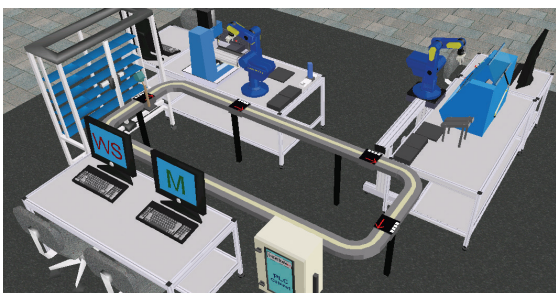
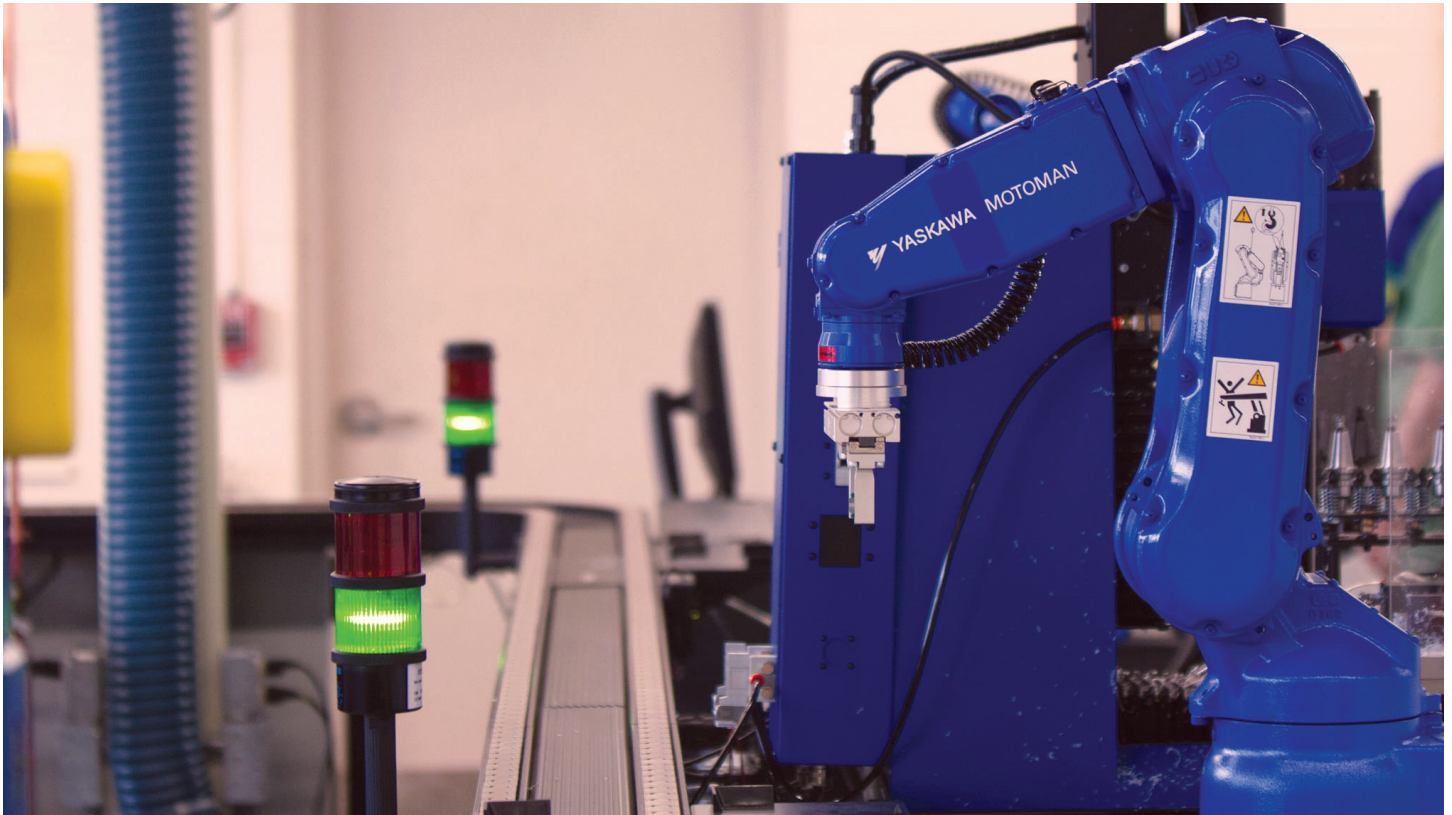


# CIM and FMS Systems

Computer Integrated Manufacturing & Flexible Manufacturing Systems



Our CIM and FMS systems are modular and flexible solutions for educating and training students in the principles and technologies of computer integrated manufacturing.

**intelitek**   
Dynamic Solutions, Inspired Classrooms

# Computer Integrated Manufacturing & Flexible Manufacturing Systems

Computer Integrated Manufacturing (CIM) system has several key components: an automated storage and retrieval system (ASRS), at least one automated workstation such as CNC machining, a continuous-loop conveyor, a central management control station, a TCP/IP communication network, and OpenCIM software.

Additional workstations can be added at any time for executing a variety of automated tasks, such as laser engraving, hydraulic and pneumatic device operation, process control, and quality control inspection.

## Stations Overview

### 1 Storage Station

The ASRS storage station is a floor-mounted or a table top automated storage and retrieval (ASRS) system designed for educational use.

The system's dedicated Cartesian robot transfers parts between storage cells and conveyor pallets stopped at the ASRS station. The robot is controlled by Controller-USB and by a dedicated ASRS software module in the OpenCIM software. An optional hand-held teach pendant can also be used for direct control of the ASRS.

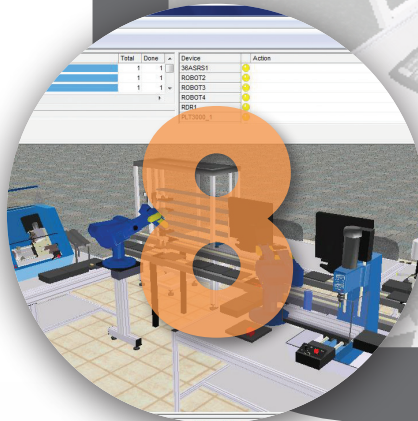
### 2 Machine Tending Station

This package can be used as a stand-alone workcell, or integrated within a CIM system. The robot tends the CNC machine and performs other part manipulation and/or assembly tasks. When used in a CIM system, the robot loads and unloads parts to and from the CIM conveyor. The robot is mounted on a linear slidebase for mobility and larger work area. **Any of the MTS stations can be provided as a standalone FMS.**

### 3 Assembly & Quality Control Station

The assembly and QC station is equipped with a variety of assembly and quality control devices as well as with local storage devices.

This turnkey station gives students training and skills in assembly, quality control, robotic programming and automated manufacturing systems.



## 4 Welding Station

This automated welding station can be used as a stand-alone workcell, or integrated within a CIM system. When used in a CIM system, the robot loads and unloads parts to and from the CIM conveyor in addition to performing arc welding and part manipulation tasks.

