NIYO engineers

Flexible Production System

Model: MCTR-01

Testing Module

Reversing & pin Module

Pneumatic/Hydraulic Press

Handling Module

Pneumatic Transfer Module

HMI

Magazine Module

Bay Module

Cartesean Robot Module

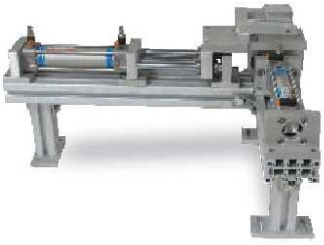
Base Module

Compressor

Conveyor Module

Drilling Module

PLC



Welding Module

MCTR01-A

Conveyor Module

The conveyor belt system is the element that connects all of the sub-systems and thus forms the backbone of the entire FMS-Mini. A sensor at the end of the conveyor belt senses that a workpiece has arrived, and the conveyor belt stops
MCTR01-A-1: DC Conveyor
MCTR01-A-2: AC Conveyor

Training contents

- Generating controlled movements along an axis
- Incremental positioning of a workpiece carrier
- Interlocking of forward motion and reverse motion
- Programming slip and standstill monitoring
- Working with different safety and interlocking circuits

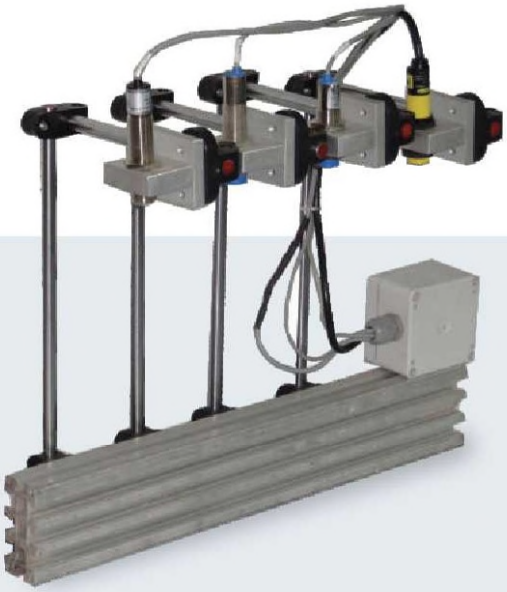
MCTR01-B

Magazine Module

The Magazine station consists of a magazine, work pieces of different types, pneumatic cylinder, sensor, solenoid valve and electrical connector.
A micro switch monitors how many pieces are in the magazines. A workpiece carrier is located on the conveyor belt. The magazine accommodates ten work pieces.
A pneumatic cylinder pushes the workpiece at the bottom of the pile onto the conveyor belt. One piece is placed on the conveyor which then moves to the end of the belt.

Training contents

- Assembly, set-up and testing of pneumatic cylinders and valves
- Definition of process sequences for sorting and assembly
- Programming of production sequences in manual and automatic modes



MCTR01-C

Testing Module

This testing station consists of four different types of sensors and electrical connector. The four sensors measure the material properties of the workpiece and of its contour.
All the mounting and adjusting arrangements are part of the station. This station sits next to the conveyor station.

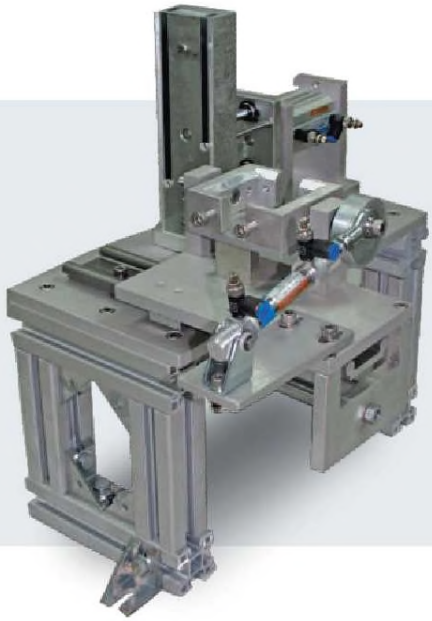
MCTR01-D

Handling Module

The Handling station consists of a 3 axis robotic arm with a vacuum pad. Work pieces are transferred from one station to another using this Handling Station.
This station consists of pneumatic cylinders, sensors, solenoid valves, a vacuum pad, a rotary actuator and an electrical connector.

Training contents

- Assembly, set-up and testing of pneumatic actuator and valves
- The Definition of handling and transferring material
- The Programming of production sequences in both manual and automatic modes



MCTR01-E

Processing and Assembly Module

The Processing and Assembly station consists of three modules.

