



**Multi-State
Advanced Manufacturing
Consortium**

US DOL SPONSORED TAACCCT GRANT: TC23767

PRIMARY DEVELOPERS:
Glenn Wisniewski – Corporate Trainer, Henry Ford College
Wes Bye – Mechatronics SME, Pontiac Coil

RELEASE DATE 12/17/2014

VERSION v 001

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Mechapacticum Outline

Electromechanical

Course Topic: Electromechanical

Estimated completion time: 16 hours

Purpose:

To properly use system documentation (schematics, Cycle description, fluid power diagrams, mechanical specs, component specifications and etc.) and tools to identify Electrical, Mechanical, Fluid Power and locate root cause. Develop a correction process, listing components that need to be adjusted, replaced or repaired. Use of Internet is permitted.

Instructional Outcomes:

The participant will demonstrate the application of their skill and knowledge in the following topical areas:

- Integrated Systems
- Basic Electrical
- Safety

Instructions to Students:

Instructions to Students

- 1) The evaluator will initiate a series of faults into the system. Student will have a specified amount of time to develop and describe to the evaluator:
- 2) Plan to Troubleshoot the fault(s)- (testing methodology)
- 3) Locate the fault(s) and verify with test equipment
- 4) Prescribe in report form the repairs and adjustments required documenting problems/Faults/Remediation

Safety:

The student will demonstrate all safety practices learned previous instruction.





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Instructions to Evaluator:

Provide the student with a System Information Package (schematics, cycle description, fluid power diagrams, mechanical specs, component specifications and etc.)

Generate four different faults in the system:

- Fluid Power fault
- Electrical fault
- Mechanical fault
- Part feed or orientation

Provide the candidate with a realistic time frame to:

- Generate a troubleshooting process that will
- Locate and confirm with test equipment the four faults
- Create a correction plan. Discuss the plan with the candidate.

Once satisfied with the plan, allow the student time to identify the fault and fix the problem.

Provide the candidate with a description of a problem situation which requires the fabrication of a bracket or support. The student must sketch, layout and fabricate the correct solution to the problem situation.

Safety:

The student's solution must be safe, durable, functional, load appropriate, and reliable.

Equipment and Materials:





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MechapRACTICUM Outline

Electromechanical

Rubrics:

	TROUBLE-SHOOTING PLAN	PTS	(A) <i>Highly Proficient</i>	(B) <i>Competent</i>	(C) <i>Partially Competent/Developing</i>	(D) <i>Limited</i>	(E) <i>Major Improvement Required</i>
1	Using schematics prints and test equipment to troubleshoot a system	25	Accurately identified 100% of the components		Needed some prompting to identify the components		Unable to identify 50% of the components
A	Establish plan for Fault #1-Elec	10	Selected the most efficient troubleshooting path to identify the problem		Needed some prompting to select the most efficient process		Not able to identify the failure components
B	Establish plan for Fault #2-Mech	10	Selected the most efficient troubleshooting path to identify the problem		Needed some prompting to select the most efficient process		Not able to identify the failure components
C	Establish plan for Fault #3-Fluid Power	10	Selected the most efficient troubleshooting path to identify the problem		Needed some prompting to select the most efficient process		Not able to identify the failure components
D	Establish plan for Fault #4 - Communication-Data	10	Selected the most efficient troubleshooting path to identify the problem		Needed some prompting to select the most efficient process		Not able to identify the failure components
	Safety	PTS	(A) <i>Highly Proficient</i>	(B) <i>Competent</i>	(C) <i>Partially Competent/Developing</i>	(D) <i>Limited</i>	(E) <i>Major Improvement Required</i>





