MODULAR PRODUCTION SYSTEM

HYTECH
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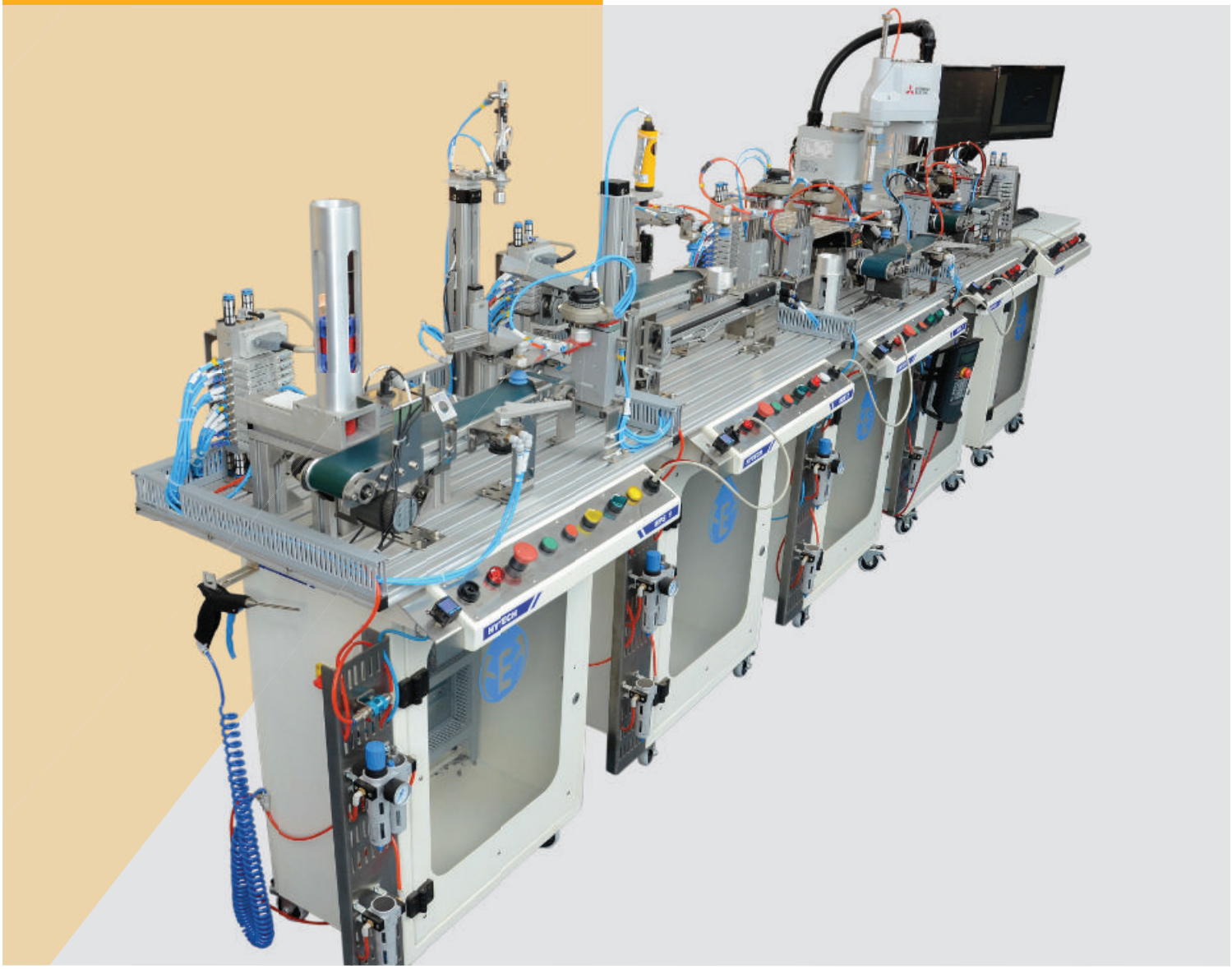
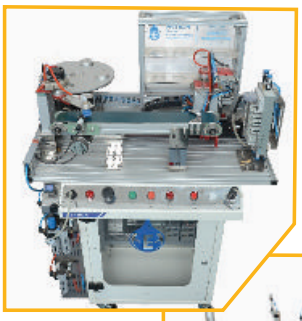




Hytech Modular Production Systems (MPS) are designed to provide hands on experience to participants on latest industrial automation practices as well as technology.

Hytech MPS stations are equipped with PLC and SCADA Connectivity. Entire process is dynamically simulated in 3D with OPC UA server giving necessary exposure to participants on factory design and simulation. Entire system is equipped with industry 4.0 connectivity.