## 5 Conveyors

The conveyor frame is constructed of extruded, black anodized aluminum, and its moving belt is a double flexible-chain rail.

## 6 PLC Station

The PLC (Programmable Logic Controller) can control and monitor the flow of pallets on the conveyor with the help of sensors and actuators that are built into the stop stations.

## 7 Pallet Tracking Station

The stop station allows the PLC to control and monitor the flow of pallets on the conveyor with the help of sensors and actuators that are built into the stop stations.

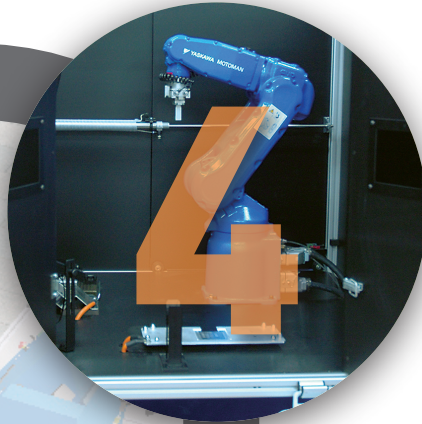
## 8 Management Station

The OpenCIM software is a computer-integrated systems management solution that contains all the elements found in fully-automated facilities.

Shop floor management controls the operation of all the elements of automated factory.

Administrative software connects the shop floor management to the production facility's Enterprise Resource Planning (ERP).

The OpenCIM software contains an ERP package which breaks down customer orders to analyze bill of materials, check availability of raw materials, produce vendor's purchase order and schedule production based on expected lead times.



# Storage Station

## ASRS-36u

The ASRS 36u has 36 cells arranged in six rows. Each cell can store a part-holding template. The 36 templates supplied with the system have pin holes that allow the user to customize the template's holding area to accommodate objects of various shapes and sizes.

A template buffer supplied with the system can be attached to a CIM conveyor or to a table in a stand-alone ASRS/robotic work cell.

The robot is controlled by Controller-USB and by a dedicated ASRS software module in the OpenCIM software. The software provides display and tracking ASRS contents, enables real-time control of inventory, and controls the robotic storage and retrieval operations.

An optional hand-held teach pendant can also be used for direct control of the ASRS.

The ASRS station may also include a bar code scanning system for real-time identification and verification of part-carrying templates.



Station	ASRS-36u	ASRS-36u2
<b>Bundle</b>	ASRS-36U-RDR	ASRS-36Ux2-RDR
<b>Description</b>	36 storage cells arranged in a 6x6 array.	72 storage cells arranged in two facing stacks.
<b>Specifications</b>		
<b>Mechanical structure</b>	Floor-mounted storage unit	
	36 cells in a 6 x 6 array	72 cells in two facing 6 x 6 arrays
	Transparent Plexiglas enclosure	
	Cartesian robot with rotational axis movement of end effectors	
	Dimensions: L=1310 mm, W=510 mm, H=1550 mm (L=51.6", W=20", H=61")	Dimensions: L= 1310mm, W=880mm, H=1550 mm (L=51.6", W=34.6", H=61")
<b>Degrees of freedom/ Axis travel</b>	X Axis: Horizontal translation: 1285 mm (50.6")	X Axis: Horizontal translation: 1325 mm (52.2")
	Y Axis: Horizontal translation: 597 mm (23.5")	
	Z Axis: Vertical translation: 795 mm (31.3")	
	θ Axis: Horizontal rotation: 184°	
<b>Speed</b>	200 mm/sec. (7.9"/sec)	
	Velocity range definition: between 1- 10 levels and duration time	
<b>End effector</b>	Standard: Fork-lift type gripper	
<b>Payload capacity</b>	1.5 kg (3.3 lb.)	
<b>Repeatability</b>	±0.2 mm (0.008") at TCP (tip of gripper)	
<b>Home</b>	Hard-home position on each axis	
<b>Feedback</b>	Optical encoder on each axis	
<b>Actuators</b>	3 motors 12 VDC, 1 motor 24 VDC	
<b>Transmission</b>	Timing-belt drive	
<b>Safety features</b>	Emergency switches; can be connected to safety mats, warning lights, etc.	
<b>Weight</b>	75 Kg	113 Kg
<b>Software</b>	Scorbase USB	

## 6-, 12- & 18-bay storage for SCORBOT-ER 4u

A storage station containing a 5-axis robot and 6-bay storage units. A table-top storage system for use in robotic workcells. Two or more units can be combined to provide greater storage capabilities in larger workcells.



### Specifications

- See specs for SCORBOT-ER 4u robot arm
- 1 to 3 storage shelves for six templates each
- 18-bay option comes with a table mounted slide base robot
- RFID reader

Station Type	Bundle
6-bay	ASRS-ER 4u-06-RDR
12-bay	ASRS-ER 4u-12-RDR
18-bay	ASRS-ER 4u-18-RDR

### USB Controller

- See specs for USB Controller in the SCORBOT-ER 4u data sheet
- See specs for USB-Pro Controller in the SCORBOT-ER 9 Pro & SCORA-ER 14 Pro data sheet
- See specs for FS100 Controller in the Motoman mh5F data sheet

### Scorbase Software for USB Controller

SCORBASE for USB Controller is a robot control and programming PC based robotic learning software. SCORBASE software is included with the robot arm.

### Optional Accessories: RFID Reader System

- Dimensions: Minimum H=30 mm (1.18"), W= 90 mm (3.54"), D= 15 mm (0.59")
- Weight Minimum: 175g (0.38 Lbs.)
- Visual Indicators Internal LED
- Audible Indicator Internal Buzzer
- Transponder: Read Only (For unique serial number/unique identifier)  
Chip type: EM H4001/H4002 compatible ID code: 10 digits in HEX; 125KHz, ASK; 64 bits, Manchester coding
- Frequency:125Khz standard, ASK
- Maximum Reach With USB between 0 to 5mm (depending on type of tags used)
- Power: 7.5-12 Volts regulated DC; 75 mA
- Operating Temperature: -10° to 60° C (14° to 140° F)
- Interface: USB

### Related Products

#### Teach Pendant for USB Controller & USB-PRO Controller

A hand-held terminal used for controlling the robot and axes connected to USB Controller and USB-PRO Controller. This teach pendant is equipped with an Emergency Stop pushbutton, an Auto/Teach selector switch, and a Deadman switch.

#### RoboCell Software

RoboCell for USB Controller is an optional 3D simulation software that lets students create, program, simulate and control the entire operation of robotic workcells.

## Machine Tending Stations (FMS)

These packages can be used as a stand-alone workcell, or integrated within a CIM system. The robot tends the CNC machine and performs other part manipulation and/or assembly tasks. When used in a CIM system, the robot loads and unloads parts to and from the CIM conveyor. The robot is mounted on a linear slidebase for mobility and larger work area.