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1	Safe Work Practices	25	Used appropriate PPE; practiced common safety practices		Most safety practices used		Demonstrated unsafe working practices
2	Safety Attitude	25	Work practices demonstrated safety consciousness in all procedures; looked out for safety of others		Most of the time worked safely and showed some concern for safety of others		Dangerous worker; did not look out for safety of others
3	Electrical safety practices	25	Used appropriate control energy and safety procedures				Dangerous worker around electrical
	Troubleshooting Skills	PTS	<i>(A) Highly Proficient</i>	<i>(B) Competent</i>	<i>(C) Partially Competent/Developing</i>	<i>(D) Limited</i>	<i>(E) Major Improvement Required</i>
1	Applied sequence of diagnosing problem	20	Followed their identified sequence		Skipped or added some non-valued added steps or required prompting or out of sequence		Did not follow sequence
2	Efficient use of time	15	Finished tasks on or ahead of time		Barely finished task in allocated time		Did not complete task
3	Accurately diagnosed root cause problem	25	Correctly diagnosed problem		With assistance was able to diagnose problem		Did not find the problem





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4	Attention to detail	15	Every aspect followed through in detail	Some areas skipped in terms of detail	Good, but incomplete	Poor and incomplete understanding	Substantial lack of effort made
5	Accuracy of Repair Plan	25	Problems/Faults/Remediation accurately documented		Skipped or missed some problems/Faults/Remediation		Substantial problems/Faults/Remediation not documented
	Tool Use	PTS	<i>(A) Highly Proficient</i>	<i>(B) Competent</i>	<i>(C) Partially Competent/Developing</i>	<i>(D) Limited</i>	<i>(E) Major Improvement Required</i>
1	Use of Diagnostic Tools	25	Correctly and efficient use of diagnostic tools in an appropriate manner		Somewhat efficiently; mishandled one or more of the tools		Had to have assistance in connecting the meter to device; or showed disrespect for the tools
	Work Habits	PTS	<i>(A) Highly Proficient</i>	<i>(B) Competent</i>	<i>(C) Partially Competent/Developing</i>	<i>(D) Limited</i>	<i>(E) Major Improvement Required</i>
1	Work Attitude	15	Alert to finding and correcting problem		Honestly attempted to find and correct problems		Showed frustration in finding and correctly problem
2	Work Procedure	25	Always followed standard procedures; demonstrated planning and organization skills in correcting the problem		Complied with standard procedures; Showed some plan and organization in working		Did not follow standard procedures; Disorganized and slipshod methods;





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3	Professionalism	20	Work showed pride in accomplishment		Tried hard and shows promise		Work lacks praiseworthy factors
4	Self-confidence	15	Appeared comfortable and posed when performing tasks		Fairly self-confident; occasionally disconnected		Hesitant, timid, uncertainty
5	Knowledge of job	25	Has an exceptionally thorough knowledge of the job		Has good knowledge but needed coaching		Has inadequate knowledge of job





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Job 1 _____ Job 2 _____ (Check 1)										
	SKETCHING	PTS	(A) <i>Highly Proficient</i>	(B) <i>Competent</i>	(C) <i>Partially Competent/Developing</i>	(D) <i>Limited</i>	(E) <i>Major Improvement Required</i>	Possible points	Ratings A - E	Points Awarded
1	Completeness of sketch	25	All features and details are represented in at least an isometric view		Major features and details are provided; but some missing		Too many features missing to be able to produce the task	25		
2	Clarity of sketch	20	Legible; no ambiguity in the design		Some assumptions need to be made in order to produce the part		Too many assumptions need to be made; part could not be produced from the sketch	20		
	MATERIALS AND PROCESSES	PTS	(A) <i>Highly Proficient</i>	(B) <i>Competent</i>	(C) <i>Partially Competent/Developing</i>	(D) <i>Limited</i>	(E) <i>Major Improvement Required</i>	Possible points	Ratings A - E	Points Awarded
3	Selection of materials for bill of materials	10	Appropriate materials for load, safety, cost		Needed assistance or prompting to select materials		Unable to select appropriate materials	10		
4	Selection of fasteners for component	25	Appropriate fasteners for load, safety, cost		Needed assistance or prompting to select fasteners		Unable to select appropriate fasteners	25		
5	Selection of tools	10	Appropriate drills and taps		Needed assistance or prompting		Unable to select appropriate tools	10		





