workpiece, metal**	LM9527	5
221	**Bolt workpiece, plastic, red**	LM9528	5
222	**IMS manual control unit**	LM9638	1
223	**IMS magnetic sensor for conveyor belt, including mounting**	LM9675	1
224	**IMS capacitive sensor for conveyor belt, incl. mounting**	LM9678	1
225	**Compressor, low-noise**	SE2902-9L	1
226	**Tubing and accessory set for mechatronics systems**	LM9670	1
227	**Serial interface cable 9/9 pole**	LM9040	2
228	**25-pin serial interface cable, Sub-D plug/socket**	LM9061	10
229	**USB-RS232 interface adapter with 9-pin SUB-D plug**	LM9062	2
230	**Initial programming and calibration setup of CIM22 before leaving the factory**	LA9722	1
231	**Set of tools with materials for turning machine**	LM9713	1
232	**Set of cutting edges for turning machine**	LM9714	1
233	**Start set for milling machines**	LM9723	1

Pos.	Product name	Bestell-Nr.	Anz.
234	**IDG3 membrane dryer with rapid coupling and filter AF20 with water trap**	LM9671	1

IMS/IPA Tester and Fault Simulator

Pos.	Product name	Bestell-Nr.	Anz.
235	**IMS/IPA test and fault simulator**	CO3713-7V	1
236	**Serial interface cable 9/9 pole**	LM9040	2
237	**25-pin serial interface cable, Sub-D plug/socket**	LM9061	2
238	**QuickChart IMS test and fault simulator**	SO6200-1Z	1

Programmable logic control (PLC) for IMS Production Lines

Pos.	Product name	Bestell-Nr.	Anz.
239	**SIMATIC S7-313C 2DP, 16 DI, 16 DO, Profibus, 24 V / 6 A power supply**	CO3713-8C	1
240	**IMS interface module for PLC**	CO3713-7F	1
241	**Touch panel TP700 Comfort Trainer Package**	CO3713-4P	1
242	**Software for training systems 1x STEP 7, S7-Graph, S7-SCL, PLC-Sim(D,GB,F,E,I)**	SO6002-1Q	1
243	**PLC-S7 PC-adapter with USB/MPI converter**	SO3713-5E	1
244	**Connection cable for PROFIBUS, per metre**	LM9181	25

Pos.	Product name	Bestell-Nr.	Anz.
245	**Connection plugs for PROFIBUS with PG socket and terminating resistor**	LM9182	12
246	**Wire stripper for PROFIBUS cables**	LM9184	1
247	**Safety measurement cable (4mm), 100cm/40", blue**	SO5126-9A	9
248	**Safety measurement cable (4mm), 100cm/40", red**	SO5126-8U	9

IMS furniture

IMS furniture

The IMS furniture system is used together with the Industrial Mechatronics System. The mobile trolleys can be used for individual components or sub-systems. In order to build complex, mechatronics systems, the trolleys can be lined up alongside one another and can be supplemented by frames to accommodate training panels. A power console allows the trolley to be equipped with a wide variety of 3 HU modules. The trolleys can be extended by means of various add-ons attachable to the aluminium rails to make up a multi-function PC experiment trolley.

Pos.	Product name	Bestell-Nr.	Anz.
249	**Mechatronics aluminium profile carriage without table-top frame**	ST7200-3R	2
250	**SybaPro mobile IMS experiment trolley with experiment frame, 1200mm, 2 levels**	ST7200-3T	1
251	**SybaPro mobile IMS experiment trolley, 1200mm**	ST7200-3U	3

Media:

| Pos.	Product name	Bestell-Nr.	Anz.
252	**Interactive Lab Assistant: CIM1 Basics Turning**	SO2800-4A	1

253	**Interactive Lab Assistant: IMS 1 Conveyor belt (DC)**	SO2800-5A	1
254	**Interactive Lab Assistant: IMS 3 Sorting station**	SO2800-5C	1
255	**Interactive Lab Assistant: IMS 4 Assembly station**	SO2800-5D	1
256	**Interactive Lab Assistant: IMS 5 Processing station**	SO2800-5E	1
257	**Interactive Lab Assistant: IMS 6 Testing station**	SO2800-5F	1
258	**Interactive Lab Assistant: IMS 8 Storage station**	SO2800-5H	1
259	**Interactive Lab Assistant: IMS 11 Disassembly by robot**	SO2800-5M	1
260	**Interactive Lab Assistant: Production line with 5 stations**	SO2800-5R	1
261	**Interactive Lab Assistant: Production line with 6 stations**	SO2800-5S	1
262	**Manual CIM1: Commissioning a Lathe**	SH5004-9K	1
263	**Manual CIM2: Commissioning a Milling Machine**	SH5004-9L	1
264	**Manual IMS 11.2: Putting a Robot into Operation**	SH5004-9M	1
265	**QuickChart, IMS 1.2 Conveyor belt with DC drive**	SO6200-1A	1
266	**QuickChart, IMS 3 Mechatronics Sorting sub-system**	SO6200-1C	1
267	**QuickChart, IMS 4 Mechatronics Assembly sub-system**	SO6200-1D	1
268	**QuickChart, IMS 5 Mechatronics Process sub-system**	SO6200-1E	1