### FMS with SCORBOT-ER 4u Robot and CNC Machining Center

Station Type	Bundle	Description	Machining Center	Robotic System	Additional components
SCORBOT-ER 4u & BenchMill 6000 CNC Milling Center	MTS-ER 4u-BM6000	A machine tending station containing a 5-axis robot and 3-axis CNC milling center	<ul style="list-style-type: none"> <li>■ BenchMill 6000 CNC Milling center</li> <li>■ Dual-axis pneumatic vise for CNC machine with controls</li> </ul>	<ul style="list-style-type: none"> <li>■ SCORBOT-ER 4u system: mechanical arm and USB Controller</li> <li>■ Scorbaser software</li> <li>■ Teach pendant</li> <li>■ Robot-CNC interface and cable</li> </ul>	<ul style="list-style-type: none"> <li>■ Palletizing rack</li> <li>■ Pneumatic feeder for square parts</li> <li>■ Raw material stock</li> <li>■ Workbench</li> </ul>
SCORBOT-ER 4u & BenchTurn 7000 CNC Turning Center	MTS-ER 4u-BT7000	A machine tending station containing a 5-axis robot and 2-axis CNC turning center	<ul style="list-style-type: none"> <li>■ BenchTurn 7000 CNC Turning center</li> </ul>		
SCORBOT-ER 4u & BenchMill 6000 CNC Milling Center & BenchTurn 7000 CNC Turning Center	MTS-ER 4u-BM-BT	A machine tending station containing a 5-axis robot, a 3-axis CNC milling center and a 2-axis CNC turning center	<ul style="list-style-type: none"> <li>■ BenchMill 6000 CNC Milling center</li> <li>■ BenchTurn 7000 CNC Turning center</li> <li>■ Dual-axis pneumatic vise for CNC machine with controls</li> </ul>		

### FMS with Motoman-MH5F Robot and CNC Machining Center

Station Type	Description
FMS with Motoman-MH5F Robot and CNC Machining Center	Packages are available. Contact us for details and quotes

## FMS with SCORBOT-ER 9Pro robot and CNC Machining Center

Station Type	Bundle	Description	Machining Center	Robotic System	Additional components
SCORBOT-ER 9Pro & BenchMill 6000 CNC Milling Center	MTS-ER 9P-BM6000	A machine tending station containing a 5-axis robot plus gripper, and 3-axis CNC milling center which together provide a Flexible Manufacturing System	<ul style="list-style-type: none"> <li>■ BenchMill 6000 CNC Milling Center</li> <li>■ Dual-axis pneumatic vise for CNC machine with controls</li> <li>■ 4 Tools Automated Tool Changer (ATC)</li> </ul>	<ul style="list-style-type: none"> <li>■ Mechanical arm and USB-Pro Controller</li> <li>■ Scorbase software</li> <li>■ Pneumatic gripper</li> <li>■ Teach pendant</li> <li>■ Robot-CNC interface and cable</li> <li>■ Linear slidebase for large robots</li> </ul>	<ul style="list-style-type: none"> <li>■ Palletizing rack</li> <li>■ Pneumatic feeder for square parts</li> <li>■ Raw material stock</li> <li>■ Workbench</li> </ul>
SCORBOT-ER 9Pro & BenchTurn 7000 CNC Turning Center	MTS-ER 9P-BT7000	A machine tending station containing a 5-axis robot and 2-axis CNC turning center which together provide a Flexible Manufacturing System	<ul style="list-style-type: none"> <li>■ BenchTurn 7000 CNC Turning center</li> </ul>		
SCORBOT-ER 9Pro & BenchMill 6000 CNC Milling Center & BenchTurn 7000 CNC Turning Center	MTS-ER 9P-BM-BT	A machine tending station containing a 5-axis robot plus gripper, 3-axis CNC milling center and 2-axis CNC turning center which together provide a Flexible Manufacturing System	<ul style="list-style-type: none"> <li>■ BenchMill 6000 CNC Milling Center</li> <li>■ BenchTurn 7000 CNC Turning center</li> <li>■ Dual-axis pneumatic vise for CNC machine with controls</li> <li>■ 4 Tools Automated Tool Changer (ATC)</li> <li>■ 12 Tools Automated Tool Changer (ATC)</li> </ul>		
SCORBOT-ER 9Pro & ProMill 8000 CNC Milling Center 4 Tool	MTS-ER 9P-PM8000	Machine Tending Station: FMS with SCORBOT-ER 9Pro Robot and ProMill 8000AC, AC Servo Milling Center with table mount 4 Tools Automated Tool Changer (ATC)	<ul style="list-style-type: none"> <li>■ ProMill 8000 AC CNC Milling center</li> <li>■ Dual-axis pneumatic vise for CNC machine with controls</li> <li>■ Pneumatic Shield with Sensors</li> <li>■ 4 Tools Automated Tool Changer (ATC)</li> </ul>		
SCORBOT-ER 9Pro & ProMill 8000 CNC Milling Center 12 Tool	MTS-ER 9P-PM-12T	Machine Tending Station: FMS with SCORBOT-ER 9Pro Robot and ProMill 8000AC, AC Servo Milling Center with rotary 12 Tools Automated Tool Changer (ATC)	<ul style="list-style-type: none"> <li>■ ProMill 8000 AC CNC Milling center</li> <li>■ Dual-axis pneumatic vise for CNC machine with controls</li> <li>■ Pneumatic Shield with Sensors</li> <li>■ 12 Tools ATC</li> </ul>		
SCORBOT-ER 9Pro & ProTurn 9000 CNC Turning Center	MTS-ER 9P-PT9000	Machine Tending Station: SCORBOT-ER 9Pro robot and ProTurn 9000AC, AC Servo Turning Center	<ul style="list-style-type: none"> <li>■ ProTurn 9000 AC Turning center</li> <li>■ Pneumatic Shield with Sensors</li> <li>■ Pneumatic Chuck</li> </ul>		
SCORBOT-ER 9Pro & ProMill 8000 CNC Milling Center & ProTurn 9000 CNC Turning Center	MTS-ER 9P-PM&PT-1 MTS-ER 9P-PM&PT-2	A machine tending station containing a 5-axis robot, a 3-axis CNC milling center and a 2-axis CNC turning center	<ul style="list-style-type: none"> <li>■ ProMill 8000 AC CNC Milling center</li> <li>■ ProTurn 9000 AC Turning center</li> <li>■ Dual-axis pneumatic vise for CNC machine with controls</li> </ul>		
SCORBOT-ER 9Pro & Laser Engraver	MTS-ER 9P-LSREN	A machine tending station containing a 5-axis robot and Laser Engraver machine.	<ul style="list-style-type: none"> <li>■ CO2 Laser engraver, fully equipped for FMS/CIM operation</li> <li>■ Raw material stock: 50 Plexiglas blocks</li> </ul>		<ul style="list-style-type: none"> <li>■ Palletizing rack</li> <li>■ Pneumatic feeder for square parts</li> </ul> <p><b>Optional</b></p> <ul style="list-style-type: none"> <li>■ Workbench: extruded aluminum frame</li> </ul>