MODULAR PRODUCTION SYSTEM WITH INDUSTRY 4.0 / IIOT

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 SCARA robot, handheld operation unit with HMI for operation 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

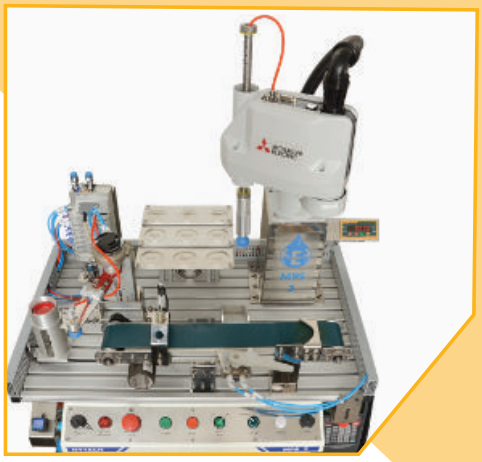
User can select from the various software packages which can be integrated with Modular Production systems.

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 MPS 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. Participants can also import various pneumatic components' 3D files in this software to simulate the process.

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.



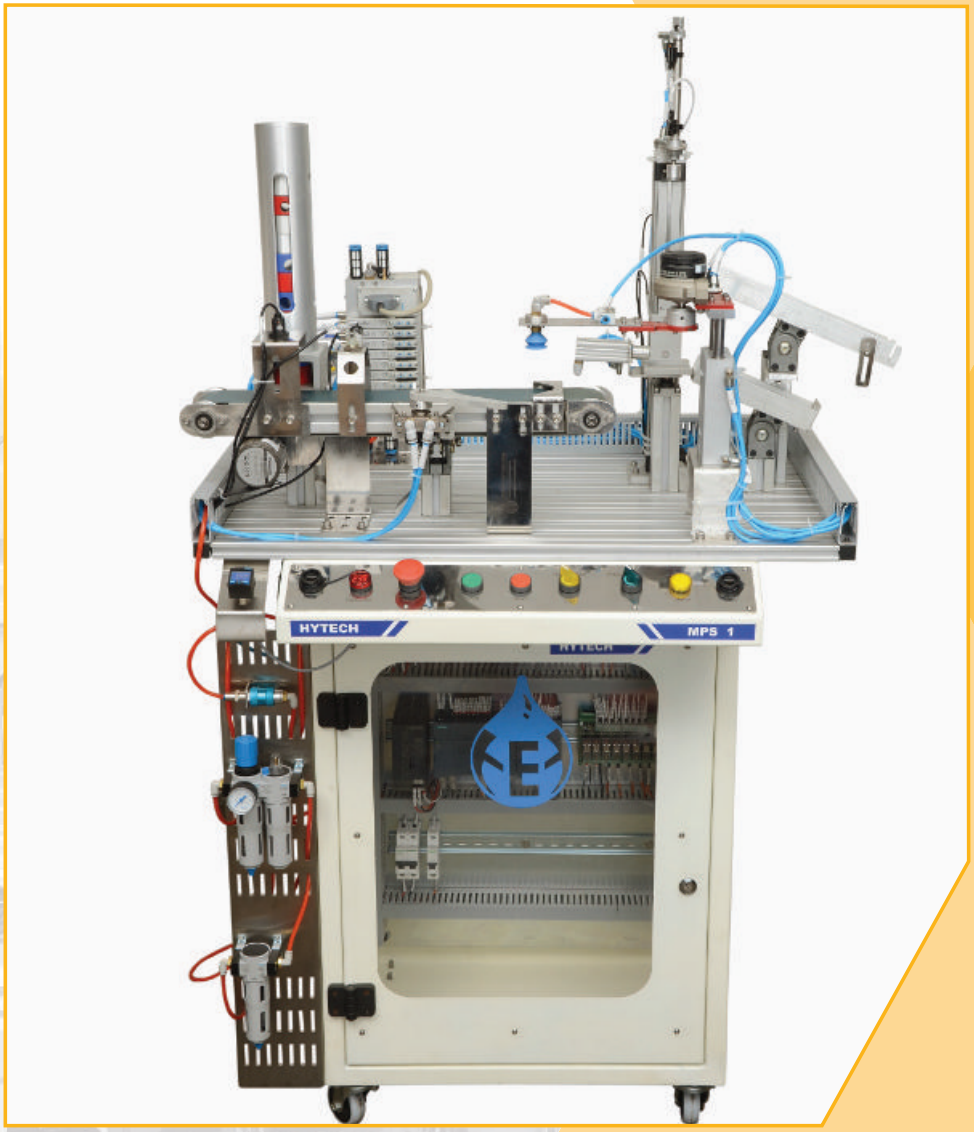
INDUSTRIAL SCARA ROBOT

Hytech Modular production System is equipped with Industrial SCARA robot in MPS station 3. User can operate this station in individual mode to gets hands on training on Industrial SCARA, SCARA integration with PLC and SCARA operation through SCADA. Various experiments such as pick and place, palletizing, sorting, etc. can be carried out in individual mode.