MCTR01-E1

Reversing module

This allows the workpiece to be tilted by 90 degrees using a pneumatic rotating cylinder

MCTR01-E2

Pin module

The module inserts a pin in the two pieces for further processing. With the help of two pneumatic cylinders, the stored pins are pressed into the workpieces.
One cylinder pushes and retrieves the workpiece to the pinning station. The second cylinder inserts the pins into this workpiece.

MCTR01-E3

Handling Module

The workpiece is loaded to the press after the reversing and pinning processes are complete. A pneumatic cylinder loads the workpiece into the press. Once the workpiece is inserted into the press, the safety doors are closed with the help of a pneumatic cylinder. The Pressing procedure is then implemented. A pneumatic cylinder then pushes out the workpiece for further transport. Any one of the two types of press can be supplied,
Pneumatic Press (MCTR01-E-3-A)
Hydraulic Press (MCTR01-E-3-B)

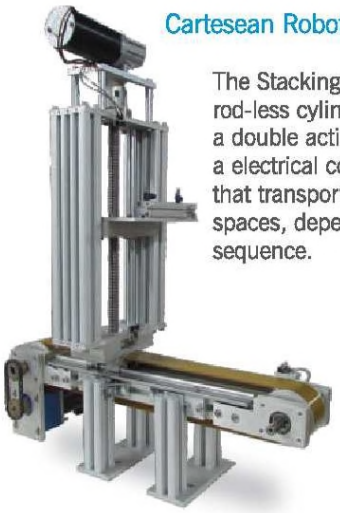
Training contents

- Assembly, set-up and testing of pneumatic cylinders and valves
- Introduction to sub-systems for the assembly of top and bottom sections.
- Introduction to Press and aspects of its safety
- Definition of process sequences for sorting and assembly
- Programming of production sequences in both manual and automatic modes

MCTR01-F

Storage and Warehousing Module

The Storage and Warehousing Station consists of two modules:



Cartesean Robot Module (MCTR01-F-1)

The Stacking Robot Module consists of a rod-less cylinder, proximity switches, a fork, a double acting cylinder, solenoid valves, a electrical connection box. a Cartesian robot that transports the work pieces to their storage spaces, depending on the predetermined sequence.

Bay Module (MCTR01-F-2)

The finished product is stacked on this rack for warehousing / dispatch.

MCTR01-G

Base Module

The Base Station consists of a mobile table with a work surface, a control panel, power supply and contactor circuits.
All the stations mentioned above can be mounted on this base station. The table is made of extruded aluminium sections. The table has four wheels. The entire electrical wiring runs through grooves and trays on the table.

Training contents

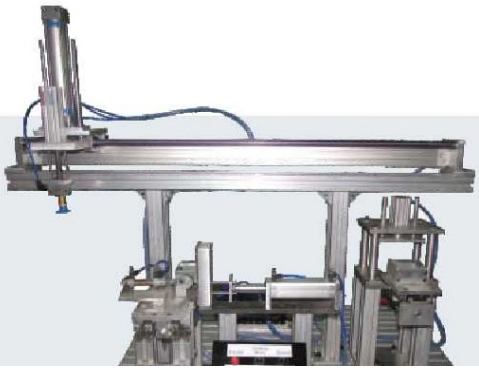
- Assembly, set-up and testing of pneumatic cylinders and valves
- Definition of process sequence for automated storage and retrieval systems
- Detection of the storage coordinate by means of incremental sensors
- Programming of a process chain
- Programming of the complete warehousing process in both manual and automatic modes.

MCTR01-H

Testing Module

Pneumatic transfer module (MCTR01-H-1 &2)

The work piece is transferred from conveyor to drilling platform using this module



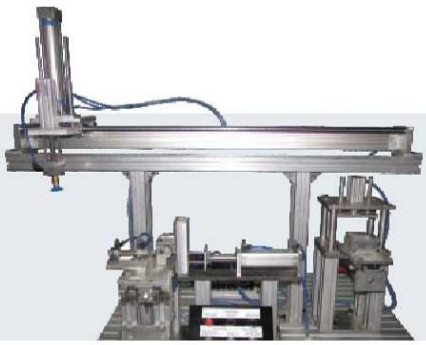
Conveyor Module (MCTR01-A-1)

This transfers the workpiece across this station.
Work piece is picked up from previous station & brought to the drilling platform. Once drilling is completed the work piece is moved to the end of station from where it can be picked up to the next station

MCTR01-H3

Drilling Module

The work piece is processed here. The Drilling operation is simulated here using a DC motor operated drill machine and pneumatic holder



MCTR01-J1

Pneumatic transfer module

The work piece is transferred to and from the welding module by this module.

MCTR01-J2

Welding module

The Welding operation is simulated here. The work piece is held in its location by a welding platform.

PLC

A standard 24 V DC operated 28 IO PLC.
The PLC is supplied with Ladder Logic programming software. Communication with the PC takes place through USB port / LAN.

