Integrated Manufacturing Systems Troubleshooting

Troubleshooting Capstone: Rubric

Course Delivery Information

The student is expected to demonstrate Proficiency in the following areas to complete the Troubleshooting section of the MAT2 Capstone:

1) Print Reading, 1 exercise (of two)
2) PLC to Robot interfacing, 1 Exercise (of one)
3) Written Troubleshooting exercises, 8 Exercises with logic
4) Written Troubleshooting exercises, 8 Exercises without logic
5) Remote I/O exercise, 1 Exercise (of 2)
6) Sequence Diagram Exercise, 2 Exercises (one on each system) Including Permissive listing.
7) Level 1 Troubleshooting Labs – 6 (Three on each system)
8) Level 2 Troubleshooting Labs – 4 (Two on each system)
9) Level 3 Troubleshooting Labs – 2
10) Sequence Optimization Lab – optional. (One of 6.)

Note: Should any student require significant assistance in any of the above areas, the student will have to repeat the area with an alternative set of instructions.

Several periods of lecture will also be included in the Troubleshooting Capstone to highlight areas that may have not been fully developed in the program of study.

The sequence exercise must be completed prior to any of the labs being attempted. The remaining exercises (1 through 4 above) can be done in any order and will be dictated by the instructor.

The optional Optimization Lab (6 above) can be substituted for half of the Level 1 or level 2 faults.

The function of this capstone is to put all the pieces together from the program of study. Each student will have to rely on information learned in most courses to complete these assignments. Alternative assignments are available for any student requiring minor remediation. The assignments will be performed individually. System familiarity can be done in teams and time will be allowed for this activity.

The following rubric will be used to access each student's performance and will be used in the development of a grade for the student. Thus, if in a specific area a student scores 3 out of 5, the student can elect to repeat that area with a different exercise to raise the rating (grade) after completing the remaining required areas. In this respect, no student will be penalized for learning late, as long as they eventually demonstrate proficiency.

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Area	Points for Each Area				
	5 – Outstanding	**4**	**3**	**2**	**1 – Needs Remediation**
1) Print Reading	Completed 100% correct	10 out of 11 correct	9 out of 11 correct	8 out of 11 correct	Required Remediation
2) PLC to Robot interfacing	Completed 100% correct		Required minimal assistance *(e.g. Had to be shown how to read the PLC logic or Access the Robot Digital I/O)*		Required Remediation
3) Written Troubleshooting exercises	8 Exercises Correct	7 Exercises Correct	6 Exercises Correct	5 Exercises Correct	Required Remediation
4) Remote I/O exercise	Completed 100% correct	10 out of 12 Questions Correct	8 out of 12 Questions Correct	9 out of 12 Questions Correct	Required Remediation
5a) Sequence Diagram AMTEC	Completed 100% correct		Required minimal assistance		Required Remediation
5b) Sequence Diagram SMC	Completed 100% correct		Required minimal assistance		Required Remediation
6) Level One faults	Completed 6	Completed 5	Completed 4		Required Remediation
7) Level Two Faults	Completed 4		Completed 3		Required Remediation

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8) Level Three Faults	Completed 2		Required minimal assistance	Completed One Fault	Required Remediation
Safety on AMTEC Trainer	Demonstrated Proficiency at all times				Required Remediation
Safety on SMC Trainer	Demonstrated Proficiency at all times				Required Remediation
Proper use of test equipment	Demonstrated The proper use of test equipment at all times *See Note 1*		Required Minimal Assistance *See Note 2*		Required Remediation
9) System Optimization Lab	Extra consideration	No points	Can Substitute	For other	Fault Levels
Attitude	Demonstrated a Positive Demeanor at all times.		Honestly attempted to complete each section		Showed frustration in completing each section
Applies Troubleshooting Logic	Logically addressed faults		Needed some help in addressing faults		Requires Remediation

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General Note: Areas 1, 2, 3 and 5 support the troubleshooting of any machine. Area 4 is required to support level 3 faults, where another shift was in the process of repairing the equipment but did not complete the work or misconfigured or failed to program a device properly.

Note 1: Since the voltmeter is the prime troubleshooting instrument used in troubleshooting sequencing machine, the student will be critiqued on the proper application. The following will be noted:

- Student is aware of the expected voltage to be measured
- The meter is on the proper function
- The meter is on the proper range
- The student shows care in the positioning of the meter to take measurements
- The method of taking measurements is appropriate

Note 2: Failure on one of the above items will necessitate 3 points being awarded in this category.

42 Points are required to pass course.

Less than 42 Points earned requires remediation and repeating sections.

Maximum of 70 Points

The grading scale is shown below:

Points	Grade
70 to 66	A
65 to 63	A-
62 to 59	B+
58 to 55	B
54 to 51	B-
50 to 47	C+
46 to 43	C
42	C-

Since most areas can be repeated with alternative assignments, any student willing to apply themselves, should receive a good grade. (This is not true for areas 2 and 5, which do not have alternative assignments.)

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