Course Code : RME 3212
Course Name : Manufacturing Process with CNC Programming Lab

Experiment no : 07
Experiment name : Introduction to MPS, Powering ON and operating all four stations simultaneously.

Group no : 06
Group members: 1. Rabeya Akter (SK-092-015)
2. Tahmid Yusuf (FH-092-019)
3. Safaeid Hossain Arib (FH-092-020)
4. Ujan Samaddar (SH-092-045)

Prepared by: Tahmid Yusuf (FH-092-019)

Submitted to: Dr. Shamim Ahmed Deowan
Assistant Professor
Department of Robotics & Mechatronics Engineering
University of Dhaka

Date of Experiment: 15 September, 2022
Date of Submission: 6th November, 2022

Objectives:

- Exploring the modular production system
- Familiarizing with PLC application
- Understanding the operations of the individual workstations of the MPS

Theory: Festo is one of the forerunners in the automation industry, especially in mechatronics. It uses MPS in a lot of production processes. MPS is a lab-scale production line simulating and performing actions such as distribution, testing, processing, handling, assembly, and packaging. It models industrial automation systems at varying degrees of complexity. It uses individual stations to demonstrate a variety of technologies and automation principles.

Teach technology fundamentals are:

- Pneumatics
- Hydraulics
- PLC controls
- Robotics
- Sensors

Teach automation processes are:

- Pick & place
- Testing & quality inspection
- Work-piece processing
- Work-piece sorting
- Robotic assembly
- Work-piece storage & retrieval

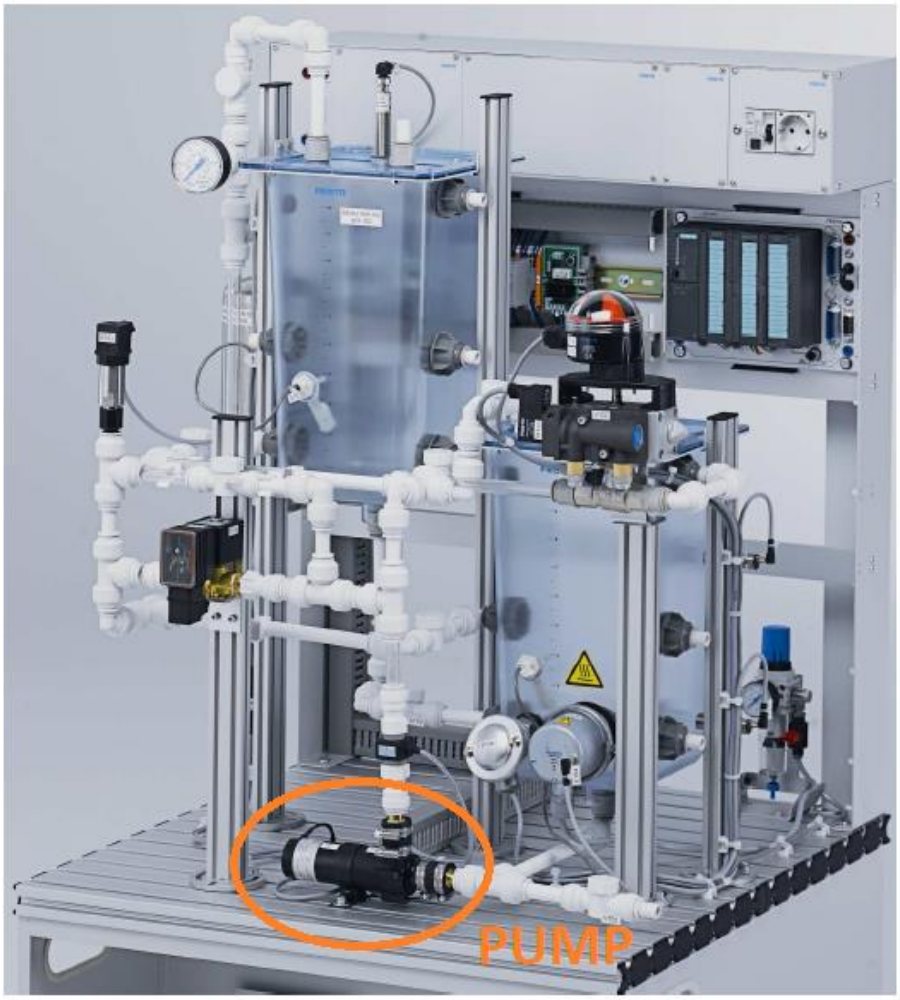


Fig: MPS Workstation

MPS system combines various individual stations to expand the number of subjects to be taught. Some of the workstations are named as follows: ‘Distribution station’, ‘Measuring station’, ‘Pick & Place station’ and ‘Packaging station’

Distribution Station

This station is a feed device with storage function. It provides the workpiece into the system such that other functions such as measuring and testing, performed by other stations in the modular production system, can operate properly on the work-pieces. The distribution station performs the following actions:

- To separate out work-pieces from the stack magazine by pushing the bottom one out with a piston
- To transfer work-pieces to a downstream station using a changer module with a rotary arm with a pneumatic suction cup.

It has the following features:

- Linear actuators
- Semi-rotary actuators
- Vacuum technology
- Optical, proximity and contact sensors
- PLC programming

Measuring Station

This station is for measuring the heights of the workpieces. It allows workpieces to pass through to the next station if the height meets the specified requirement. Otherwise, it takes the workpiece outside of the production line. Thus, faulty materials are separated from the production process.

