

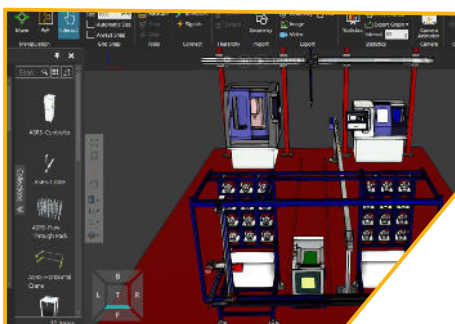
CIM & FMS

COMPUTER INTEGRATED MANUFACTURING SYSTEM &
FLEXIBLE MANUFACTURING SYSTEM

HYTECH

Since 1992

www.hytechautomation.in



Hytech CIM / FMS systems are equipped with industrial automation components. All of the control software used in the system are industrial open ended software which give user an additional advantage of adding additional equipment / stations in future. Entire system is industrial SCADA based system which gives freedom as well as necessary confidence about the effective use and operation in the long run. Our CIM / FMS systems are specifically designed for educational use to encourage students to make full use of each and every component as well as software without any fear. In case if something goes wrong, industrial SCADA can restore the system to factory settings within few seconds. The system is designed to provide hands on experience and not just to showcase the operation.

CIM & FMS



CCU STATION

This is a central control station from where operator can control entire system in individual mode as well as in integrated mode. Workstation with dual monitors is provided with ergonomic design. Hardware operation panel is also mounted on the CCU for effective operation control. Teach pendants for Industrial robot, handheld operation unit for ASRS and Gantry are also connected to CCU with RJ 45 connection ports. Central PLC which communicates with all machines is also mounted in CCU control panel.

SOFTWARE PACKAGE

User can select from the various software packages which can be integrated with CIM / FMS systems.

SCADA: Entire system is designed as well as controlled from Industrial SCADA with unlimited tags (WinCC Advance)

Layout Planning and Optimisation (Factory Simulation): This is a dynamic 3D process simulation software where students can design various CIM / FMS layouts as well as simulate the entire process with more than 3000 industrial automation related components such as gantries, robots, AGVs already present in the library.

OPC UA Server: With OPC UA connectivity, entire process can be dynamically simulated on factory simulation software. Students can effectively find out the actual process variants and determine the bottlenecks in the system

Industry 4.0 / IIOT: With this latest industrial technique, user can select the process parameters that will be stored in the dedicated cloud server which can be accessed from anywhere in the world. Students can also select the process parameters which will be conveyed immediately by Email as well as SMS.



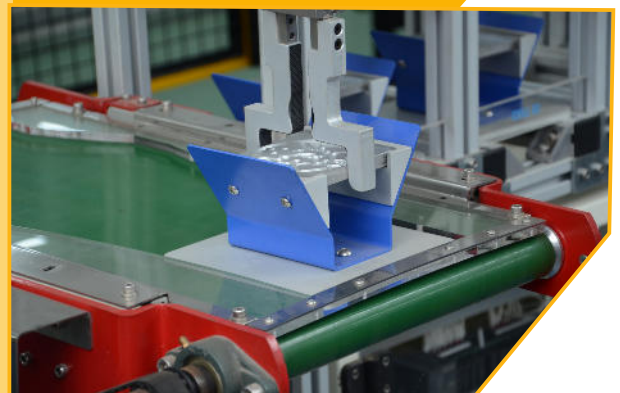
AUTOMATIC STORAGE AND RETRIEVAL SYSTEM (ASRS)

ASRS is a floor mounted storage and retrieval station specifically designed for educational use. It is equipped with a three axes Cartesian robot and pneumatically actuated end effector. ASRS picks up a job pallet from the ASRS and drops it on a transfer station and vice versa.

ASRS is directly controlled from a handheld HMI based unit where coordinated of cells can be set as well as different cycles can be performed.

TRANSFER STATIONS

There are two transfer stations (Conveyors) mounted on each side of the ASRS. Elevation of each station can be modified if desired. With changed elevation, different programs of ASRS as well as Industrial robots can be performed by the students. Transfer stations can be directly controlled by handheld HMI unit or from Central control unit.