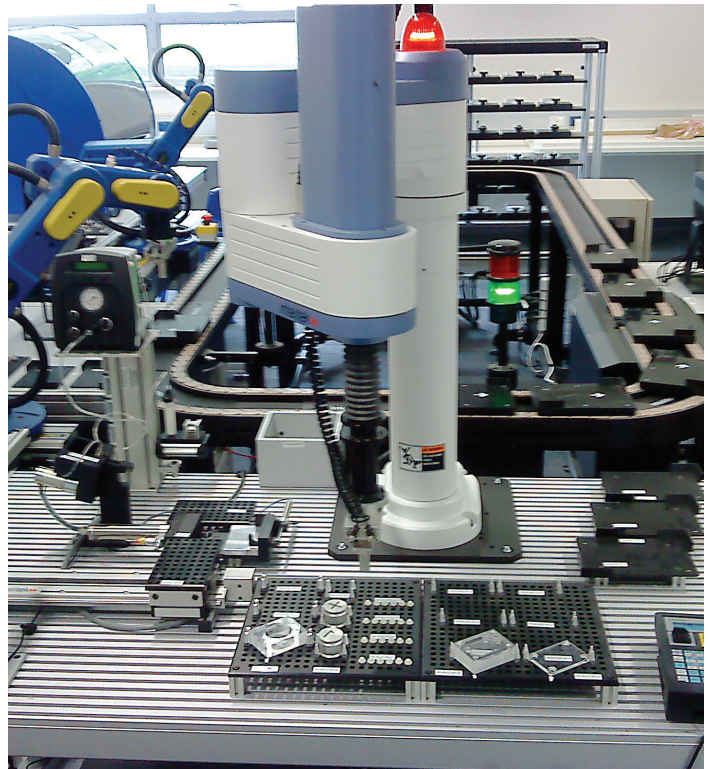
# Assembly & Quality Control Station

A number of optional add-on application packages enable more sophisticated assembly operations as well as automated quality control inspections.

The basic package includes the SCORBOT-ER 4u robot system or SCORBOT-ER 9Pro, SCORA-ER 14Pro or Motoman MH5F and palletizing racks for assembly operations.

## Robotic System

- SCORBOT-ER 4u system: mechanical arm; USB Controller
- SCORBOT-ER 9Pro system: mechanical arm; USB-Pro Controller
- SCORA-ER 14Pro system: mechanical arm; USB-Pro Controller; USB and power cables
- Motoman MH5F mechanical arm; Controller-NXC100; Cables
- SCORBASE software
- Pneumatic gripper for SCORBOT-ER 9
- Pneumatic gripper for SCORA-ER 14Pro
- Pneumatic gripper (2 parallel fingers)
- Teach pendant for USB Controller
- Teach pendant for Controller-FS100
- Adapter plate for mounting mechanical arm on workbench
- Pedestal for mechanical arm



**We can integrate industrial robots and machines in your CIM system.**  
**Contact sales for details and quotes.**

## Assembly & Quality Control Station

Station Type	Bundle
ER 4u (Ballgame & ViewFlex Machine Vision System)	ASM&QC-ER 4u-01
ER 4u (Ballgame & Gluing & Caliper)	ASM&QC-ER 4u-02
ER 4u (Ballgame & Gluing & ViewFlex Machine Vision System)	ASM&QC-ER 4u-03
ER 4u (Basic Assembly & ViewFlex Machine Vision System)	ASM&QC-ER 4u-04
ER 9Pro (Ballgame & ViewFlex Machine Vision System)	ASM&QC-ER 9P-01
ER 9Pro (Ballgame & Caliper)	ASM&QC-ER 9P-02
ER 9P (Ballgame & ViewFlex Machine Vision System & Caliper)	ASM&QC-ER 9P-03
Robot ER14 (Ballgame & Vision)	ASM&QC-ER14P-01
Robot ER14 (Ballgame & Vision & Caliper)	ASM&QC-ER14P-02
Robot ER14 (Ballgame & Vision & LSM)	ASM&QC-ER14P-03
Robot ER14 (Ballgame & Glue & Vision)	ASM&QC-ER14P-04
Robot ER14 (Ballgame & Screw & Vision)	ASM&QC-ER14P-05
Assembly & QC Robot ER14 (Ballgame & Glue & Vision & Caliper & ATC)	ASM&QC-ER14P-06
Assembly & QC Robot ER14 (Ballgame & Glue & Vision & Caliper)	ASM&QC-ER14P-07