Pos.	Product name	Bestell-Nr.	Anz.
269	**QuickChart, IMS 6 Mechatronics Testing sub-system**	SO6200-1F	1
270	**QuickChart, IMS 8 Mechatronics Storage sub-system**	SO6200-1H	1
271	**QuickChart, IMS 11.2 Kawasaki FS003N Teach Pendant**	SO6200-1M	1
272	**QuickChart, IMS 11 Mechatronics Disassembly sub-system**	SO6200-1N	1
273	**QuickChart, IMS 25 Production line with 5 stations**	SO6200-1R	1
274	**QuickChart, IMS 26 Production line with 6 stations**	SO6200-1S	1

Optional Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
275	**Set of batteries for industrial robot RS03N (E-Controller)**	LM9664	3
276	**Set of Allen keys**	LM9716	1
277	**Vernier calliper**	LM9717	1
278	**Software, STEP 7 Trainer package 6xSTEP 7, S7-Graph, S7-SCL, PLC-Sim (D,GB,F,E,I)**	SO6002-1X	2
279	**Lathe machine programming software with 3D simulation**	SO4002-2A	1
280	**Milling machine programming software with 3D simulation**	SO4002-2B	1

CIM 23 Flexible Production Plant with 12 stations
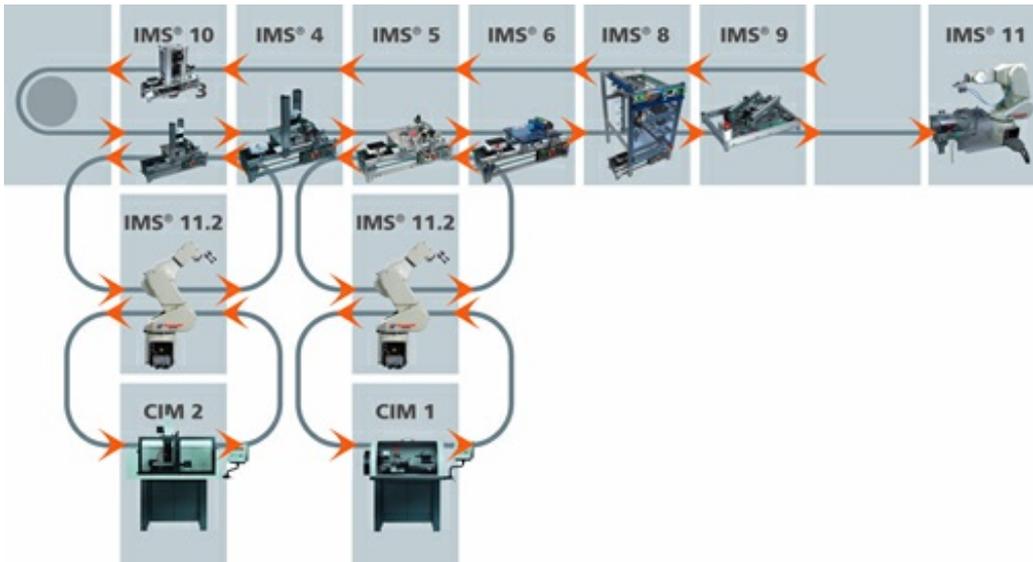
CIM 23 Flexible Production Plant with 12 stations

The system can be used for the fully automatic manufacture of a three-part workpiece for up to eight different end products. CIM 23 consists of the stations sorting, assembly, processing, testing, storage, routing, buffering, disassembly, workpiece transfer with robot, lathe and milling machine. The stations can be used individually or combined into a single system. For the transport of workpieces to the station a conveyor belt system is used to transport the workpiece carrier on dual conveyor belts. A robot is used for the transfer of the workpieces from the lathe/milling machine to the IMS station.

With this training system industrial processes involving complex manufacturing can be realistically simulated. Industrial type actuators and sensors are used exclusively. Industrial-type PLC systems with Profibus and decentralised periphery are also used for the control of the production line. Optional expansions of additional, modern, industrial communications systems are planned. The system promotes skills training while working within a team and empowers the students to acquire on their own the basics needed to master machining and mechatronic systems.