AIR TREATMENT UNIT

Each Hytech MPS Station is equipped with air treatment unit. This enables users to operate each station individually. Air treatment unit consists of 3/2 way hand slide valve, air filter (5 micron), Digital pressure switch, FRL unit and air gun with spiral PU tube.

MPS 1: MATERIAL BASED SORTING WITH HEIGHT SENSING APPLICATION



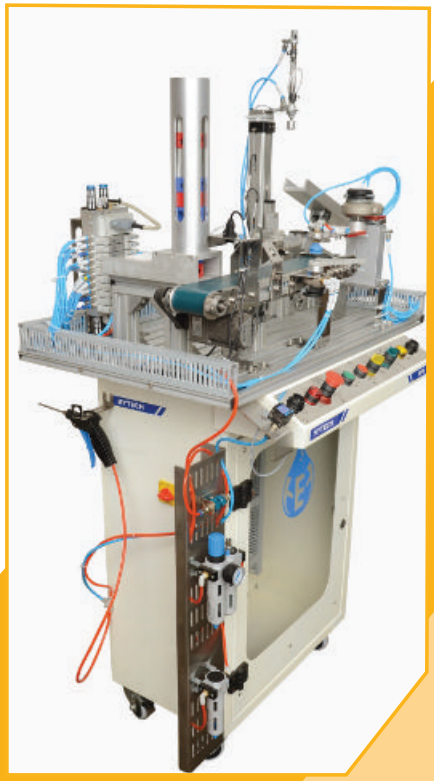
This is the first station of Hytech MPS system which is equipped with automatic loading tube. It can be connected to MPS 2.

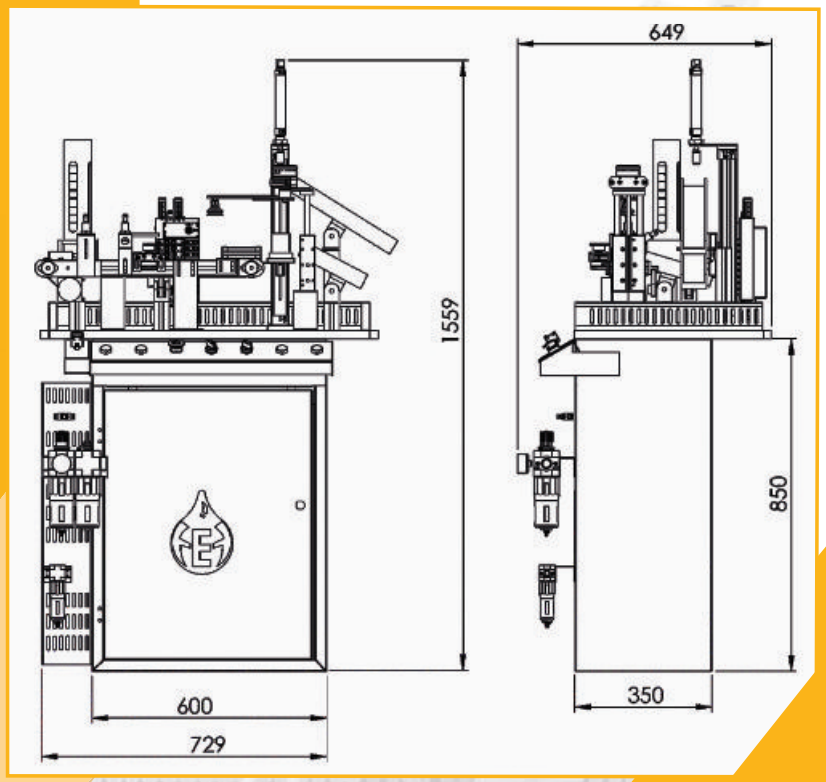
Basic operational concept of this MPS is material based sorting along with Height sensing application. There are two separate provisions for rejections in this MPS. First rejection arrangement is mounted on the conveyor. Participants can select the job based on material (MS / SS / PU) to process further.

Height based sensing is again a rejection mechanism. Students can select the height of the job which will be processed to next station. In case if there is no MPS 2, participants can sort the jobs based on their heights.