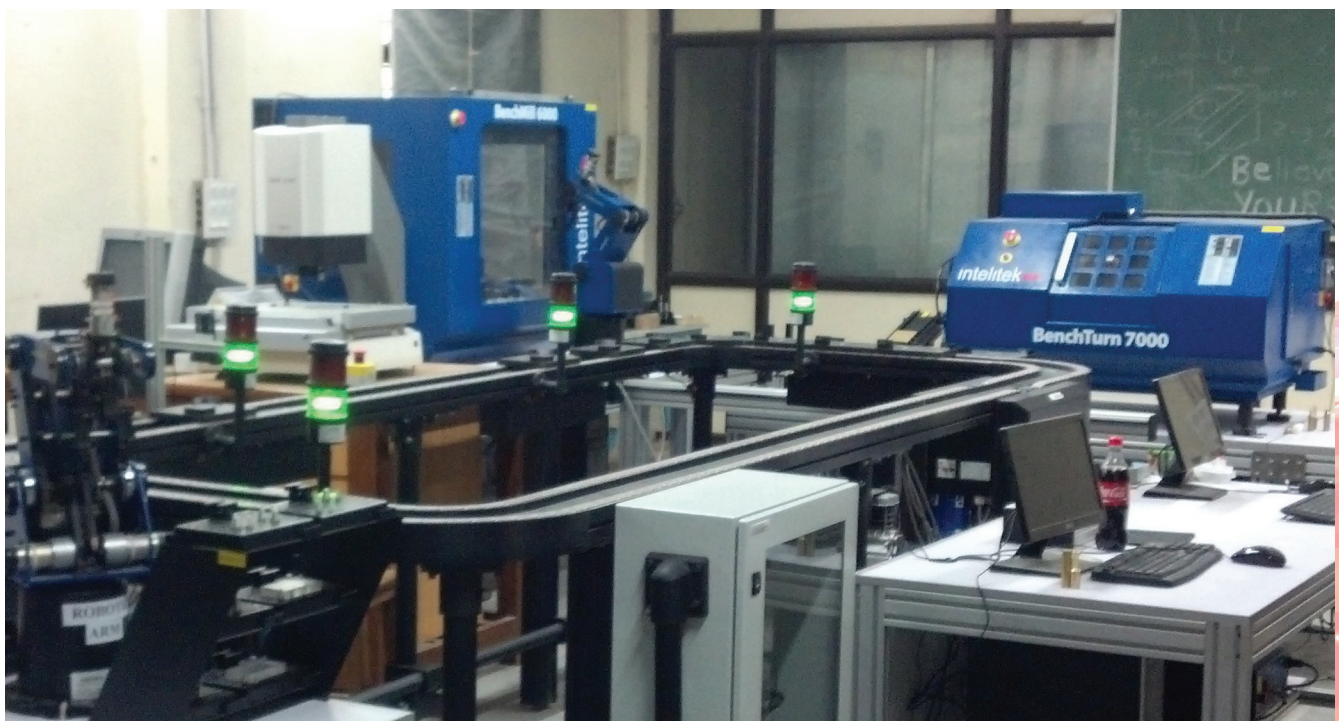


## Assembly Station

Station Type	Bundle
Assembly station with Scora-ER14 Scara robot (Ballgame)	ASM-ER14P-01
Assembly station with Scora-ER14 Scara Robot (Ballgame & Gluing Machine)	ASM-ER14P-02
Assembly station with Scora-ER14 Robot (Ballgame & Automatic Screwdriver)	ASM-ER14P-03
Assembly station with SCORBOT-ER 4u Robot (Basic Assembly)	ASM-ER 4u-01
Assembly station with SCORBOT-ER 9Pro Robot (Ballgame)	ASM-ER 9P-01
Assembly station with SCORBOT-ER 9Pro Robot (Ballgame & Gluing Machine)	ASM-ER 9P-02
Assembly station with SCORBOT-ER 9Pro Robot (Ballgame & Automatic Screwdriver)	ASM-ER 9P-03
Assembly station with Robot ER 9 (Gear Assembly)	ASM-ER 9P-GEAR
Assembly station with MOTOMAN MH5F (Ballgame)	ASM-MH5F-01
Assembly station with MOTOMAN MH5F (Ballgame & Glue)	ASM-MH5F-02
Assembly station with MOTOMAN MH5F (Gear Assembly)	ASM-MH5F-GEAR

## Quality Control Station

Station Type	Bundle
QC with ViewFlex Machine Vision System on Pallet Conveyor	QC-CNV-VSN
QC with SCORBOT-ER 4u Robot (with Caliper)	QC-ER 4u-01
QC with SCORBOT-ER 4u Robot (with ViewFlex Machine Vision System)	QC-ER 4u-02
QC with SCORBOT-ER 4u Robot (w ViewFlex Machine Vision System & Caliper)	QC-ER 4u-03
QC with SCORBOT-ER 9Pro (w ViewFlex Machine Vision System & Caliper)	QC-ER 9P-01
QC with SCORBOT-ER 9Pro (with Coordinated Measurement Machine [CMM])	QC-ER 9P-02
QC with SCORBOT-ER 9Pro FOR DURAMAX CMM	QC-ER 9P-03
QC with SCORBOT-ER 9 Pro Robot (For CMM)	QC-ER 9P-CMM
QC with SCORBOT-ER 9 Pro Robot for CMM DURAMAX	QC-ER 9P-ZEISS
QC with MOTOMAN MH5F (with ViewFlex Machine Vision System)	QC-MH5F-01
QC with MOTOMAN MH5F (with ViewFlex Machine Vision System & Caliper)	QC-MH5F-02
QC with MOTOMAN MH5F on 1.8m LSB FOR CMM DURAMAX	QC-MH5F-ZEISS



# Welding Station

This turnkey automated welding station gives students training and skills in production welding methods, robotic programming and control.

Using RoboCell software students safely perform entire welding processes in 3D simulation before executing actual automated welding applications.

Students learn to overcome common welding problems, such as thermal deformation, by adjusting welding technique. Students also learn to improve weld quality by optimizing important welding parameters such as wire feed rate, robot speed, inert gas shield and voltage.

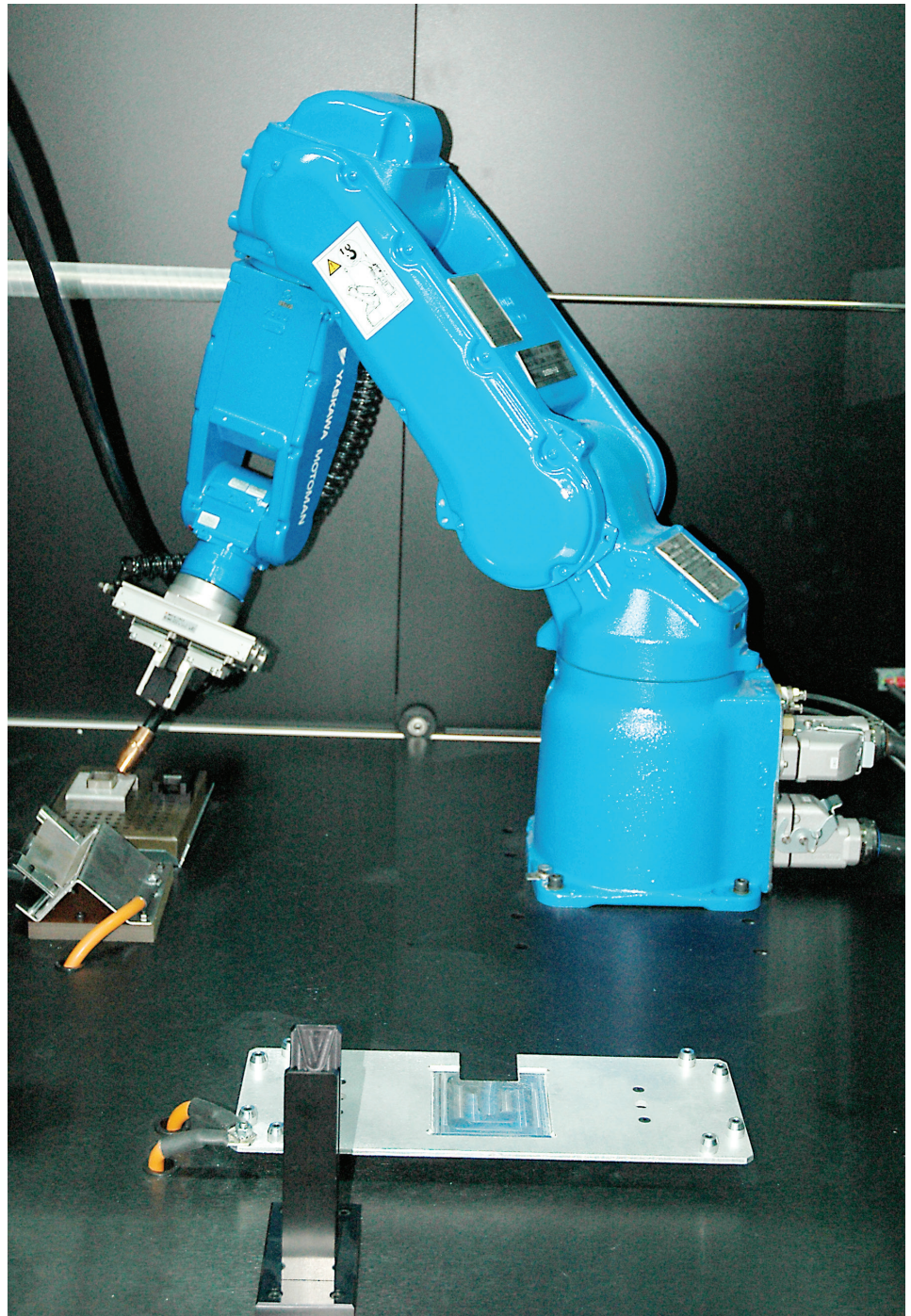
Safety is an integral part of the system. The robotic workbench is housed in a fire retardant metal booth with filter-plated windows for UV and eye protection. Opening a booth door automatically halts the welding operation. Pressing either of two emergency buttons immediately halts both robotic and welding operations.