MATERIAL TRANSFER

In our CIM / FMS Systems, different types of material transfer mechanisms can be used for the transfer of work pieces from ASRS to Machining Stations and then back to ASRS.

User can select different types of system for better understanding of advantages and disadvantages of various systems. Depending on the user requirement, layout can be designed with various types of material transfer systems.

AUTOMATED GUIDED VEHICLE (AGV)

AGV is an optional package which can be integrated with CIM / FMS systems. AGV is operated with a magnetic sensor based controller and magnetic strips which can be easily pasted on the floor. This gives as additional advantage of changing the path of AGV easily. With a dedicated transfer station mounted on the top of AGV, job fixtures can be transferred from transfer stations to AGV and vice versa. AGV can be directly controlled from an HMI mounted on it or from Central control unit.



6 AXES INDUSTRIAL ROBOT

6 Axes industrial robot can be used either individually for each machine loading operation or can be mounted on a gantry with 7th axis configuration. Industrial robot mounted on a horizontal gantry can have a total travel reach of 7 meter. It provides hands on experience to users on PLC – SCADA – Robot integration.



HORIZONTAL GANTRY FOR INDUSTRIAL ROBOT

This gantry is specifically used for 6 axes industrial robot. This gantry is mounted on the floor on which industrial robot can travel. Travel span of this gantry can be up to 4 meter. Industrial robot with horizontal gantry can be used for machine tending applications for number of machining stations.



TRANSFER CONVEYOR

Transfer conveyor can take any shape depending on the user layout requirement. This conveyor starts at ASRS station and terminates at machine tending stations. Transfer conveyor is equipped with flex belt which provides necessary flexibility in the desired conveyor shape



MACHINE LOADING GANTRY

Machine loading gantry can be used for loading / unloading of join individual machines or it can be used as a common gantry for number of machines. This industrial gantry equipped with linear motion guide ways and Servo Motors picks up the raw jobs from machine tending stations loads them into machining stations as well as unloads finished jobs from machining station and drops them back into machine tending stations.



MACHINING CENTERS

Hytech CIM / FMS system is equipped with Semiproduction CNC machines with latest industrial CNC controllers (Fanuc / Siemens). CNC machining centers along with vision inspection station as well as Assembly station are integrated with SCADA and Industry 4.0.

Entire CNC Machining process, Assembly process as well as vision inspection process can be controlled through SCADA along with Program selection as well as Data Storage.



CNC Turning Center

CNC Turning center is a semiproduction CNC Turning machine equipped with latest industrial controllers (Absolute) from Fanuc / Siemens. User can get the hands on experience on the exact CNC machines which are being used in the industry and not on a prototype. Material such as Aluminum, MS, etc can be machined on this CNC Turning center.

CNC Turning Machine is equipped with necessary CIM / FMS accessories such as Auto Door, Hydraulic / Pneumatic powerchuck, OPC – UA server etc. Basic FMS / CIM relates functions such as Door open / Close, Program Selection, Program Start / STOP, Chuck activation, etc can be performed directly from Central Control Unit.

CNC Milling Center (Vertical Machining)

CNC Milling center is a semiproduction CNC Milling machine equipped with latest industrial controllers (Absolute) from Fanuc / Siemens. User can get the hands on experience on the exact CNC machines which are being used in the industry and not on a prototype. Material such as Aluminum, MS, etc can be machined on this CNC Milling center.

CNC Milling Machine is equipped with necessary CIM / FMS accessories such as Auto Door, Pneumatic Vice, OPC – UA server etc.

Basic FMS / CIM relates functions such as Door open / Close, Program Selection, Program Start / STOP, Chuck activation, etc can be performed directly from Central Control Unit.