What can be achieved with MPS 1:

1. Material based sensing
2. Height based sensing
3. Acceptance and rejection based on user preference
4. Introduction to rotary pick and place unit
5. Operation of auto loader
6. Operation of rod less cylinder

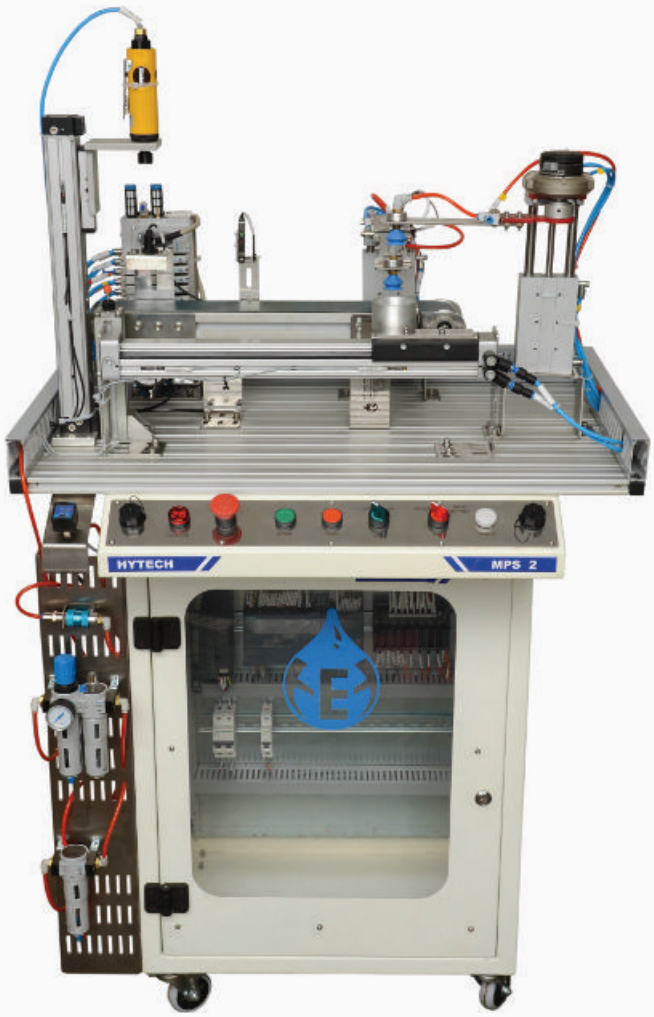




Sr No	Description
1	Auto Loader Tube 55mm ID
2	Push Cylinder, Guided
3	Sensor Mounting Bracket (Conveyor) M18 x 2
	M18 Capacitive Sensor
	M18 Inductive Sensor
4	Height Sensing Unit
	Square Cylinder 12 x 100
5	Conveyor 70 x 500mm
6	Rotary Rejection Module
	Rotary Vane Motor
	Rejection Slide
7	Stopper Cylinder, Guided
8	Rotary transfer station
	Guided Cylinder 20X100
	Vane Motor
	VACUUM Generator
	Suction Cup

Sr No	Description
9	Vertical transfer station
	Rodless Cylinder, 25 x 250
	Mounting Plate for 40mm workpiece
	Push Cylinder
10	Rejection Push Cylinder
	Rejection Push Cylinder
11	Connecting Slide
12	Solenoid Valve Bank, 10 5/2 DA Solenoid Valves, 1/4
13	Digital Pressure Switch
14	5 Micron Air Filter
15	FRL UNIT
16	Control Panel with Hardware based Operation Module
17	Mounting plate of 22.5 mm thick aluminum extrusions with working dimensions of 820 x 540mm
18	Siemens S7 1200 PLC (S7 1215C)
19	HMI Connection Port

MPS 2: COLOR BASED SORTING WITH PNEUMATIC DRILLING APPLICATION



This is ideally a second station in Hytech MPS system which is preceded by MPS 1. Job can be directly transferred from station 1 to station 2.

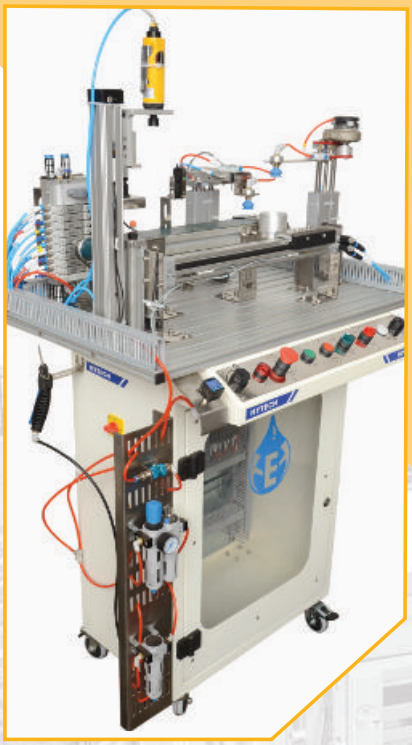
In case of Multi station option, station 2 starts immediately as the job is transferred from Station 1 to station 2. In case of Individual mode, user has to place the job on the conveyor to initiate the system. In case of multi station mode, job is transferred from station 2 to station 3. In case of individual mode, processed job from station 2 is dropped in a bin to conclude the process.