### Robotic system for ER 9Pro:

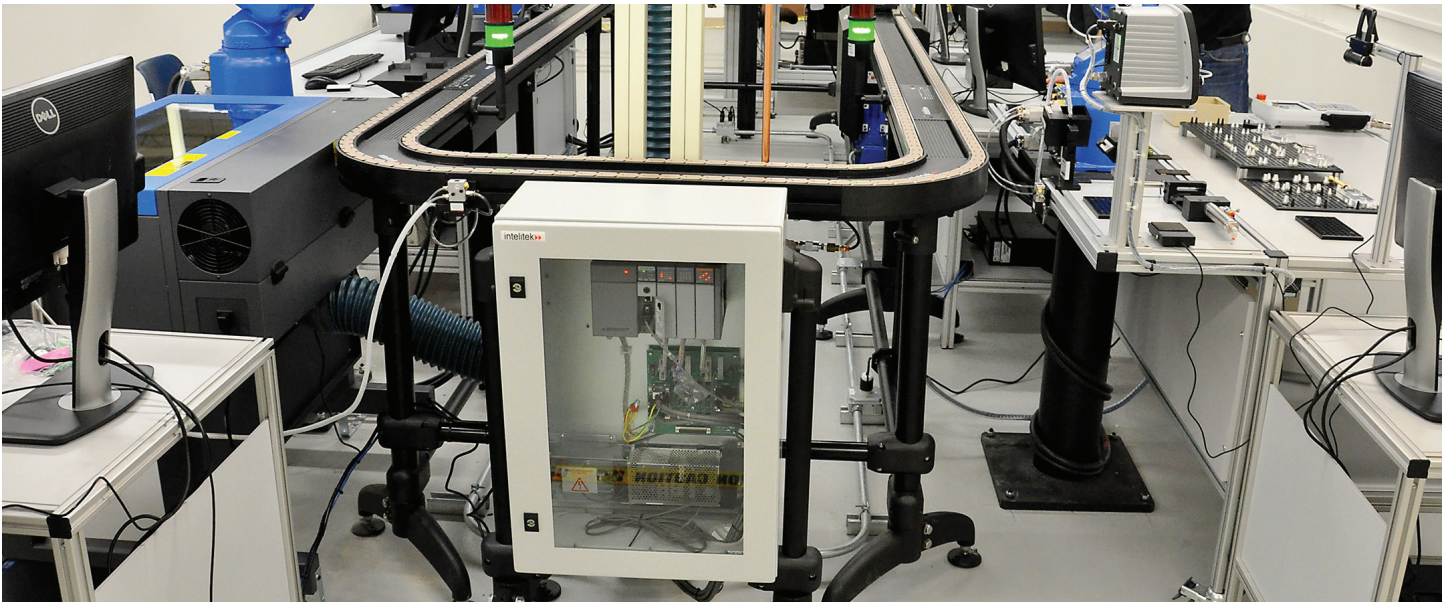
- SCORBOT-ER 9Pro mechanical arm
- USB-PRO controller
- Pneumatic gripper for SCORBOT-ER 9Pro

### Robotic system for MH5F:

- Motoman MH5F mechanical arm
- FS100 controller
- Cables
- Pneumatic gripper for MOTOMAN MH5F
- Windows® CE programming pendant



Station Type	Bundle
Automated Welding Station with SCORBOT-ER 9Pro	WELDING-ER 9P
Automated Welding Station with MOTOMAN-MH5F	WELDING-MH5F



## Conveyors

The conveyor frame is constructed of extruded, black anodized aluminum. A double flexible-chain moves in the inner and outer rails and moves the load (pallets) by friction. Due to the modular concept a large variety and sizes of conveyors can be created.

To maximize efficiency of part conveyance in the CIM system, pallets are not removed from the conveyor. Instead, the pallets carry part templates (holders) that are loaded and unloaded at each station by robots and manipulators. The pallets are thus free to transport parts and materials to and from any CIM station. Magnetic codes embedded on the underside of the pallets enable tracking.

### Design and construction:

- Minimum conveyor dimensions: 1.40 m x 3.44 m [55" x 135"] = approx. 10 m total length.
- Maximum conveyor total length: 25 m.
- Maximum conveyor turns: 6
- Conveyor rails constructed of extruded, black anodized aluminum, with continuous slots for mounting additional hardware
- Conveyor driven by a single 220/380 VAC Motor, 3-phase, 0.25kv/0.325 hp
- Start/stop control disconnects power to the drive motor, with safety overload breaker and adjustable sensitivity.
- Conveyor stations (pallet-stop devices; see #021136): assemblies for stopping part/template carrying pallets; each station is a self-contained module, including electrical and air connectors and integrated pallet tracking system.

### Safety

- Conveyor system is certified for CE safety compliance.

Station Type	Bundle
Conveyor size: 2040mm x 1400mm	CNV-2040x1400
Conveyor size: 3440mm x 1400mm	CNV-3440x1400
Conveyor size: 4840mm x 1400mm	CNV-4840x1400
Conveyor size: 6240mm x 700mm	CNV-6240x700
Other conveyor sizes and also L-shaped are available on demand.	On demand

## Programmable Logic Controller (PLC) Station

The PLC (Programmable Logic Controller) can control and monitor the flow of pallets on the conveyor with the help of sensors and actuators that are built into the stop stations. Various PLC types (Siemens, Omron, Allen-Bradley) and field bus systems (digital I/O, PROFIBUS, ASI bus) are supported.

To achieve a proper pallet tracking function the following additional products are required:

- Closed Loop Conveyor to mount the stop stations and carry the pallets.
- Conveyor stops alongside each CIM workstation include magnetic sensors for pallet detection and pneumatic pistons for halting and releasing the pallets.