Assembly Station

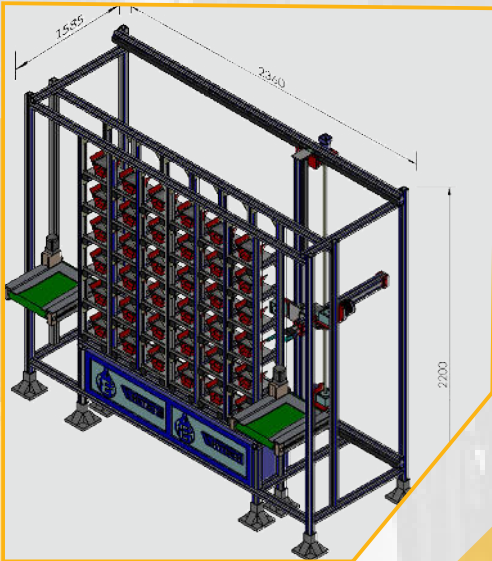
This is a pneumatically actuated individual station. Assembly of manufactured items can be carried out in this station. Assembled parts are again transported back to the ASRS station or are processed in a Vision Inspection Station. Optional arrangement of barcode printer can be integrated with Assembly station which assigns UIN (Unique Identification Number) to Assembled parts for industry 4.0 / IIOT related applications.

Vision Inspection Station

This is an individual station which is integrated with CCU as well as Industry 4.0 / IIOT. 2D / 3D vision sensor can store the vision data of machined parts or assembled parts and the same can be recorded with the help of Industry 4.0 / IIOT applications. This station is integrated as well as controlled through SCADA.



AUTOMATIC STORAGE & RETRIEVAL SYSTEM

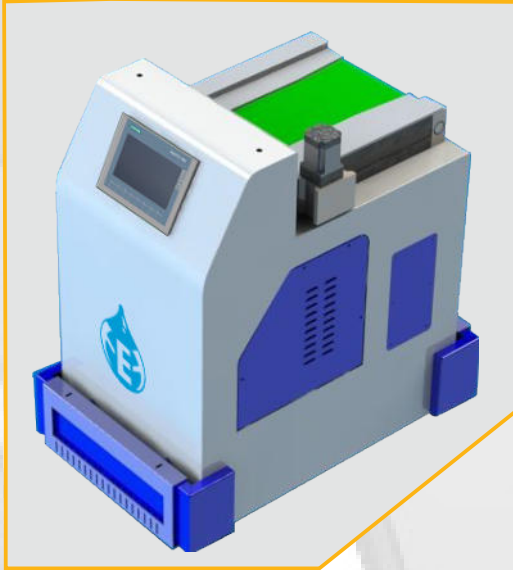


ASRS is a floor mounted storage and retrieval station specifically designed for educational use. It is equipped with a three axes Cartesian robot and pneumatically actuated end effector. ASRS picks up a job pallet from the ASRS and drops it on a transfer station and vice versa. ASRS is directly controlled from a handheld HMI based unit where coordinated of cells can be set as well as different cycles can be performed. All axes of ASRS station are controlled with digital servo motors with feedback. Accuracy of 10 micron can be achieved in each axis. Each axis is equipped with dual linear motion guideways as well as in line planetary gear box. ASRS is an open system which can be easily connected with any CIM / AGV systems. Any system with SCADA interface can be communicated with Hytech ASRS. ASRS is equipped with dual transfer stations on each side of ASRS, elevation of which can be adjusted as per user requirement. Transfer stations are used for the transfer of job fixtures from material movement equipment such as AGV / Robotic arm, gantry etc. In case of individual use of ASRS, various pick and drop cycles can be executed in ASRS with the help of dedicated HMI based handheld unit. In individual mode, cycle completion signal as well as cycle initiation signal can be interfaced with any supervisory system with ease which makes it very easy to integrate with existing CIM systems or for future expansion.

