Manufacturing

Pathway: Manufacturing Production Process Development

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
MNPA01.01	Customer Needs	#7: Strategies to Ensure Continuous Improvement in Manufacturing	Produce a product to satisfy customer desires.	Conduct in-depth investigation to identify customer needs.	Explain the impact of the customer's intended use of a product on every phase of the manufacturing process.
					Meet needs of both internal and external customers.
					Maintain liaison with customer contacts.
					Review, maintain, and communicate customer needs and specifications.
					Identify issues that prevent proactive handling of customer needs.
				Verify that needed resources are available for the production process.	Use work orders when handling raw materials, while setting up of tools and equipment, and when scheduling workers to maximize productivity.
					Properly report any discrepancies related to raw materials, tools/equipment, and workers' abilities/availability.
					Identify consequences of not reporting discrepancies in production.
				Relate workers' skills to equipment management to set up equipment for the production process.	Evaluate workers' skills when setting up, programming, and operating equipment required for production.
					Make proper repairs and adjustments to equipment prior to putting into service.
					Verify that the first piece or production meets both product specifications and production capacities.
					Examine how set-up procedures are documented for repeatability.
					Identify possible consequences resulting from failure to meet production standards.

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			(CONTINUED)	Use process control data to monitor fabrication of the product.	Use process control data to indicate that the manufacturing process complies with standards.
					Make the manufacturing process cycle time meet customer and business needs.
					Identify possible consequences resulting from failure to perform operations safely.
					Verify that the product meets customer specifications.
					Complete, maintain, and forward to proper parties product and process documentation.
					Verify that production operations comply with all health, safety, and environmental policies and procedures.
				Inspect the product to verify that it meets specifications.	Verify the calibration of the testing equipment.
					Follow the established sampling plan and inspection policies/procedures.
					Predict consequences of failure to identify promptly any product and production process that does not meet specifications.
					Complete inspection documents accurately and forward them to proper parties.
					Following appropriate testing/production tools and procedures.
					Make adjustments needed to bring the production process back into specification.
					Make necessary adjustment in the manufacturing process in a timely manner.

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			(CONTINUED)	Document product and process to assure formal compliance with customer requirements.	Write compliance documents legibly in the appropriate format and store them in a safe, secure place.
					Completing compliance documentation, obtain “sign off,” and forward to the proper parties.
					Distinguish between products that are labeled appropriately for compliance and products that are not appropriately labeled for compliance.
				Check for specified quantities and proper documentation to prepare a final product for shipping or distribution.	Package materials to meet packaging and shipping specifications (including proper labeling).
					Complete package documentation and customer shipping instructions to accompany the product to the next destination.
					Communicate product availability to the proper parties in a timely manner.
					Check relevant information such as quantity, destination and packaging instructions against the work order.
					Verify that product is correctly stored or staged for shipping.
					Explain the significance of following all laws and regulations related to labeling, packaging, and transport.
					Verify that material handling procedures are followed to prevent product damage.

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MNPA03.01	New Manufacturing Process	#8: Manufacturing Production Processes	Implement new manufacturing process.	Research the new manufacturing process.	Review current processes completely to determine any changes that are needed to meet customer requirements.
					Provide research to correct parties to confirm manufacturability.
					Confirm resource requirements accurately.
					Review project materials and processes thoroughly to establish cost estimates.
					Hold customer meetings to confirm customer needs when appropriate.
				Create standard operating procedures (SOPs) for new process.	Identify new tooling and materials.
					Specify new training where required.
					Document new standard operating procedures according to company procedure.
					Make sure that correct parties review new standard operating procedures.
					Verify that standard operating procedures meet customer needs including cost effectiveness.
				Develop new tooling and fixtures.	Fabricate new tooling and fixtures according to design specifications.
					Properly document new tooling and fixtures development process with new material suggestions noted.
					Verify that new tooling and fixtures increase efficiency and cost effectiveness of the process.
					Verify that new tooling and fixtures result in improvement of product quality and a decrease in nonconformance.

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			(CONTINUED)	Set up and program equipment for new processes.	Verify that new equipment or process works to specification and runs efficiently.
					Program equipment to maximize output and quality.
					Make sure that equipment program is concise and understandable by others.
					Set up equipment or process in a timely way.
					Continue test runs until product specifications and efficiency levels are met.
					Download equipment program and store correctly.
				Schedule and test new processes.	Verify that schedules for testing new processes are complete and detailed.
					Follow standard procedures when making a testing schedule.
					Conduct review on the new process to determine readiness for implementation.
					Verify that testing is specific and done on a timely basis.
					Include data on usefulness and efficiency with documentation of test results.
					Obtain proper approvals to implement the changes in process determined by the test results.
					Use new or updated processes according to specifications.