Each station is designed so that starting with simple automation and machining operations and sequences the student proceeds step by step to acquire the skills and know-how needed to create a complex automation program. The standardised interfaces permit the use of different industrial PLC control units.

- Transport system: dual conveyor belt transport system with DC drive motors and speed-variable three-phase drive motor.

- Identsystem: as an option an RFID identifcation system can be installed

- Identsystem: vision sensor can be used optionally to check whether workpiece has been finished correctly

- Control level: to complete manufacturing orders at the process control console PC; process visualisation and operational data capture

- Connection link of the process control console to TCP/IP

- IMS 3 Sorting station

- IMS 4 Assembly station

- IMS 5 Processing station

- IMS 6 Testing station

- IMS 8 Storage station

- IMS 9 Routing station

- IMS 10 Buffering station

- IMS 11 Disassembly station with robot

- IMS 11.2 Robot station

- CIM 1 Lathe machine

- CIM 2 Milling machine

CIM 1 Lathe machine

CIM 1 Lathe machine

The compact lathe is optimally suited for educational purposes and is fully in line with industrial standards in terms of design and functionality. All essential processes in modern manufacturing can be explained and understood in a manner that reflects authentic practice. A few sensible simplifications, an easily understood machine design and ease of operation mean that students can learn rapidly and reliably.

Benefits to you:

- Compact CNC lathe

- Hardened cast bed in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- High-resolution axis motors

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Automatic 8-way tool bit changer

- Made in Germany

Pos.	Product name	Bestell-Nr.	Anz.
281	**CNC lathe with professional software**	LM9712	1

282	**Automation set for CNC lathe**	LM9715	1
283	**Under-table cabinet for CNC lathe**	LM9718	1
284	**PROFIBUS DP Slave for conveyor belt**	SO9601	1

CIM 2 Milling machine

CIM 2 Milling machine

The compact milling machine is optimally suited for educational purposes and is fully in line with industrial standards in terms of design and functionality. All essential processes in modern manufacturing can be explained and understood in a manner that reflects authentic practice. A few sensible simplifications, an easily understood machine design and ease of operation mean that students can learn rapidly and reliably.

Benefits to you:

- Compact CNC milling machine

- Stable, cast design in line with industrial machinery

- Professional software with simulation of operating procedures

- Machine safety cabin

- Clockwise/anti-clockwise spindle rotation

- Continuously controllable main drive

- Made in Germany

Pos.	Product name	Bestell-Nr.	Anz.
285	**CNC milling machine with professional software**	LM9720	1
286	**Automation kit for CNC milling machine**	LM9722	1

287	**Under-table cabinet for CNC lathe**	LM9718	1

288	**PROFIBUS DP Slave for conveyor belt**	SO9601	1
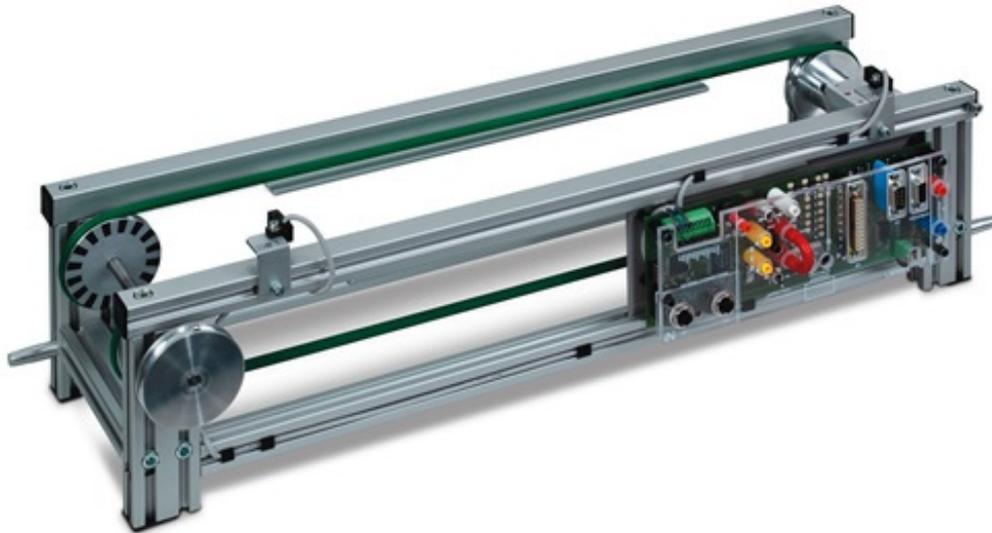
IMS 1.2: DC transport system

IMS 1.2: DC transport system

Conveyor belts form the basis for all sub-systems and installations. They are used for transferring workpieces on carriers.