It has the following features:

- Linear actuators
- Semi-rotary actuators
- Proximity sensor
- PLC programming

Pick & Place

This station transports and assembles the work-pieces. It moves parts to or from a conveyor belt. It has the following functions:

- Three axis gantry device is typical of industrial products
- Sensors detect a part is present
- DC electrical conveyor moves parts

It is essentially a modern pick-and-place application that moves part from pick-up point to one of several drop-off locations. Features include:

- Double-acting rod-less cylinder
- Proximity switches sense cylinder positioning
- Pneumatic gripper technology

Packaging Station

This station packages the workpieces. This is a complex workstation where many functions take place. For instance:

- A packet is opened by maintaining air pressure at a time.
- The picked up work-piece is placed in the packet
- The packet is closed by a complex mechanism.
- Then the package is picked up by a gripper and placed in a separate place.

Some of its features are:

- Pneumatic control
- Stepper motor
- PLC programming

Fig: 4 workstations of the MPS

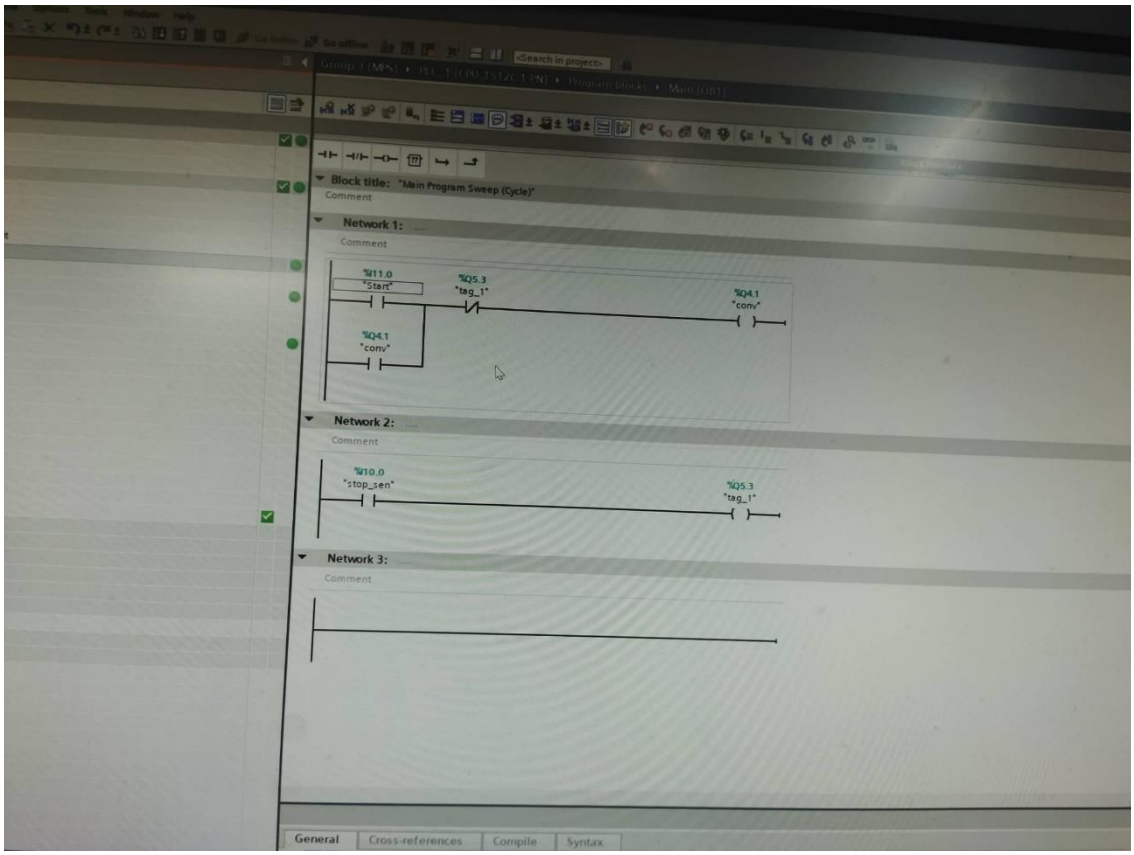
Equipment:

- Festo Modular Production System(MPS)

- Computer
- Industrial grade Ethernet cable
- Power supply
- Siemens TIA portal

Working Procedure:

1. All the power cables were connected to the individual workstations and the compressor. Afterwards, the power was turned ON.
2. The MPS was connected with the computer with the appropriate ethernet cable.
3. In the computer, we created a new project in the SIEMENS TIA portal.
4. The project was opened in project view and the device was added.
5. A CPU was selected for the PLC.
6. The appropriate ladder program for configuring the stations was opened in the portal.



Conclusion: The work-piece was at first placed in the distribution station, after which it was transported to the measuring station when ready. If the product met the required specifications, then it was passed to the pick and place station where a cap was picked up and placed on the product. Afterwards, it was transferred to the packaging station. Thus, the whole process was conducted by the functions performed by the 4 stations.

References:

https://www.festo.com/net/SupportPortal/Files/10142/MPS.pdf

Experiment no : 07

Experiment name : Introduction to MPS and initial powering on.

Date of the experiment : 15/9/2022

Group no : 06

Group member :

① ~~Rabeya Akter (SK-092-015)~~.
② Sabaeid Hossain Arib (FH-092-020)
③ Tahmid Yusuf (FH-092-029)
④ Ujan Samaddar (SH-092-045)

15.09.2022