Multi-State Advanced Manufacturing Consortium

US DOL SPONSORED TAACCCT GRANT: TC23767

MSAMC Master Performance Based Objectives (PBO) Review Template

Instructions

The following tab lists PBOs for the topic area ***Pneumatics*** . Please review each of the PBOs, and rate each PBO with one of the following ratings:

1 = Skill or understanding is required for employees.
2 = Skill is useful, but is not crucial for employees.
3 = Skill is not useful for employees, or isn't relevant for typical work assignments.
0 = PBO is unclear.

Additionally, for each PBO, note any comments or recommendations that you may have about how to improve the PBO. If any PBOs or skill sets seem to be missing from the list, please add them in the space at the bottom of the list.

Please enter your information below	
Name:	
Company/Plant:	
Department/Division:	
Industry/Segment:	
Email:	
Phone:	

Pneumatics

M-S AMC Industry Partner PBO Review

Please review the following PBOs to identify the appropriate skill set for a given job title / category / classification (see row 10 below).

* In the "**Importance**" column, identify how important each PBO is for someone in the relevant position. For each PBO, type 1 if the PBO must be covered in the coursework, enter 2 if the PBO is helpful but not necessary and would not impair the performance of the employee in the workplace if missed, and enter 3 if the PBO would not benefit the student or doesn't apply to the typical work assignments. If you don't understand the PBO, enter 0.

* Note any comments or feedback for improving each PBO (in the "Comments" column).

Note: It is the intention of competency based instruction to have each student individually demonstrate their proficiency of the skills indicated.

Reviewing PBOs fc ***TYPE JOB TITLE HERE*** (from whose perspective are you rating PBO importance?)

Sub-Topic	Level	Topic	PBO ID	Performance Based Objective (PBO)	Importance 1 = Need 2 = nice to have 3 = N/A 0= Don't understand	Comments *Notes to improve the PBO, PBO is unclear, etc.*
	1	PN	1	Match the following force & energy transmission terminology related to Pneumatic technology with its proper definition: - Pascal's Law - Mechanical force multiplier - Intensifier - Vacuum - Gas molecular energy - Gas temperature and pressure - Gas expansion - Heat of compression - Friction - Flow rate - Velocity		
	1	PN	2	Match each type of Pneumatic pressure or vacuum gage, and scale to its proper description. (Includes: absolute, gauge, atmospheres, Bars, milli-bars, inches of water and inches of mercury)		
	1	PN	3	Match the Pneumatic component's name with its industry standard schematic symbol and function.		
	1	PN	4	Solve for unknown quantities when given two of the three variables, force, pressure, and area.		
	1	PN	5	Approximate the change in actuator speed when given a percentage of change in the following: - CFM - Load - Actuator volume		
	1	PN	6	Match the following characteristics of a directional control valve when given its schematic symbol: - Number of positions - Number of ways and ports - Center condition - Methods of control - Methods of actuation - Detent action (if used) - Centering of offset mechanism (if used)		

	1	**PN**	**7**	Match the method of control associated with the following types of flow control valves: - Ball valve - Needle valve - Globe valve - Fixed orifice	
	1	**PN**	**8**	Sketch the different types of metering circuits and choose the most preferred.	
	1	**PN**	**9**	List the different applications of check valves in a given pneumatic diagram.	
	1	**PN**	**10**	Label the following items when given the cross sectional views of various types of pneumatic actuators: - Rod gland seals - Wiper seals - Piston seals - Stop tubes - Stroke adjustors - Cushions	
	1	**PN**	**11**	Match the circuit function of the following pressure control valves to their symbols and names: - Regulator - Sequence valve - Venting regulator - Pilot controlled regulator - Pressure relief valve	
	1	**PN**	**12**	List the various types, functions, symbols and features of the following pneumatic valves: - Check - Directional control - Flow control - Pressure regulator - Sequence	
	1	**PN**	**13**	List the purpose, function, and features of the following miscellaneous pneumatic devices: - After coolers - Dryers - Receivers - Surge tanks - Accumulators - Compressors	
	1	**PN**	**14**	List the long term symptoms associated with a lack of preventive maintenance of the following: - Dryers - Lubricators - Filters - Air receivers - Coalescing filters - F-R-L	
	1	**PN**	**15**	Convert readings in P.S.I.A. to the following units using text references: - Inches of mercury - Inches of water - PSIG - Bars - Atmospheres	
	1	**PN**	**16**	Match the following pneumatic terms to their definitions and applications: - Isothermal - Absorption - Adiabatic - Adsorption - Desiccant	