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Training objectives for DC transport system

- Principle and function of various sensors

- Making controlled movements on a single axis

- Incremental positioning of a workpiece carrier

- Disabling movement forwards or backwards

- Program for monitoring slip and whether a machine is stopped

- Safe handling of various safety circuits and locks.

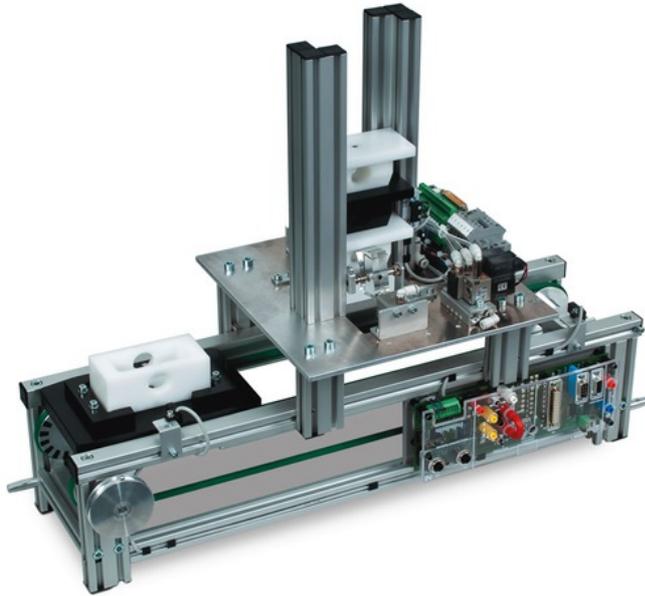| Pos.	Product name	Bestell-Nr.	Anz.
289	**Double conveyor belt segment, 24V motor**	LM9606	8

IMS 3 Sorting
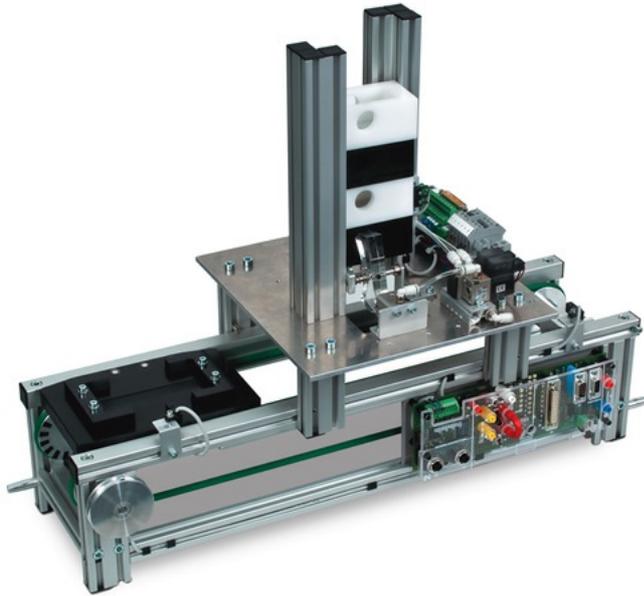
A workpiece carrier is located on the conveyor belt. The carrier is positioned under the shaft for the gravity-feed magazine. The sorting station has a magazine that accommodates six bottom pieces. One piece is selected and placed in the carrier. The carrier and its load are then conveyed to the end of the belt to be passed on to the next sub-system.

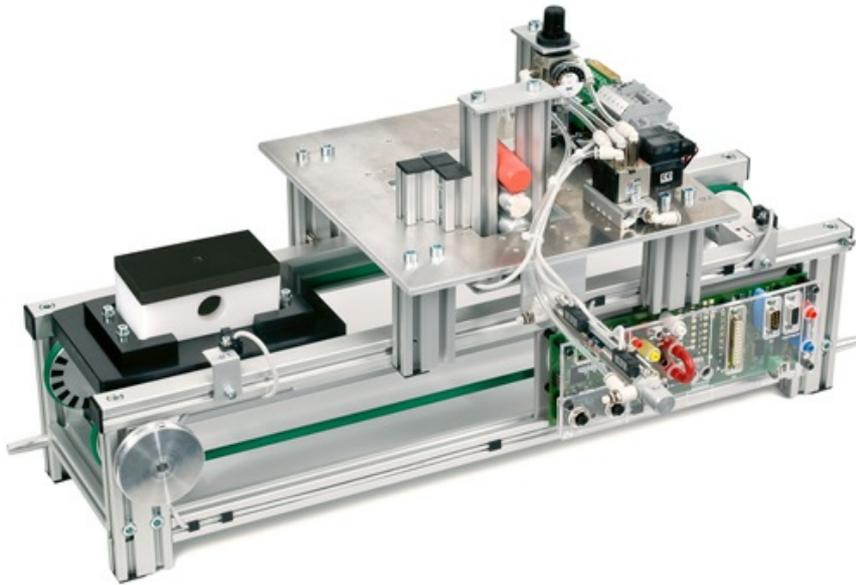| Pos.	Product name	Bestell-Nr.	Anz.
290	**Sorting station**	LM9680	1