Automatic storage and Retrieval System	
No of Cells	36
No of Rows	6
No of Columns	6
Cell Size	200mm x 200mm x 200mm
Accuracy	0.010mm
Repetability	0.015mm
X Axis Travel: 2,000mm	2000mm active travel
Linear Motion Rails for X Axis, Qty: 02	25mm size, 3 meter x 2
Linear Motion Blocks for X Axis, Qty: 04	25mm size x 4
Servo Motor for X Axis	750 Watt- 2.39 Nm
Y Axis Travel: 800mm	800mm active travel
Linear Motion Rails for Y Axis, Qty: 02	25mm size, 1.5 meter x 2
Linear Motion Blocks for Y Axis, Qty: 04	25mm size x 4
Servo Motor for Y Axis	750 Watt- 2.39 Nm
Z Axis Travel: 1,500mm	1500mm active travel
Linear Motion Rails for Z Axis, Qty: 02	25mm size, 1.8 meter x 2
Linear Motion Blocks for Z Axis, Qty: 04	25mm size x 4
Servo Motor for Z Axis	750 Watt- 2.39 Nm with Brake
Pneumatic Gripper for ASRS	32mm Cylinder with 10 KG holding capacity at 7 Bar air pressure
Pneumatic FRL Unit	1/4 inch
Pneumatic Air Gun	1/4 inch

Handheld Unit for ASRS Operation	
HMI for handheld unit	Siemens KTP 700
Profinet cable	Siemens- 7 meter, CAT 6
Power Cable	7 meter with IP68 connector
Protection	Casing in Stainless steel with holding arrangement
ASRS Control	
PLC for ASRS Operation	S7 1200- 1215C with dual profinet 14 DI / 10 DQ 2 AI / 2 AQ
Additional I/O Module	16DI / 16DO
Stabiliser for ASRS	3 KVA- Servo
Power Supply	230V- Single Phase OR 415V, Three Phase
Cell Coordinate Setting	Through HMI
Operation Modes	Individual / CIM (Integrated Mode)
Transfer Stations	
No of transfer stations	2
Length of each transfer station	500mm
With of each transfer station	250mm
Transfer station operation control	Through ASRS PLC
Software Package	
PLC and HMI operation software	Siemens TIA (Basic) Perpetual License (STEP 7 Basic V15 Floating License)
3D design and simulation software	Online process simulation with OPC UA server
SCADA for CIM / AGV integration	Siemens WinCC Advance

MAGNETIC STRIP GUIDED AUTOMATED GUIDED VEHICLE



Magnetic Strip / Line following is the simplest and most reliable guiding techniques for AGVs. Magnetic guide sensors used in Hytech AGVs report the exact position of magnetic track on the floor. Brushless high power dual channel DC motor controller control the complete navigation of Hytech AGV.

Compared to other guiding techniques, magnetic strips / lines are totally passive and therefore easy to lay and modify. The tape creates an invisible field that is immune to dirt and unaffected by lighting conditions. There is no need to dig the floor. Magnetic strips can be very easily pasted on the surface and can be protected with the protective film which is similar to a sellotape.

The magnetic strip is completely immune to dirt and the path can be easily modified by re-pasting the magnetic strips. Unlike color guided AGVs, user does not need to worry about the dirt or repainting the tracks for efficient operation of 'Hytech AGV'.

'Hytech AGV' is controlled with Siemens PLC and HMI. It can be very easily integrated with any existing CIM / ASRS setups. It has an open interface which makes it easier to communicate it with any of the supervisory controls.

All necessary accessories for effective operation of AGV including its operation in circular path are provided along with it.

Touch screen HMI mounted in the front of AGV provides options of individual operation as well as integrated operation with supervisory control. AGV can be operated to perform various operations in 'JOG' mode by the user or directly from the Central Control Unit with WiFi communication.

Exact position of the AGV can be determined as well as represented on HYTECH CIM – Design and Simulation software.