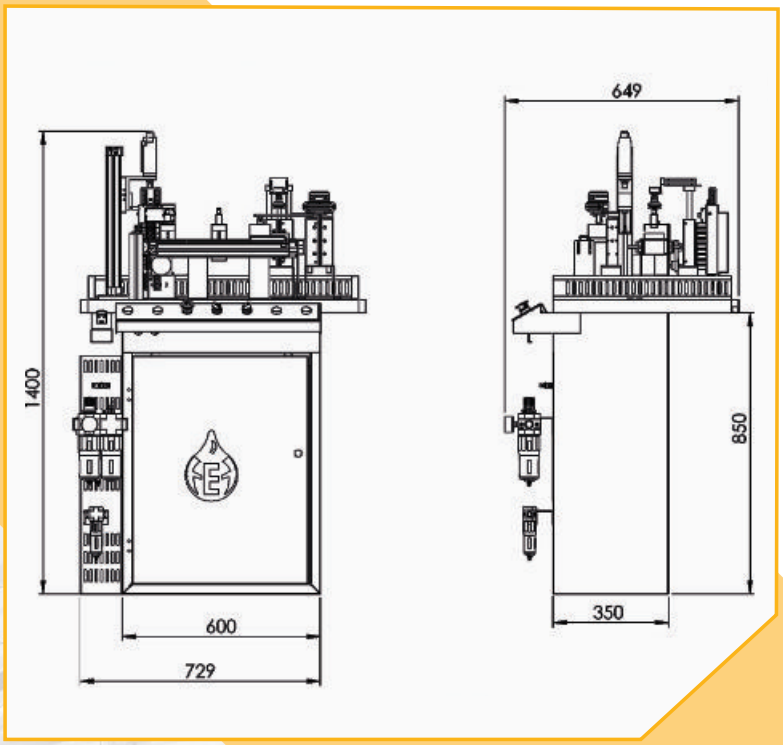
Digital sensor is provided in station 2 which can be taught to sense a particular color. This input of a digital color sensor can be used to decide the process flow or to display the count on SCADA.

Pneumatic drilling application can actually drill on a raw job of operator's choice. User can decide the jobs (based on color from MPS2 / material from MPS1) that will be drilled and the ones that will not be drilled.

What can be achieved with MPS 2:

1. Color based sensing
2. Pneumatic Drilling Application
3. Acceptance and rejection based on user preference
4. Introduction to rotary pick and place unit
5. Operation of linear transfer station
6. Operation of rod less cylinder





Sr No	Description
1	6 Station Roary Indexing Unit
2	Sensor Station (Conveyor) with M18 Capacitive and M18 Inductive sensor
3	Sensor Mounting Bracket (Conveyor) M18 x 2
	M18 Capacitive Sensor
	M18 Inductive Sensor
4	Height Sensing Unit
	Round Cylinder
5	Pick and Place Arrangement with Vacuum cup
	Guided Cylinder
	Rotary Vane Motor
	In Line VACUUM Generator
	30mm Suction Cup
6	Conveyor 70 x 500mm
7	Color Sensing Assembly
	Color Sensor Mounting Bracket (Conveyor)
	Color Sensor

Sr No	Description
8	Rotary Rejection Module
	Rotary Vane Motor
	Rejection Slide
9	Stopper Cylinder, Guided
10	Pick and Place Arrangement with Vacuum cup
	Guided Cylinder
	Rotary Vane Motor
	In Line VACUUM Generator
	30mm Suction Cup
11	Solenoid Valve Bank, 10 5/2 DA Solenoid Valves, 1/4
12	Digital Pressure Switch
13	10 Micron Air Filter
14	FRL UNIT
15	Control Panel with Operation Module
16	Mounting plate of 22.5 mm thick aluminum extrusions with working dimensions of 820 x 540mm
17	Siemens S7 1200 PLC (S7 1215C)
18	HMI Connection Port with SCADA

MPS 3: WEIGHT BASED SORTING WITH 4 AXES INDUSTRIAL SCARA ROBOT

This is ideally a third station in Hytech MPS system which is preceded by MPS 2. Job can be directly transferred from station 2 to station 3.