IMS 4 Assembly

A workpiece carrier is located on the conveyor belt. The carrier is positioned under the shaft for the gravity-feed magazine. The sorting station has a magazine that accommodates six top pieces. One piece is selected and placed in the carrier. The carrier and its load are then conveyed to the end of the belt to be passed on to the next sub-system.

| Pos.	Product name	Bestell-Nr.	Anz.
291	**Assembly station**	LM9681	1

IMS 5 Processing

A workpiece carrier is located on the conveyor belt. It is loaded with a fully assembled two-component workpiece (top and bottom pieces). The carrier and its load are positioned beneath the process module. The workpiece is clamped for processing. A bolt from the gravity-feed magazine is pressed into the hole in the workpiece. The clamp opens and the carrier and load are conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
292	**Processing station**	LM9682	1
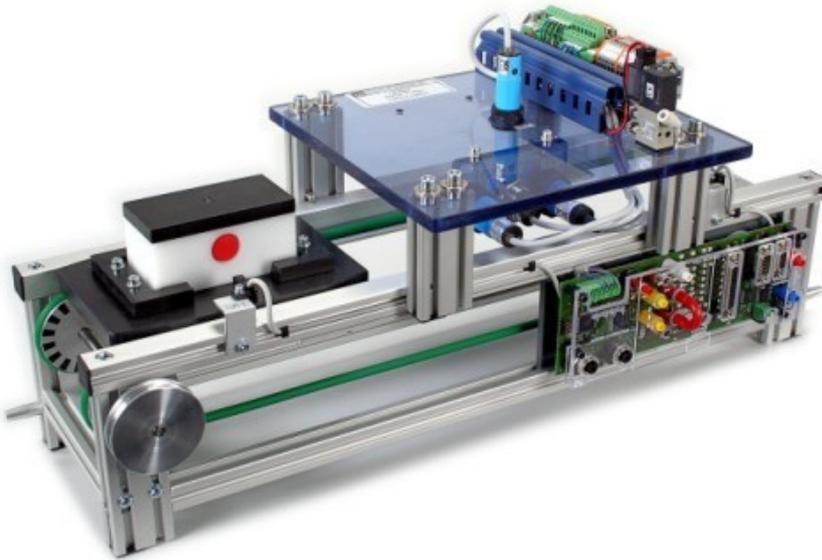
IMS 6 Testing

A carrier with a fully assembled workpiece is located on the conveyor belt. A stopper positions the piece alongside the sensors. The sensors detect the colour of the piece, its material and optionally its height. Test data will be saved for subsequent processes. After each successfully completed test the carrier is conveyed to the end of the belt to be passed on to the next sub-system.

| Pos.	Product name	Bestell-Nr.	Anz.
293	**Testing station**	LM9684	1

IMS 8 Storage

A carrier with a fully assembled and tested workpiece is located on the conveyor belt. The carrier is stopped at the removal position. The handling module lifts up the workpiece and transfers it to one of twenty possible storage positions. The storage positions can be chosen according to the production task and test results. The empty carrier is conveyed to the end of the belt to be passed on to the next sub-system.

Pos.	Product name	Bestell-Nr.	Anz.
294	**High rack storage station with 20 storage cells**	LM9641	1
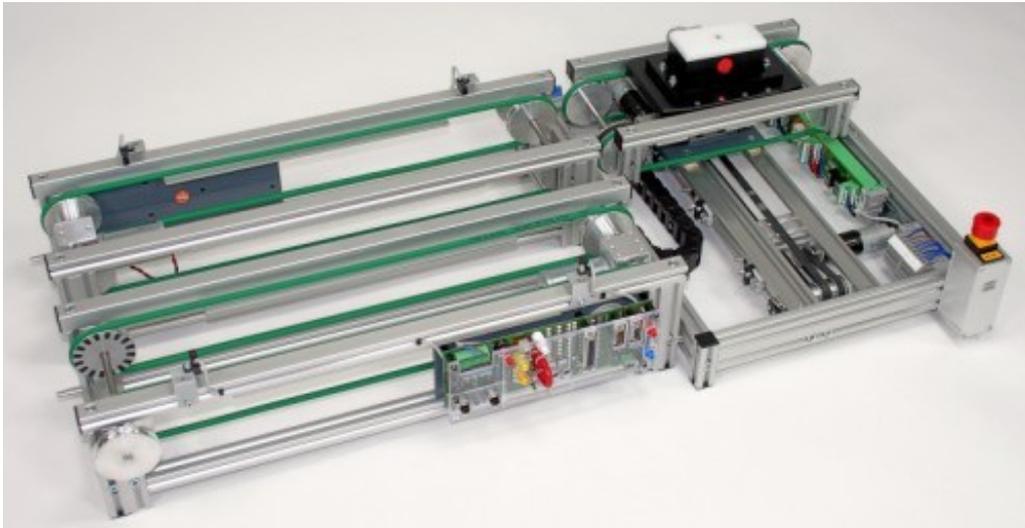
IMS 9 Routing