Magnetic Strip Guided Automated Guided Vehicle	
Sensor for Guidance	Magnetic track sensor with 3-axis Gyroscope
Path Tracing	Magnetic Strip Tracing
Magnetic Strip Application	Directly on floor with protective tape
Load Carrying Capacity	30 KGs
Minimum turning radius	700mm
Drive	Magnetic sensor guided DC Drive Brushed DC Motor Controller, Dual Channel
Maximum Travel Speed	30 m/min
Accuracy	15mm
Obstacle Sensing	Front- Up to 300mm
Transfer Station	
Transfer Station Location	Mounted on top of AGV for material transfer
Transfer Station size	300mm x 350mm
Transfer Station Operation	Stepper Motor / DC Motor
Control	
Operation Control	Siemens S7 1200 PLC
User Operation	Siemens HMI
Communication	WiFi
Accessories	
Emergency Stop	
Battery Status Indicator	
Voltage Indicator (Digital)	
Battery Charging Dock with Isolation	
Tower lamp with buzzer	
Obstacle sensor for port and starboard sides (Optional)	
Magnetic Tape roll (45m) long by (50mm) wide	
Magnetic Tape segment for use as Markers (2.54cm x 1.1mm x 30.5 cm)	
Line Protective Tape Roll (45m) long by (75mm) wide	



MACHINING CENTERS



Hytech CIM / FMS systems are equipped with semi production CNC machines which can be used individually for CNC training purpose. CNC turning as well as CNC Milling centers can be used to cut mild steel as well as Aluminum.

Automatic tool changers and industrial absolute CNC controllers from Siemens / Fanuc provide necessary hands on experience for CNC learning. Linear motion guideways as well as C3 class ball screws make sure that necessary accuracy can be achieved in both machining centers.



CNC Mill Machine, Model: SPM 250	
Description	Specifications
Axis Motor and Drive	Servo Motor with Servo Drive
X / Y / Z Axes	300 / 225 / 250 mm
Guideways	Linear Motion Guideways
Feed Rate	0 to 5,000 mm/min
Rapid Travel	5,000 mm/min
Table Size	600 x 160mm
Load On Table	120 Kg
Spindle Motor Capacity	3HP
Motor Type	AC Motor with VFD
Spindle Nose Taper	BT 30
Spindle RPM	100 to 3000 RPM
Controller	Siemens 828D / Fanuc 0iMF
Controller Type	Absolute
Positioning / Repeatability	0.005 mm / +/- 0.010 mm
Resolution	0.001 mm
Tool Changer	Automatic- 8 Station
Lubrication / Coolant	Automatic
Dimension in mm	1600mm x 1420mm x 1850mm
Power Supply	415V, +-2% 50 Cycles, 3 Phase
Machining Capacity	MS, Aluminum, Acrylic, etc
Vice	Pneumatic
Approximate Weight	1350 KG
Door	Auto Door

CNC Lathe Machine, Model: HPL 100	
Description	Offered Specifications
Bed Type	45 Degree Slant
Guideways	Linear Motion Guideways
Chuck Size	135mm (Dia)- Hydraulic / Pneumatic power chuck
Maximum Turning Diameter / Length	52mm / 250mm
Center Height	160mm
Controller	Siemens 828D / Fanuc 0iMF
Controller Type	Absolute
Positioning / Repeatability	0.005 mm / +/- 0.010 mm
Spindle Motor Capacity	3HP
Spindle RPM	100 to 3000 RPM with VFD
Spindle Nose Taper	MT 3
Hole Through Spindle	22mm
Axis Motor and Drive	Servo Motor with Servo Drives
X / Z Axes	120 / 280 mm
Feed Rate	0 to 5,000 mm/min
Rapid Travel	5,000 mm/min
Turret Type	Automatic- 8 Station
Tool Cross Section	16 mm x 16 mm
Lubrication / Coolant	Automatic
Dimension in mm	1700mm x 1320mm x 1550mm
Power Supply	415V, +-2% 50 Cycles, 3 Phase
Machining Capacity	MS, Aluminum, Acrylic, etc
Approximate Weight	1100 KG
Door	Auto Door