In case of Multi station option, station 2 places the job in a load cell in MPS 3. The measured weight of the job is displayed on a digital display. Analog output is also provided from an amplifier which can be used to display the weight in SCADA.

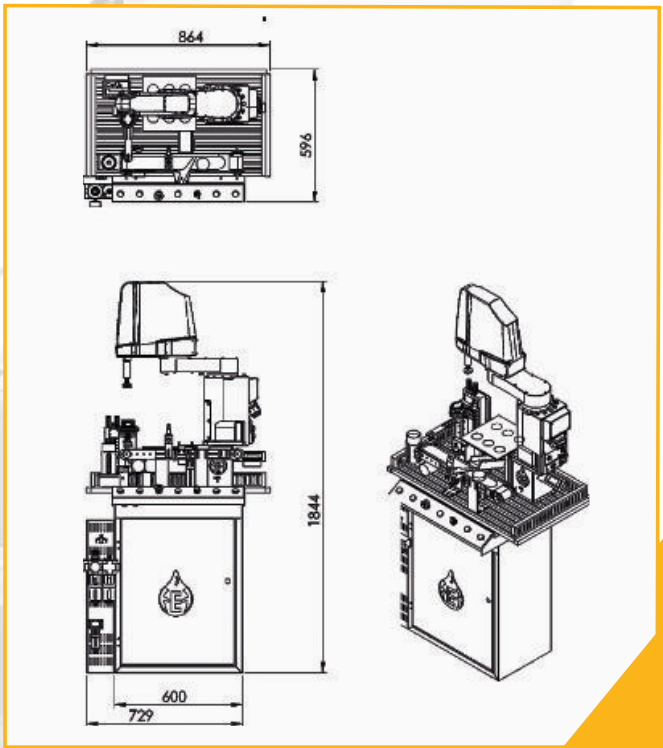
Depending on the weight of the job, user can decide to store the job in a particular slot in MPS 3 pallet (total 9 slots are available) or user can transfer the job to MPS 4. Participants are expected to have hands on experience on MPS programming through which they can decide the flow as well as process in each station.

4 axes industrial SCARA robot is used to transfer jobs from conveyor to either pallet or to MPS 4.

In case if the MPS 4 is being used in individual mode, user has to load the job in a load cell pallet to initiate the process. In individual mode, user can use SCARA to store the jobs in SCARA Pallet. MPS 3 is designed particularly to operate efficiently in individual mode to provide hands on experience on SCARA operations which can be termed as SCARA Operation Training as well. Industrial pendant is provided for SCARA operation as well as programming. Software with 3D simulation of SCARA for designing as well as executing various individual SCARA programs is also provided along with a system.

What can be achieved with MPS 3:

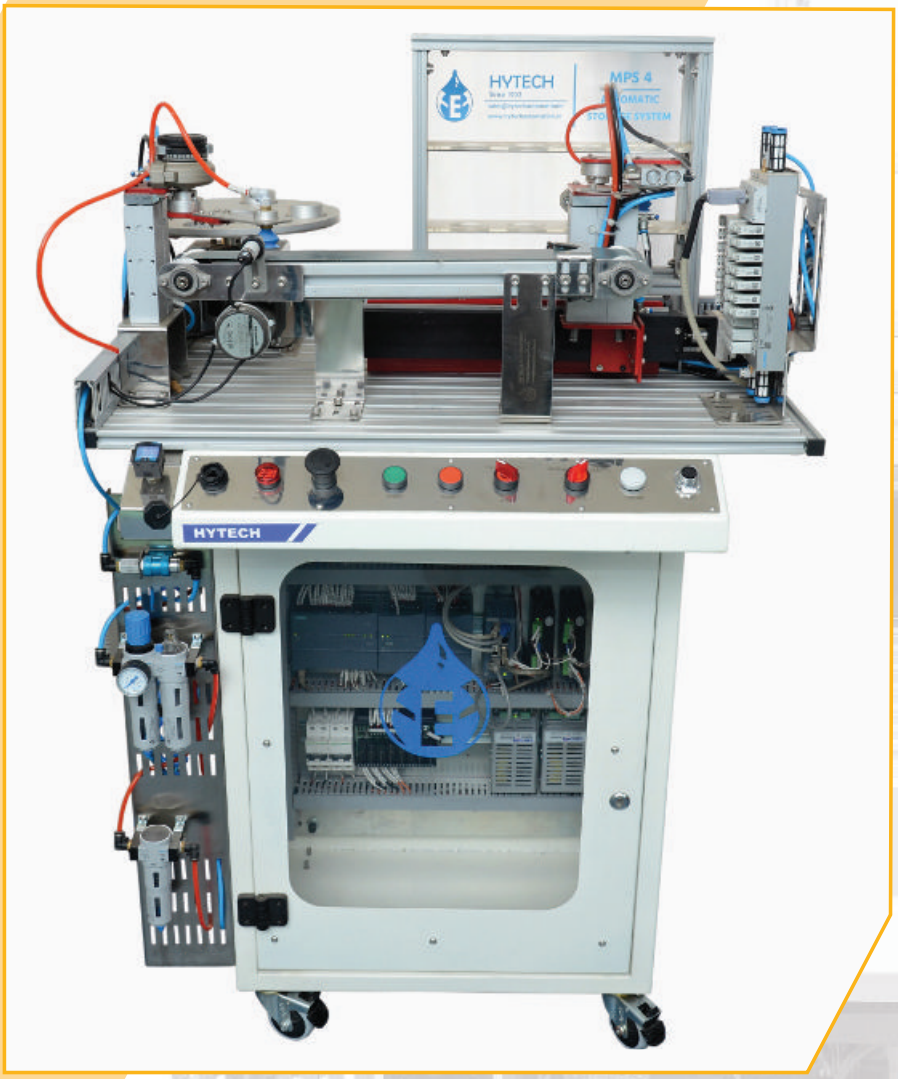
1. Operation of SCARA Robot
2. SCARA Robot operation in individual mode as well as in integration mode with PLC
3. Weight based sorting
4. Integration of Load cell with PLC and SCADA
5. Operation of rotary pick and place station