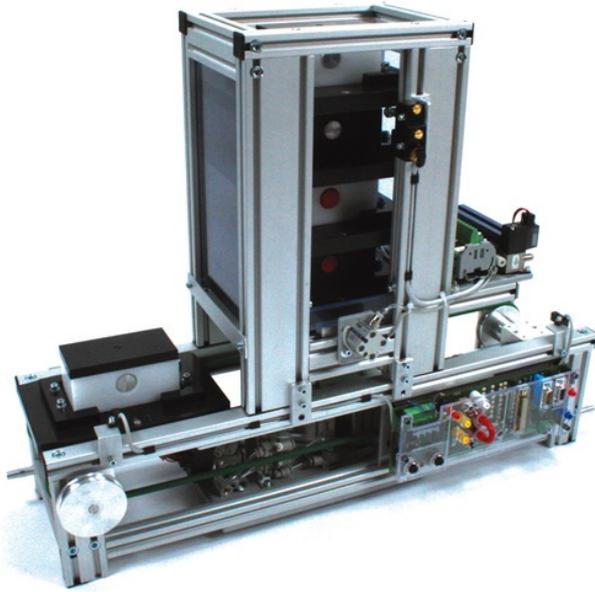A workpiece carrier is located on the conveyor belt. The routing unit receives the carrier and transfers it to a revolving transport unit. The revolving unit can determine the further routing of the carrier. The carrier can be picked up and passed on in any one of three positions.

Pos.	Product name	Bestell-Nr.	Anz.
295	**Routing station**	LM9614	1

IMS 10 Buffering

The conveyor belt is equipped with two lifting units for buffering or queuing workpieces in complex mechatronics systems. The buffer controls the flow of materials. The carrier is lifted from the conveyor belt by a lifting unit and deposited in a magazine, while the belt continues moving with other pieces. Up to four laden or 10 unladen workpiece carriers can be held in store. The lifting unit can set the workpiece back onto the conveyor when necessary.

Pos.	Product name	Bestell-Nr.	Anz.
296	**Material buffering station**	LM9687	1

IMS 11 Disassembly by robot
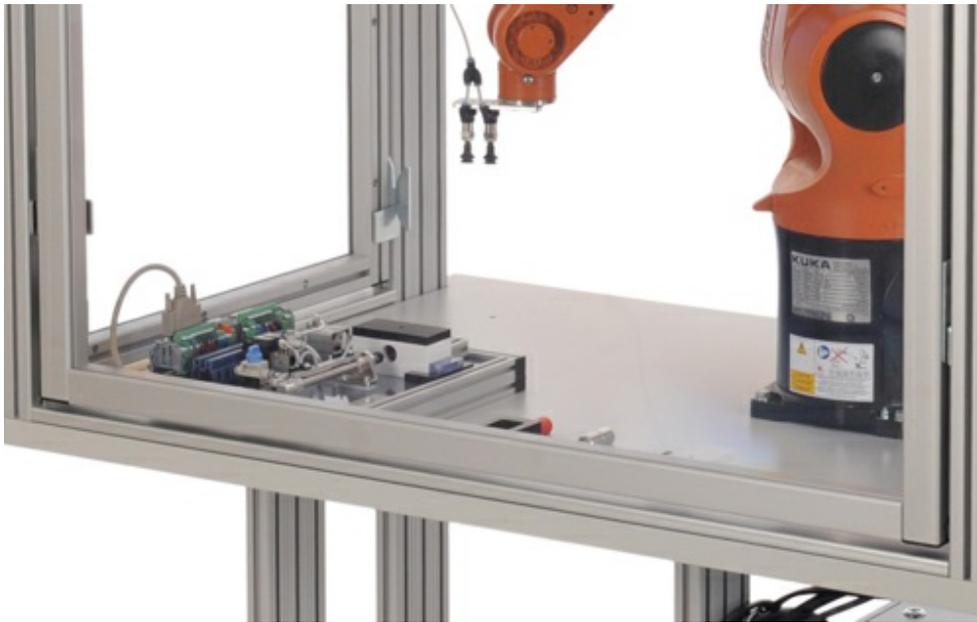
A carrier with a fully assembled and tested workpiece is located on the conveyor belt. The carrier is stopped at the removal position. The robot lifts up the workpiece and transfers it to the dismantling station. The workpiece is clamped in place. The individual pieces of the workpiece are taken apart. The robot sorts the individual components into pre-defined storage places.