	1	**PN**	**17**	Match the following components with a description of their function and their symbol: - Mufflers - Silencers - Filters - Lubricators - FRLs		
	1	**PN**	**19**	Sketch, construct, and debug the following circuit: a standard single-acting cylinder circuit controlled by a 2 position, 3-way valve. (Manual operation)		
	1	**PN**	**20**	Sketch, construct, and debug the following circuit: a standard double-acting cylinder circuit controlled by a 5 ported, 2 position directional control valve. (electrically controlled)		
	1	**PN**	**21**	Sketch, construct, and debug the following circuit: a pneumatic circuit that demonstrates the “AND” function.		
	1	**PN**	**22**	Sketch, construct, and debug the following circuit: a Two-hand start and auto pneumatic circuit controlling a double acting Cylinder.		
	1	**PN**	**23**	Sketch, construct, and debug a pneumatic circuit that demonstrates the proper use of a quick exhaust valve.		
	1	**PN**	**24**	Sketch, construct, and debug the following circuit: a single acting and a double acting cylinder sequenced so that the single acting cylinder extends second. Uses all pneumatically operated valves with pneumatic limit switches.		
	1	**PN**	**25**	Sketch, construct, and debug the following circuit: a single acting and a double acting cylinder sequenced so that the single acting cylinder extends second. Uses all pneumatically operated valves with a pneumatic sequence valve.		
	1	**PN**	**26**	Sketch, construct, and debug the following circuit: a pneumatic circuit that extends 2 cylinders uses reduced force on the second cylinder.		
	1	**PN**	**27**	Sketch, construct and debug a pneumatic circuit that controls the extend and return of two cylinders. The second cylinder extension is delayed 5 seconds by a Pneumatic timing circuit.		
	1	**PN**	**28**	Sketch, construct, and debug the following circuit: a pneumatic circuit that uses a shuttle valve associated with pneumatic start buttons.		
	1	**PN**	**29**	Sketch, construct, and debug the following Pneumatic circuits (to control a cylinder) providing particular functions such as: - Automatic return - Logic control (OR, AND, NOT) - Speed control - Pressure sequencing - Reduced actuator forces - Timing		

	1	**PN**	**30**	With the available lab components, safely connect, operate, and analyze the operation of the following Pneumatic circuits using the pneumatic trainer and available gauges: - Flow control - Hi/low pressure clamping - Deceleration - Oscillating shuttle - Cylinder directional control with 3 way valves - Cylinder directional control with 4 way valves - Double acting cylinder with 3-way directional valve control - Double acting cylinder with 4-way directional valve control - Double acting cylinder with 4-way directional valve control pilot operated - Double Acting Cylinder with 4-Way Directional Valve Control and Flow Controls - Double Acting Cylinder with 4-Way 5-Port Pilot Operated Directional Valve with Integral Flow Controls - Double Acting Cylinder with Quick Exhaust and Flow Control - Two Cylinder Sequencing Circuit - Two Cylinders with Dual Pressure and Manually Sequenced Operation - Double Acting Cylinder with Dual Pressure and Single 3-way Directional Control Valve	
	1	**PN**	**31**	Using plant working drawings perform the following: (Written exercise with prints) - Identify the proper name and function of all pneumatic components - Identify the circuit action if any component fails in an open or closed position - Select which indicators and manual valve operators could be used to isolate the failed component	
	1	**PN**	**32**	Identify the possible danger associated with spring off-set directional control valves (when power is removed).	
	1	**PN**	**33**	Using plant working drawings, predict the direction of pneumatic fluid flow when given the state of all directional control valves and predict the circuit response to a change of all adjustable controls.	
	1	**PN**	**34**	Match the operation and application of Electro-pneumatic components to such devices as valves, electrical sensors, transducers and actuators.	
	1	**PN**	**35**	Draw the symbols for standard ANSI Electro-pneumatic components such as valves, electrical sensors, transducers and actuators	

	1	**PN**	**36**	With the available lab components, sketch, construct, and debug the following Electro-pneumatic circuits providing particular functions such as: - Ladder Diagram and Pilot Control - Pilot Control of a Single Acting Cylinder - Pilot Control of a Double Acting Cylinder - Memory Control - Automatic Return - Latching - AND Logic Function - OR Logic Function - NOT Logic Function - Logic Combinations - Proximity Sensors - Timers - Counters - Emergency Stop		
	1	**PN**	**37**	Troubleshoot faulty pneumatic and electro-pneumatic circuit operation on training simulator with instructor induced faults.		
	1	**PN**	**38**	Given the formulas for the following fluid power laws/principles, Demonstrate the ability to transpose and solve for unknown variables: - Pascal's Law - Cap and Annular Areas and volumes - Boyle's law - Charles' Law - Guy-Lussac's law		
	1	**PN**	**39**	Demonstrate the ability to adjust vacuum generators (ejectors) on material handling applications.		
	1	**PN**	**40**	Given plant working drawings (with and without manifolds) and the state of all directional control operators, draw all paths for fluid flow and predict the circuit response associated with all adjustments and solenoid actuation.		

Additions: Please add any additional objectives that we may have overlooked.

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