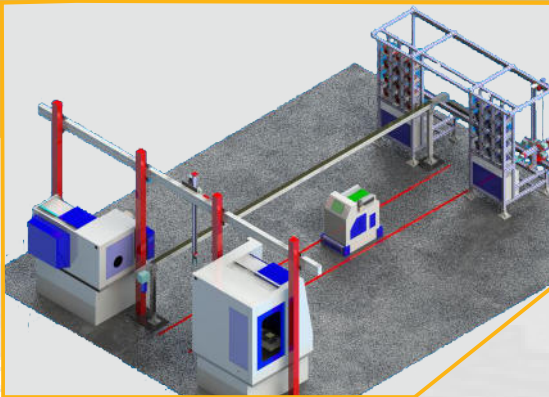
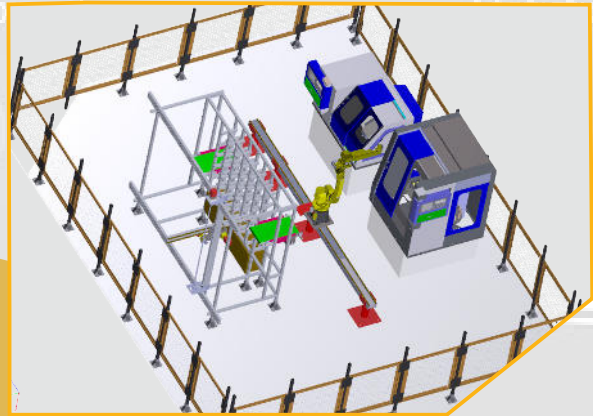
CIM / FMS OPTIONS

'Hytech CIM / FMS' can come in various options depending on user requirements. Users can select various combinations depending upon their requirement. Layouts can be modified to suit the space available as well as to accommodate the required systems.

There are two standard layouts which are as follows:

LAYOUT 1 WHICH CONSISTS OF FOLLOWING SYSTEMS

1. Automatic Storage and Retrieval System (ASRS-36)
2. Software Package
3. Central Control Unit
4. 6 axes Industrial Robot
5. Horizontal gantry for industrial robot
6. CNC Turning Centre
7. CNC Vertical Machining Centre

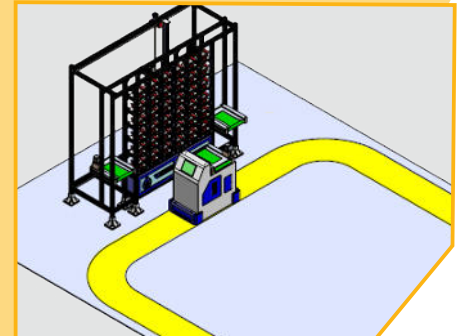
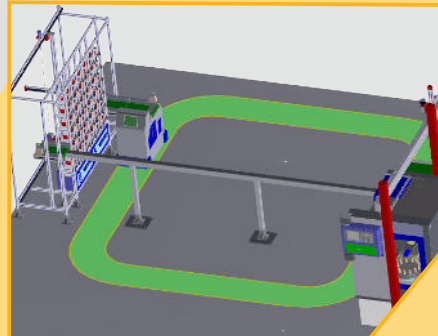


LAYOUT 2 WHICH CONSISTS OF FOLLOWING SYSTEMS

1. Automatic Storage and Retrieval System (ASRS-36)
2. Software Package
3. Central Control Unit
4. Magnetic Strip Guided Automated Guided Vehicle (AGV)
5. Transfer Conveyor:
6. Machine Loading Gantry:
7. CNC Turning Centre
8. CNC Vertical Machining Centre

Few of the custom made layouts include AGV as well as 6 axes industrial robot working in integration with each other providing hands on experience on both latest material handling systems.

Users can also start with basic layout of ASRS and AGV with SCADA based integration which can later be upgraded to fully fledged CIM / FMS Systems.



Software Package	Operating Station	Storage System	Material Movement System	Machine Loading / Unloading System	Machining Stations	Post Processing Stations
Industrial SCADA	Handheld Operation unit _ HMI based	ASRS - 36	Automated Guided Vehicle	Gantry with transfer station	CNC Turning Centre	Assembly Station
PLC and HMI software	Central control unit with workstation, dual monitors and hardware based operating panel		Industrial 6 Axes Robot with horizontal Gantry	Direct loading with Industrial 6 Axes Robot and gantry	CNC Vertical Machining Centre	Vision Inspection Station
OPC - UA Server			Flex Conveyor			
3D design and online process simulation software						
Industry 4.0						