Pos.	Product name	Bestell-Nr.	Anz.
297	**Disassembly station for robots**	LM9637	1
298	**Industrial-type robot RS03N (modified version), 6 axes, 3kg**	LM9661	1
299	**Pneumatic gripper for LM9661/LM9691**	LM9663	1
300	**IMS Mounting plate for robot**	LM9667	1

IMS11.2 Robot subsystem

The robot subsystem is a versatile unit. Not only can the industrial-type robot assemble and disassemble workpieces, it can also load and unload machines and other subsystems. The robot can be connected to mechatronics systems via the control unit. Using interfaces on the control unit that were designed especially for these applications the robot can communicate with a PLC and a safety light curtain can be implemented to protect the robot's operating area.

Pos.	Product name	Bestell-Nr.	Anz.
301	**Industrial-type robot RS03N (modified version), 6 axes, 3kg**	LM9661	2
302	**Parallel finger gripper for LM9661/LM9691**	LM9662	2
303	**CIM Mounting plate for robot**	LM9666	2
304	**PROFIBUS DP Slave for conveyor belt**	SO9601	2

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
305	**Safety pack comprising light barrier and assembly kit for industrial robots**	LM9665	1
306	**Double conveyor belt segment, passive**	LM9603	3
307	**180° conveyor belt segment**	LM9611	1
308	**Workpiece transport pallet**	LM9520	6
309	**Workpiece, top section, white**	LM9521	5
310	**Workpiece, top section, black**	LM9522	5

311	**Workpiece, bottom section, white**	LM9524	5
312	**Workpiece, bottom section, black**	LM9525	5
313	**Bolt workpiece, metal**	LM9527	5
314	**Bolt workpiece, plastic, red**	LM9528	5
315	**ID scanning unit, 4bit**	LM9635	2
316	**IMS manual control unit**	LM9638	1
317	**IMS capacitive sensor for conveyor belt, incl. mounting**	LM9678	1
318	**IMS magnetic sensor for conveyor belt, including mounting**	LM9675	1
319	**Compressor, low-noise**	SE2902-9L	1
320	**Tubing and accessory set for mechatronics systems**	LM9670	1
321	**Serial interface cable 9/9 pole**	LM9040	2
322	**25-pin serial interface cable, Sub-D plug/socket**	LM9061	14
323	**USB-RS232 interface adapter with 9-pin SUB-D plug**	LM9062	2
324	**Initial programming and calibration setup of CIM23 before leaving the factory**	LA9723	1
325	**Set of tools with materials for turning machine**	LM9713	1

326	**Set of cutting edges for turning machine**	LM9714	1
327	**Start set for milling machines**	LM9723	1
328	**IDG3 membrane dryer with rapid coupling and filter AF20 with water trap**	LM9671	1

IMS/IPA Tester and Fault Simulator

Pos.	Product name	Bestell-Nr.	Anz.
329	**IMS/IPA test and fault simulator**	CO3713-7V	1
330	**Serial interface cable 9/9 pole**	LM9040	2
331	**25-pin serial interface cable, Sub-D plug/socket**	LM9061	2
332	**QuickChart IMS test and fault simulator**	SO6200-1Z	1

Programmable logic control (PLC) for IMS Production Lines

Pos.	Product name	Bestell-Nr.	Anz.
333	**SIMATIC S7-313C 2DP, 16 DI, 16 DO, Profibus, 24 V / 6 A power supply**	CO3713-8C	1
334	**IMS interface module for PLC**	CO3713-7F	1
335	**Touch panel TP700 Comfort Trainer Package**	CO3713-4P	1
336	**Software for training systems 1x STEP 7, S7-Graph, S7-SCL, PLC-Sim(D,GB,F,E,I)**	SO6002-1Q	1