Sr No	Description
1	Stationary Station for job loading from previous station
	M18 / M12 capacitive sensor connection
2	Pick and Place Arrangement with Vacuum cup
	Guided Cylinder
	Rotary Vane Motor
	In Line VACUUM Generator
	30mm Suction Cup
3	Conveyor 70 x 500mm
4	Rotary Rejection Module
	Rotary Vane Motor
	Rejection Slide
5	Weigh Scale
	Stationary Station
	M18 / M12 capacitive sensor connection
	Load Cell
	Load Cell Amplifier with Display unit and analog output

Sr No	Description
6	Industrial SCARA Robot - 4 Axes (Make: Mitsubishi / Delta)
	In Line VACUUM Generator
	30mm Suction Cup
7	Sorting Pallet
8	Solenoid Valve Bank, 10 5/2 DA Solenoid Valves, 1/4
9	Digital Pressure Switch
10	10 Micron Air Filter
11	FRL UNIT
12	Control Panel with Operation Module
13	Mounting plate of 22.5 mm thick aluminum extrusions with working dimensions of 820 x 540mm
14	Siemens S7 1200 PLC (S7 1215C)
15	HMI Connection Port with SCADA
16	Control Panel for SCARA

MPS STATION 4 : 4 STATION ROTARY INDEXING WITH AUTOMATIC STORAGE SYSTEM (STEPPER MOTOR DRIVEN)



This is ideally a last station in Hytech MPS where job is stored in one of the 8 storage cells. This station is equipped with stepper motors for rotary indexer as well as linear movement of the job loader.

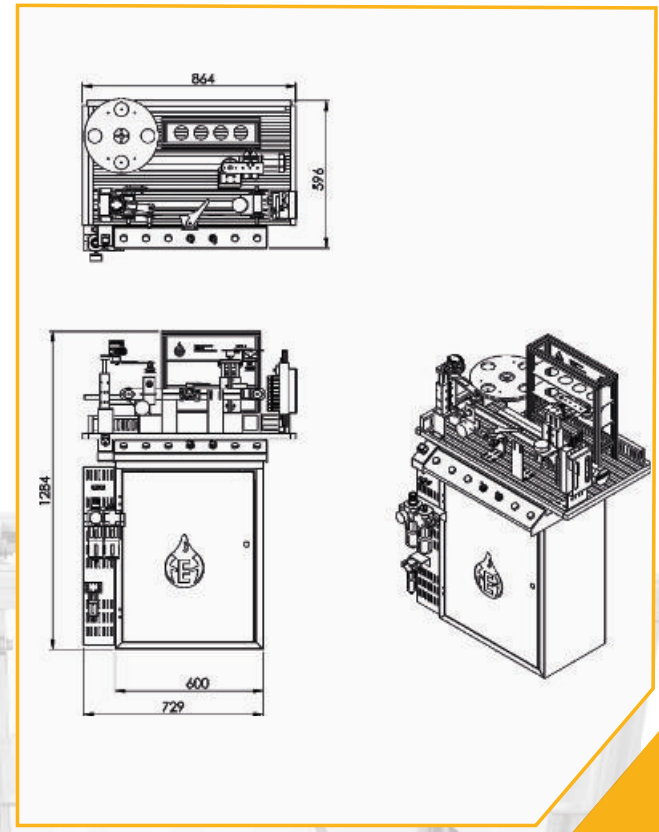
Students can get hands on experience on the operation of stepper motor from PLC and SCADA.

