



Integrated Manufacturing Systems Troubleshooting

Performance Based Objectives for Mechatronics Capstone

Duration: 120 Hrs.

Performance Based Objectives

Upon completion of this course, the student will be proficient in the following:

- By physical examination of an operating machine, and through operation of the manual controls, a sequence diagram will be developed for each station(s) which will indicate:
 - Each step in the sequence following a cycle start
 - The duration of the step
 - The output actuator controlling the action
 - The probable triggers for that step
 - Note: There will be two sequence diagrams for the AMTEC simulator to allow for the robot to be activated or bypassed.
- By examination of the working drawings, identify and verify (on the integrated system) the PLC inputs and outputs associated with each input and output referenced in the sequence diagram. This information is to be added to the Sequence diagram generated in the first objective.
- Verify the sequence diagram triggers through analysis of the Programmable Controller Logic
- Demonstrate proficiency in the Start-up, Manual Operation and Automatic operation of integrated systems.
- Demonstrate proficiency in reading Electrical, Hydraulic and Pneumatic prints (full set of working drawings) that use ANSI and IEC617 symbols.
- Demonstrate the ability to analyze Control Logix Programs to understand the operation of an Integrated System.
- Demonstrate the ability to interpret manufacturer's technical information and apply the information to the repair of a faulted component on an Integrated System
- Given an operator's complaint identify a faulted part. The following will be supplied:
 - A copy of the logic as it would appear on a programming terminal
 - A drawing depicting the physical layout of the machine
 - All indicators reflecting the state of the machine
 - Processor status indications.
- Given an operator's complaint identify a faulted part. The following will be supplied:
 - A copy of the sequence diagram
 - A drawing depicting the physical layout of the machine
 - All indicators reflecting the state of the machine
 - Processor status indications.





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- List the steps in the troubleshooting process and distinguish the changes in the methodology as it would apply to:
 - An Integrated System that was just working
 - An Integrated System that would not start at the beginning of a shift
 - An Integrated System that has a problem that crosses shifts
 - Commissioning a new System discussion - not demonstrated in lab.
- Demonstrate proficiency in the navigation of Studio 5000 software as it applies to troubleshooting and repair of Integrated Systems.
- Demonstrate the ability to identify all relevant signals used to interface a Fanuc Robot to a Control Logix processor over Ethernet communications
- Given that the PLC logic can be viewed on studio 5000, identify a faulted component, wire, module, etc. when given an operator complaint. Manual operation can be attempted and common test equipment is available for use. (This assumes that the equipment was running production and just stopped operating.) Working Drawings are to be used along with any Diagnostic messages available.
- Given that the PLC logic cannot be viewed, identify a faulted component, wire, module, etc. when given an operator complaint. Manual operation can be attempted and common test equipment is available for use. (This assumes that the equipment was running production and just stopped operating.) Working Drawings are to be used along with any Diagnostic messages available.
- Given an operator complaint that the integrated system will not start in automatic, after week end maintenance, troubleshoot and repair the system and return to full automatic operation. This is to be completed under two scenarios - with and without access to the PLC logic.

Required Equipment

- 1 or More AMTEC Simulators – have 2 installed
- 1 or more SMC Simulators – have 2 installed
- PPE for 4 different sizes
- DVM's - 4
- Hand Tools, Assortment of Wrenches, Screw Drivers, Socket sets, Metric and English
- Laptop with Studio 5000 - 10





**Multi-State
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