MECHATRONICS LAB

- This lab imparts skill and knowledge on Modular Automation Production Systems by implementing the automation skills achieved from Basics of PLC and SCADA system

- Candidates are trained on the Modular Mechatronic Systems(MMS) which is designed to understand the industrial production process
- Labs are equipped with Modular Controllers S7-1200 to control the stations in the MAPS 6S system
- Programmes were developed to enhance the skill set of the participants on functions of components and modules.
- Servicing and Troubleshooting the system during the breakdowns and failures.

Basics of Mechatronics

Course Description / Learning Objective

On completion of this course the participant will be able to:

- Identify the components and performance characteristics of the system and the stations.

- Understanding the Energy Mass and Information flow in the Mechatronics system.

- Benefits of the Modular Production Systems.

- Mechatronic system components like control components and power components

- Knowledge transfer by learning different mechatronics system.

- To function as a Mechatronic Systems Assistant working asa well-grounded machine operator in a complex system, with responsibility for efficient operation of the equipment with minimal down-times.

- Localize malfunctions, identify causes and sources of malfunctions, correct malfunctions where possible.

- Read and understand the technical documents, reports and outlines specific to the system and subsystems.

- Learning the Sequential Function Chart for the steps and transitions

- How to approach a system by understanding the Module, Application of components in the system, Characteristic and design function in the system
- Tracing of the signal flow measurements
- System trouble shooting strategies using step displacement diagrams
- Understanding Pneumatic components and circuits.
- Causes of malfunction in the system.
- Synergistic integration of Mechanical engineering, Electronics, Control & Computer through the design process
- Install a PLC system and interface the sensors and actuators to the system.
- Understanding the wiring and connections to the system
- Programming the stations based on their operations

LIST OF HARDWARE COMPONENTS

SIMATIC S7 Controllers – S7-1200

- The Simatic S7-1200 Basic Controller for small to medium-sized applications are used to control the stations and its process.
- Controller are enhanced with reliable diagnostics and communication for data transfer.

FILTER REGULATOR AND LUBRICATOR

- FRL were installed in the laboratory for protecting and regulating the pneumatic components in the system.

PNEUMATIC ACTUATORS AND COMPONENTS

- Pneumatic actuators were used in the processing station for filling and capping function and they were also used for the material handling. Unidirectional and Bidirectional Restrictors are installed for flow control

ELECTRICAL COMPONENTS

➤ Electrical components were used to give the input commands to initiate the process and to stop the process.

➤ Electrical components like Start Stop Pushbutton and Emergency stops buttons were added to the control circuit. Components like relay and contactors were used as actuators in the circuit whereas the motors act as Final control element.

MECHANICAL COMPONENTS

➤ Gears and belts were used for running the conveyor modules in the system and the manipulators were also used in the system based on the mechatronics concept design

TOOLS

➤ Measuring instruments and other tools were included for diagnostics and trouble shooting. Assembly and adjustments on the stations can be done using the provided tools.

LIST OF SOFTWARE COMPONENTS

TIA portal software for integrated automation.

➤ The Totally Integrated Automation Portal (TIA Portal) is a central framework for engineering SIMATIC products. It provides solution complete range of digitalized automation.

STEP-7 Basic software for engineering PLC CONTROLLERS

➤ An engineering tool for configuration and programming for SIMATIC S7-1200 controllers to solve your engineering tasks intuitively and efficiently.

DIAGNOSTIC Kit

➤ An internal tool designed by SIEMENS to improve the Diagnostic troubleshooting skills of the candidates which runs a virtual environment

Courses offered

S.No	Domain	Course Name	Hours	Prerequisites

| 1 | Electrical /Automation | Basic Mechatronics | 50 | Electrical, Electronics, Mechanical, Instrumentation engineers (6th Semester) |

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