Pos.	Product name	Bestell-Nr.	Anz.
337	**PLC-S7 PC-adapter with USB/MPI converter**	SO3713-5E	1
338	**Connection cable for PROFIBUS, per metre**	LM9181	25
339	**Connection plugs for PROFIBUS with PG socket and terminating resistor**	LM9182	13
340	**Wire stripper for PROFIBUS cables**	LM9184	1
341	**Safety measurement cable (4mm), 100cm/40", blue**	SO5126-9A	10
342	**Safety measurement cable (4mm), 100cm/40", red**	SO5126-8U	10

IMS furniture

IMS furniture

The IMS furniture system is used together with the Industrial Mechatronics System. The mobile trolleys can be used for individual components or sub-systems. In order to build complex, mechatronics systems, the trolleys can be lined up alongside one another and can be supplemented by frames to accommodate training panels. A power console allows the trolley to be equipped with a wide variety of 3 HU modules. The trolleys can be extended by means of various add-ons attachable to the aluminium rails to make up a multi-function PC experiment trolley.

Pos.	Product name	Bestell-Nr.	Anz.
343	**Mechatronics aluminium profile carriage without table-top frame**	ST7200-3R	2
344	**SybaPro mobile IMS experiment trolley with experiment frame, 1200mm, 2 levels**	ST7200-3T	2
345	**SybaPro mobile IMS experiment trolley, 1200mm**	ST7200-3U	3

Pos.	Product name	Bestell-Nr.	Anz.
346	**Interactive Lab Assistant: CIM1 Basics Turning**	SO2800-4A	1
347	**Interactive Lab Assistant: IMS 1 Conveyor belt (DC)**	SO2800-5A	1
348	**Interactive Lab Assistant: IMS 3 Sorting station**	SO2800-5C	1
349	**Interactive Lab Assistant: IMS 4 Assembly station**	SO2800-5D	1
350	**Interactive Lab Assistant: IMS 5 Processing station**	SO2800-5E	1
351	**Interactive Lab Assistant: IMS 6 Testing station**	SO2800-5F	1
352	**Interactive Lab Assistant: IMS 8 Storage station**	SO2800-5H	1
353	**Interactive Lab Assistant: IMS 9 Routing station**	SO2800-5J	1
354	**Interactive Lab Assistant: IMS 10 Buffering station**	SO2800-5K	1
355	**Interactive Lab Assistant: IMS 11 Disassembly by robot**	SO2800-5M	1
356	**Interactive Lab Assistant: Production line with 5 stations**	SO2800-5R	1
357	**Interactive Lab Assistant: Production line with 6 stations**	SO2800-5S	1
358	**Interactive Lab Assistant: Production line with 8 stations**	SO2800-5T	1

359	**Manual CIM1: Commissioning a Lathe**	SH5004-9K	1
360	**Manual CIM2: Commissioning a Milling Machine**	SH5004-9L	1
361	**Manual IMS 11.2: Putting a Robot into Operation**	SH5004-9M	1
362	**QuickChart, IMS 1.2 Conveyor belt with DC drive**	SO6200-1A	1
363	**QuickChart, IMS 3 Mechatronics Sorting sub-system**	SO6200-1C	1
364	**QuickChart, IMS 4 Mechatronics Assembly sub-system**	SO6200-1D	1
365	**QuickChart, IMS 5 Mechatronics Process sub-system**	SO6200-1E	1
366	**QuickChart, IMS 6 Mechatronics Testing sub-system**	SO6200-1F	1
367	**QuickChart, IMS 8 Mechatronics Storage sub-system**	SO6200-1H	1
368	**QuickChart, IMS 9 Mechatronics Routing sub-system**	SO6200-1J	1
369	**QuickChart, IMS 10 Mechatronics Buffering sub-system**	SO6200-1K	1
370	**QuickChart, IMS 11.2 Kawasaki FS003N Teach Pendant**	SO6200-1M	1
371	**QuickChart, IMS 11 Mechatronics Disassembly sub-system**	SO6200-1N	1
372	**QuickChart, IMS 25 Production line with 5 stations**	SO6200-1R	1
373	**QuickChart, IMS 26 Production line with 6 stations**	SO6200-1S	1
374	**QuickChart, IMS 28 Production line with 8 stations**	SO6200-1T	1

| 375 | **QuickChart IMS Manual operating device** | SO6200-1V | 1 |

Optional Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
376	**Set of batteries for industrial robot RS03N (E-Controller)**	LM9664	3
377	**Set of Allen keys**	LM9716	1
378	**Vernier calliper**	LM9717	1
379	**Software, STEP 7 Trainer package 6xSTEP 7, S7-Graph, S7-SCL, PLC-Sim (D,GB,F,E,I)**	SO6002-1X	2
380	**Lathe machine programming software with 3D simulation**	SO4002-2A	1
381	**Milling machine programming software with 3D simulation**	SO4002-2B	1