### Design and construction:

- PLC cabinet includes industrial PLC unit (OMRON)
- Hardware system for monitoring and managing the flow of pallets on the conveyor
- I/Os configured for up to 5 Stop Stations.
- Pre-programmed for real-time identification and tracking of pallets

Station Type	Bundle
Allen-Bradley (AB) SLC500 PLC & Cabinet (max. 5 Stations)	PLC-AB-5ST
Omron PLC & Cabinet (max. 5 Stations)	PLC-OMRON-7ST
Siemens S7-300 PLC & Cabinet (max. 5 Stations)	PLC-SIEMENS-5ST
Allen-Bradley (AB) SLC500 PLC & Cabinet (max. 8 Stations)	PLC-AB-8ST
Omron PLC & Cabinet (max. 8 Stations) CQM1	PLC-OMRON-8ST
Siemens S7-300 PLC & Cabinet (max. 8 Stations)	PLC-SIEMENS-8ST
Siemens S7-300 PLC & Cabinet (ASI BUS)	PLC-SIEMENS-ASI
Siemens S7-300 PLC & Cabinet (PROFIBUS)	PLC-SIEMENS-PRO

# Pallet Tracking Station

The stop station allows the PLC to control and monitor the flow of pallets on the conveyor with the help of sensors and actuators that are built into the stop stations. Stop stations for various PLC types (Siemens, Omron, Allen-Bradley) and field bus systems (digital I/O, PROFIBUS, ASI bus) are supported.

To achieve a proper pallet tracking function the following additional products are required:

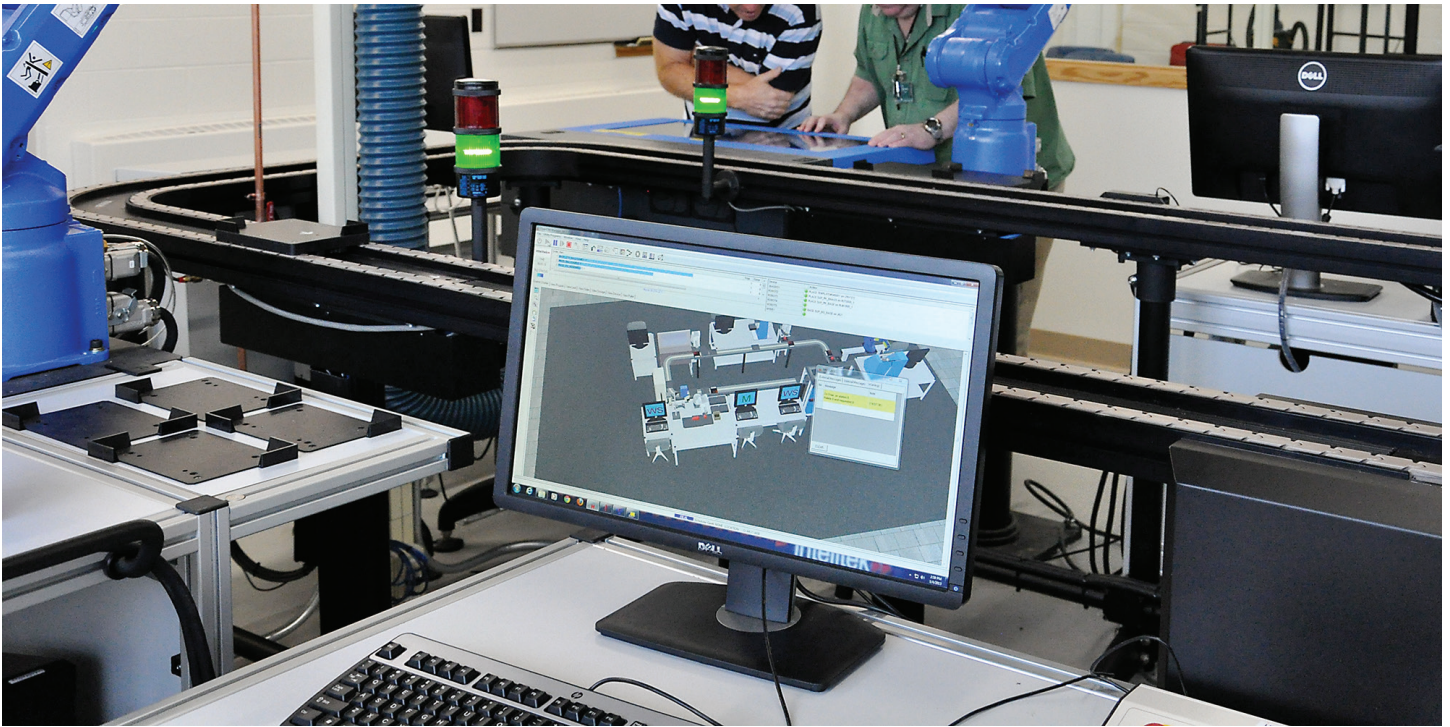
- Closed Loop Conveyor to mount the stop stations and carry the pallets.
- A PLC control unit monitors and manages the flow of pallets on the CIM conveyor.

### Design and construction:

- Stop Station box with integrated sensors and actuators
- Station Light
- Wiring to PLC



Station Type	Bundle
Allen-Bradley SLC500 (12m cable)	PLTR-AB-12M
Allen-Bradley SLC500 (15m cable)	PLTR-AB-15M
Allen-Bradley SLC500 (6m cable)	PLTR-AB-6M
Allen-Bradley SLC500 (9m cable)	PLTR-AB-9M
OMRON CQM1 (12m cable)	PLTR-OMRON-12M
OMRON CQM1 (15m cable)	PLTR-OMRON-15M
OMRON CQM1 (6m cable)	PLTR-OMRON-6M
OMRON CQM1 (9m cable)	PLTR-OMRON-9M
SIEMENS S7-300 (12m cable)	PLTR-SIEMENS-12M
SIEMENS S7-300 (15m cable)	PLTR-SIEMENS-15M
SIEMENS S7-300 (6m cable)	PLTR-SIEMENS-6M
SIEMENS S7-300 (9m cable)	PLTR-SIEMENS-9M
SIEMENS S7-300 ASI BUS	PLTR-SIEMENS-ASI
SIEMENS S7-ET200L PROFIBUS Terminal Module (for up to 3 stop stations)	PLTR-S7-ET200L
SIEMENS S7-300 PROFIBUS (requires 1 ET200L per 3 stop stations)	PLTR-SIEMENS-PRO

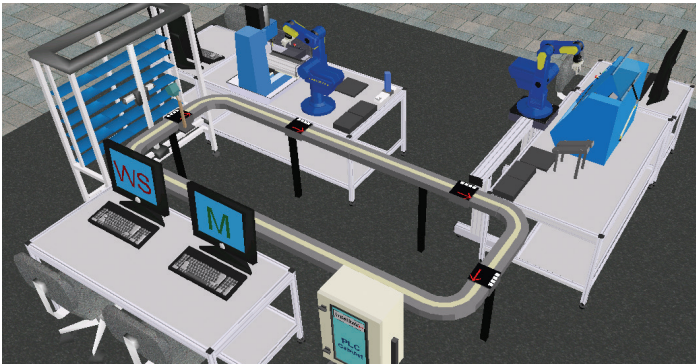


## Management Station

OpenCIM/OpenCIM Offline and OpenFMS software provides a comprehensive solution for the study and practice of CIM/FMS methods and operations.

OpenCIM/FMS incorporates the latest advancements in CIM, FMS and software technologies:

- OpenCIM/FMS is an enterprise resource planning (ERP) tool. It combines a number of CIM cell and station management modules: MRP for defining parts, machines and processes, customer, purchase and production orders; inventory control and tracking; scheduling and dispatching; report generation.