Silent Compressor (Optional)

A silent compressor can be supplied with the equipment, if needed. Alternatively, an existing compressor of required specifications from your laboratory can be hooked up to the trainer.

Optional

- HMI: One HMI per station or a single common HMI for all stations combined.

- SCADA software for the entire system.
- Industry 4.0 Software: This software is implemented on any two stations.
- Bar Code Reader: Bar coded raw material decides the process to be followed.

FMS-A: Station 1

Conveyor station

MCTR01-A : Conveyor module
MCTR01-B : Magzine module
MCTR01-C : Testing module
MCTR01-G : Base module and PLC

FMS-B: Station 2

Pinning Press

MCTR01-A : Conveyor module
MCTR01-D : Handling module
MCTR01-E-1 : Reversing module
MCTR01-E-2 : Pin module
MCTR01-E-3-A : Pneumatic press
MCTR12-G : Base module and PLC

FMS-C: Station 3

Storage station

MCTR12-D : Handling module
MCTR12-F-1 : Stacking Robot module
MCTR12-F-2 : Bay module
MCTR12-G : Base module and PLC

FMS-D: Station 4

Drilling station

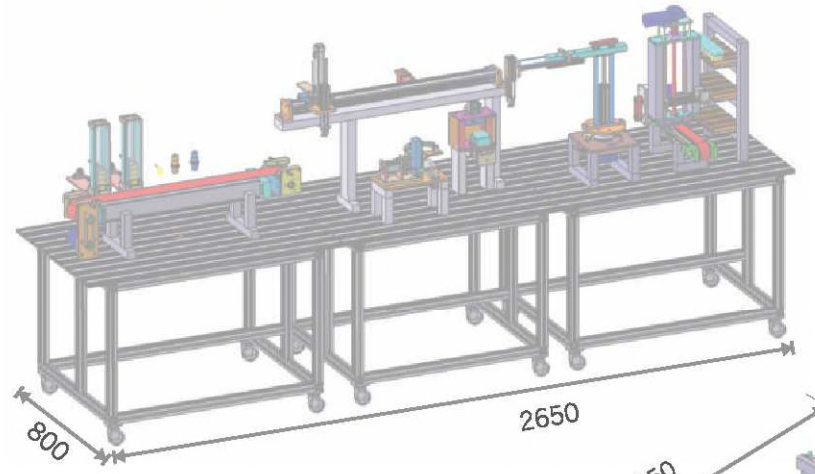
MCTR01-D : Handling module
MCTR01-A : Conveyor module
MCTR01-F-2 : Bay module
MCTR01-G : Base module
MCTR01-H : Drilling module and PLC

FMS-S: Station 5

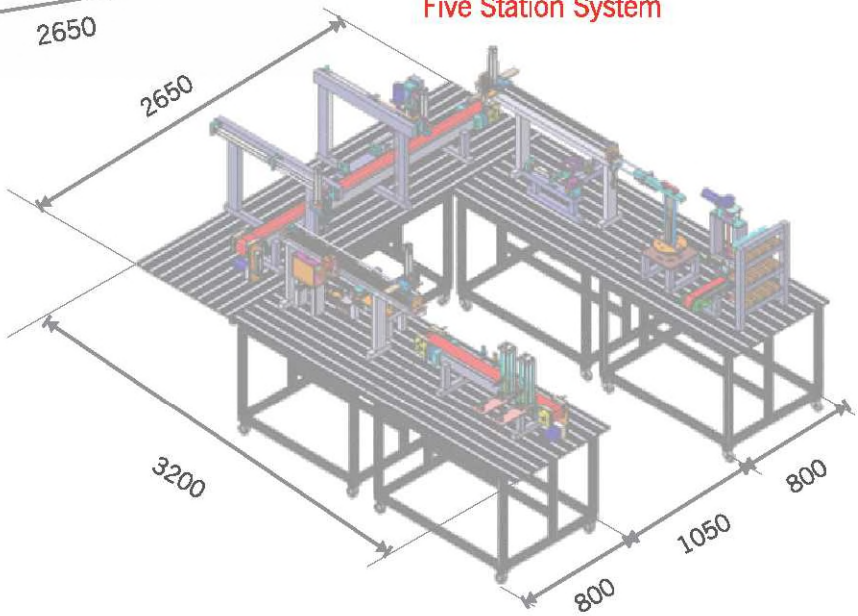
Welding station

MCTR01-D : Handling module
MCTR01-A : Conveyor module
MCTR01-F-2 : Bay module
MCTR01-G : Base module
MCTR01-E-3-A : Pneumatic press
MCTR01-J : Welding module and PLC

Three Station System



Five Station System



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