During the startup, referencing of rotary indexing unit as well as the linear transfer station should be carried out. Coordinates of each stepper motor can be displayed on the SCADA.

User has to decide the pallet in which job will be stored.

What can be achieved with MPS 4:

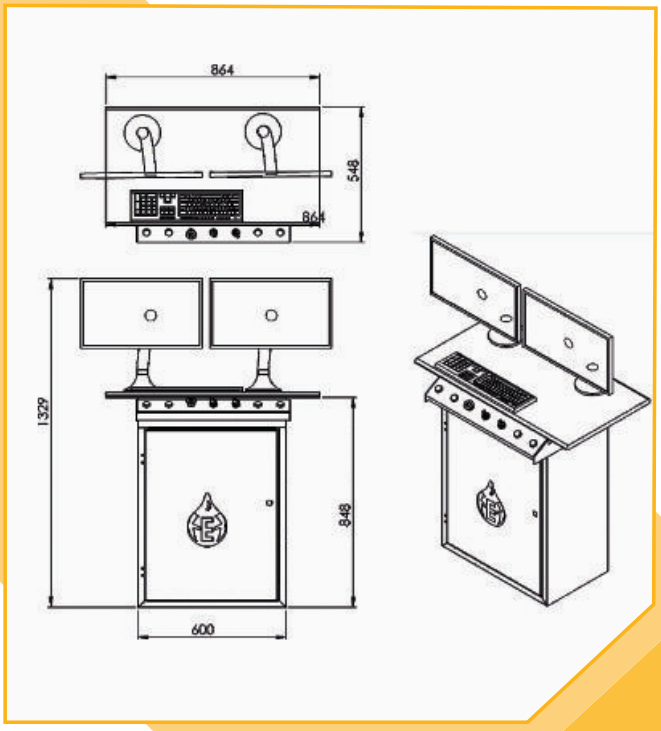
1. Operation of linear slide operation with stepper motor and PLC
2. Operation of incremental position control
3. Operation of rotary indexing station
4. Homing / Referencing of stepper motor with PLC
5. Calibration of linear slide



Sr No	Description
1	4 Station Indexing Mechanism
	M18 Capacitive sensor for position referencing
	Station mounting stand in SS 304
	Stepper motor with stepper drive of suitable capacity
2	Pick and Place Arrangement with Vacuum cup
	Guided Cylinder
	Rotary Vane Motor
	In Line VACUUM Generator
	30mm Suction Cup
3	Conveyor 70 x 500mm
4	Automatic Storage System with 8 stations (Pallet with 2 storey, 4 stations on each)
	500mm Linear slide with Linear motion guidwways and ball screw
	Stepper motor with stepper drive of suitable capacity

Sr No	Description
	M12 Capacitive sensor for position referencing
	Pick and Place Arrangement with Vacuum cup
	Guided Cylinder
	Rotary Vane Motor
	In Line VACUUM Generator
	30mm Suction Cup
5	Solenoid Valve Bank, 10 5/2 DA Solenoid Valves, 1/4
6	Digital Pressure Switch
7	10 Micron Air Filter
8	FRL UNIT
9	Control Panel with Operation Module
10	Mounting plate of 22.5 mm thick aluminum extrusions with working dimensions of 820 x 540mm
11	Siemens S7 1200 PLC (S7 1215C)
12	HMI Connection Port with SCADA

MPS CCU: CENTRAL CONTROL UNIT



This is the final station of MPS which is connected to all other MPS stations through Ethernet connection with a separate direct communication with Industrial SCARA Robot.

MPS CCU is equipped with SCADA through which participants can control individual stations as well as entire MPS system in integration mode. Participants can select between Remote mode and station mode through which systems can be operated remotely.

CCU is industry 4.0 ready.

3D simulation and designing software is displayed on the second screen of CCU. Entire MPS operation can be dynamically simulated on this software through OPC UA connectivity.

List of softwares installed in CCU:

1. SCADA (Siemens WinCC Professional with minimum 4096 tags with developer license)
2. Visual components 3D with OPC UA connectivity
3. Mitsubishi RT Tool box with dynamic 3D simulation
4. TIA Basic for ladder design and updation of individual station's PLC