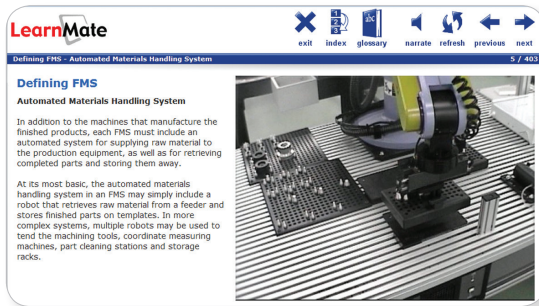
- OpenCIM/FMS implements manufacturing execution system (MES) technology. It integrates real-time information with the system's PC-based database, and maintains online communication with all subsystems through a LAN, a lab network or the Internet.
- OpenCIM/FMS includes a 3D solid model graphic display module that dynamically and accurately simulates the CIM/FMS components and processes. It provides both online graphic tracking of the manufacturing processes and off-line simulation that allows students to test procedures before executing an actual production run. Students can also design virtual CIM cells and experiment with CIM and work cell configurations that are not actually available in the CIM lab.
- OpenCIM Web viewer enables access to CIM manager via the Internet and allows users to monitor CIM/FMS cell operations in real time from remote locations. Using internet browsers, users can view real-time reports generated by the CIM manager, remotely track live production cycles in the 3D graphic display, and view details of current CIM/FMS cell status.
- OpenCIM/FMS open architecture enables the integration of various hardware and software components, making it easy to expand and customize the CIM/FMS system.

Station Type	Bundle
Management Station	CIM-MANAGER-ST

# Course List

## Computer-Integrated Manufacturing (CIM) 1

Computer Integrated Manufacturing (CIM) introduces the basic concepts and procedures of CIM production as well as the main components and devices in a CIM cell. Using OpenCIM Software with a fully simulated industrial CIM, students learn about all the aspects of a CIM production cycle, from customer order and inventory control, through automated manufacturing of materials into finished parts, to quality inspection and final delivery.

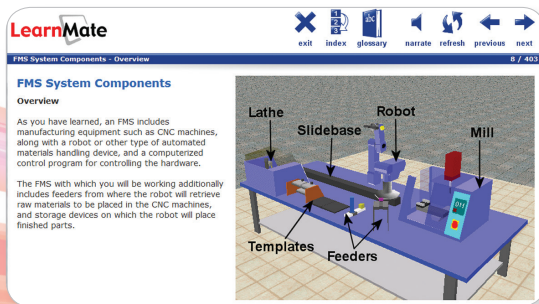


### Course Outline

- Introduction to CIM
- Introducing OpenCIM Software
- Parts and Production Flow
- Storage Setup
- Production Planning
- Processes and Machine Definition
- Part Definition
- Defining a Product Part
- Producing a New Part
- Timing and Optimization
- Viewing Production Details in the Device View
- Viewing Production Details in the Storage View
- Defining Part Production in the Lathe
- Integrated Production
- Tracking Integrated Production

## Flexible Manufacturing Systems (FMS)

The Flexible Manufacturing System (FMS) course exposes students to automation and industrial applications by combining CNC technology with robotics and materials handling. Students develop and edit programs, record precise robotic positions, accurately mill parts, and synchronize mill and robot operation. Students gain "virtual hands-on" experience in CNC and robot programming, especially in I/O commands.



## Computer-Integrated Manufacturing (CIM) 2

CIM 2 builds on the basic concepts covered in CIM 1. Students design, set up and operate CIM cells and learn about mass production, robotic systems, location planning, QC devices, part feeding, assembly, purchase orders, MRP and CIM databases.



### Course Outline

- Mass Production and CIM
- Robotic Systems
- Location Planning
- QC Devices
- Feeders
- Adding an Assembly Station
- Assembled Part Production
- Assembled Product Characteristics
- Expanding Assembly Capabilities
- Sub-assemblies and Multi-Level Assembly
- Purchase Orders and MRP
- Multi-Level Assembly Production
- CIM Database: Part I
- CIM Database: Part II

### Course Outline

- CNC Machining
- RoboCell Simulation and Control Software
- Designing an FMS Workcell
- Expanding the Workcell
- Writing a Program
- Programming Mill Operations
- Conditional Programming
- Storing Finished Parts
- Multiple Part Programming
- Lathe Operations
- Multiple Part Lathe Operations
- Program Integration
- Designing the Final Project
- Running the Final Project

## Related Courses

Course	For additional information see
<b>Robotics</b>	
Fundamentals of Robotics for SCORBOT-ER 4u	Robotics Concepts & Programming data sheet.
Fundamentals of Robotics for SCORBOT-ER 9Pro	
Advanced Robotics Programming with SCORBOT-ER 4u	
Advanced Robotics Programming with SCORBOT-ER 9	
<b>CNC Turning and Milling</b>	
CNC Milling Technology with BenchMill 6000	CNC Milling Technology with BenchMill 6000 data sheet.
CNC Milling Technology with ProMill 8000	CNC Milling Technology with ProMill 8000 data sheet.
CNC Turning Technology with BenchTurn 7000	CNC Turning Technology with BenchTurn 7000 data sheet.
CNC Turning Technology with ProTurn 9000	CNC Turning Technology with ProTurn 9000 data sheet.
<b>Computer-Aided Design (CAD)</b>	
Computer-Aided Manufacturing with SpectraCAM Milling	spectraCAM & spectraCAD Engraver data sheet.
Computer-Aided Manufacturing with SpectraCAM Turning	
Computer-Aided Drafting with SpectraCAD Engraving	
<b>Quality Control</b>	
Machine Vision & Quality Control	Vision Technology data sheet.
Exploring Machine Vision & Quality Control	

## Ordering Information

### Hardware

CNC BenchMill 6000	
110V	005505-110
220V	005505-220
CNC ProMill 8000 AC	
110V	005507-110
220V	005507-220
CNC ProMill 8000AC-S with Siemens control	
110V	005508-110
220V	005508-220
ProMill 8000 AC with 12 Tool ATC	
110V	005509-110
220V	005509-220
CNC BenchTurn 7000	
110V	005504-110
220V	005504-220
CNC ProTurn 9000 AC	
110V	005501-110
220V	005501-220
ProTurn 9000 AC-S with Siemens control	
110V	005503-110
220V	005503-220
SCORBOT-ER 4u Robotic Arm	000413
SCORBOT-ER 9Pro Robotic Arm	000430
SCORA-ER 14Pro Robotic Arm	000432
Motoman MH5F Robotic Arm	000436

### Software

OpenCIM/FMS	700013
OpenFMS	700014

### Curriculum

Computer-Integrated Manufacturing (CIM) 1, LearnMate course	17-3015-0000
Computer-Integrated Manufacturing (CIM) 2, LearnMate course	17-3016-0000
Flexible Manufacturing Systems (FMS), LearnMate course	17-3022-0000

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