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6	Resource utilization	25	Used appropriate resources for selecting materials, selecting fasteners, and tools		Needed assistance or prompting		Unable to use resources	25		
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	LAYOUT AND FABRICATION	PTS	(A) <i>Highly Proficient</i>	(B) <i>Competent</i>	(C) <i>Partially Competent/Developing</i>	(D) <i>Limited</i>	(E) <i>Major Improvement Required</i>	Possible points	Ratings A - E	Points Awarded
7	Accuracy of layout	10	Correct measurements; marked center points of holes; accurately cut parts		Need prompting to do correctly		Unable to layout	10		
8	Use of fasteners for component	25	Appropriate installation of fasteners for load, safety, cost		Needed assistance or prompting to install fasteners		Unable to install fasteners or incorrect fasteners used	25		
9	Use of tools	10	Appropriate operation of drills press, taps, wrenches, etc.		Needed assistance or prompting		Unable to use tools	10		
10	Assembly	25	Assembly was easily put together; holes appropriately located		had to alter to assemble; rework required		Was impossible--could not be assembled	25		





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	Safety	PTS	(A) <i>Highly Proficient</i>	(B) <i>Competent</i>	(C) <i>Partially Competent/Developing</i>	(D) <i>Limited</i>	(E) <i>Major Improvement Required</i>	Possible points	Ratings A - E	Points Awarded
11	Safe Work Practices	25	Used appropriate PPE; practiced common safety practices		Most safety practices used		Demonstrated unsafe working practices	25		
12	Safety Attitude	25	Work practices demonstrated safety consciousness in all procedures; looked out for safety of others		Most of the time worked safely and showed some concern for safety of others		Dangerous worker; did not look out for safety of others	25		
13	Machining safety	25	Guards used on drill press; secured; band saw--pusher used		Had to be prompted		Dangerous worker; did not look out for safety of others	25		





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	PRODUCT EVALUATION	PTS	(A) <i>Highly Proficient</i>	(B) <i>Competent</i>	(C) <i>Partially Competent/Developing</i>	(D) <i>Limited</i>	(E) <i>Major Improvement Required</i>	Possible points	Ratings A - E	Points Awarded
14	Safe product	10	Product was deburred so could be handled safely		Minor deburring problems; but overall safe		Ouch	10		
15	Durability, reliability and load appropriate	25	Appropriate materials, fasteners and design made the product durable for use in an industrial environment		Minor design issues could have improved the durability		Not at all durable	25		
16	Function	25	Product met the needs of the problem presented		Will basically work		Will not serve the needs of the problem	25		

	WORK HABITS	PTS	(A) <i>Highly Proficient</i>	(B) <i>Competent</i>	(C) <i>Partially Competent/Developing</i>	(D) <i>Limited</i>	(E) <i>Major Improvement Required</i>	Possible points	Ratings A - E	Points Awarded
17	Work Attitude	15	Alert to finding and correcting problem		Honestly attempted to find and correct problems		Showed frustration in finding and correctly problem	15		





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18	Work Procedure	25	Always followed standard procedures; demonstrated planning and organization skills in correcting the problem	Complied with standard procedures; Showed some plan and organization in working	Did not follow standard procedures; Disorganized and slipshod methods ;	25		
19	Professionalism	20	Work showed pride in accomplishment	Tried hard and shows promise	Work lacks praiseworthy factors	20		
20	Self-confidence	15	Appeared comfortable and posed when performing tasks	Fairly self-confident; occasionally disconnected	Hesitant, timid, uncertainty	15		
21	Knowledge of job	25	Has an exceptionally thorough knowledge of the job	Has good knowledge but needed coaching	Has inadequate knowledge of job	25		

Total Points





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