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			(CONTINUED)	Monitor production performance data for new processes.	Use up-to-date charts and available statistics to properly document monitoring.
					Used the proper test equipment to monitor production performance.
					Perform the appropriate tests based on customer or manufacturer specifications or company policy.
					Communicate problems effectively to proper parties.
					Use proper measurements.
				Train employees on new processes.	Make sure that training covers appropriate material and is delivered clearly.
					Make sure that employees meet standards on newly trained skills.
					Evaluate training.
					Use evaluations to improve training.
					Verify that training records show training has been delivered.
					Use training to establish certification.
				Prepare documentation on new processes.	Make sure that documentation is complete, accurate, and legible.
					Use company procedures to complete documentation in a timely way.
					File documentation properly.
					Solicit input from workers to ensure that documentation is useful.

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MNPA04.01	Safety	#3: Employment in Manufacturing Occupations #6: Safety in the Workplace	Maintain a safe and productive workplace.	Follow local, federal and company regulations to perform environmental and safety inspections.	Identify, report and monitor potential hazards in the workplace.
					Take corrective action to correct potential hazards.
					Review health, safety, and environmental documentation and policies thoroughly and regularly.
					Ensure that inspections meet all relevant, health, safety, and environmental laws and regulations.
					Complete inspections according to company schedule and procedures.
					Document inspection records and store them correctly.
				Participate in emergency response teams to perform emergency drills.	Confirm that first aid training and certification on emergency and first aid procedures are complete and up-to-date.
					Comply with company and regulatory policies and procedures to respond to emergencies.
					Document emergency drills and incidents according to company and regulatory procedures promptly.
				Identify unsafe conditions and take corrective action.	Identify, report, and document conditions presenting a threat to health, safety, and the environment.
					Identify corrective actions.
					Consult appropriate parties about corrective actions and take corrective actions following company procedures promptly.
					Track and report ongoing safety concerns until corrective action is taken.

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			(CONTINUED)	Provide safety orientation to train other employees in safe practices and emergency procedures.	Verify that all topics and procedures are covered in orientation to facilitate employee safety.
					Observe orientation to ensure that it makes clear the need and processes for employees to raise safety concerns, ask questions, and receive additional training.
					Use company requirements to document orientation.
					Verify that orientation meets all relevant laws, policies, and regulations.
					Deliver safety instruction and updates on a regular schedule.
MNPA05.01	Quality Improvement	#5: Quality Assurance Concepts and Techniques	Maintain quality and implement continuous improvement processes.	Perform periodic internal quality audit activities.	Complete all audit forms correctly in a timely manner.
					Forward forms to the correct parties.
					Verify that audit data is relevant and correct.
					Make sure that conformances to quality standards are properly assessed and documented.
					Include observation of operation in audit when appropriate to ensure performance meets specifications.
					Follow company and other required schedules and procedures to perform audit.
				Check calibration of gauges and other data collection equipment.	Follow specifications to implement calibration schedule.
					Review documents and use thorough careful observation to check instrument certification during use.
					Recalibrate instruments that are out of calibration or refer them to the appropriate parties for recalibration or repairs immediately.

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			(CONTINUED)	Suggest continuous improvements.	Use observations and data analysis to generate potential improvements.
					Verify that suggestions communicate measurable and data-driven benefits to the company, its customers, and employees.
					Use proper procedures and documentation to make suggestions.
					Make sure that all suggestions show that all data was reviewed prior to making recommendation.
				Inspect materials at all stages of process to determine quality or condition.	Follow schedule and procedures to complete sampling and inspection.
					Select and use inspection tools and procedures correctly.
					Inspect materials against correct specifications.
					Identify materials that do not meet specification correctly.
					Take corrective action on out-of-specification material.
					Document inspection results properly.
					Report inspection results to correct parties.
				Document the results of quality tests.	Check data forms to ensure that they are complete and accurate.
					Make sure that information is evaluated and interpreted correctly.
					Forward data to correct parties.
					Select and use correct analytical tools properly.
				Make adjustments to restore or maintain quality.	Make sure that appropriate corrective actions are identified and approvals received when needed.
					Make adjustments to eliminate deviations and bring the process back into control.
					Make adjustments in a timely manner.
					Document adjustments properly.

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MNPA06.01	Communications	#3: Employment in Manufacturing Occupations	Communicate with co-workers and/or external customers to ensure production meets business requirements.	Use speaking and presentation skills to effectively communicate safety, training, and job-specific needs.	Ensure that safety issues are understood and safety practices are being used.
					Explain the significance of on-the-job issues and concerns being discussed and quickly resolved.
					Identify current and future training issues in a timely way.
					Verify that communication shows knowledge of both customer and business needs.
					Be clear and relevant with communications related to safety, training, and job-specific needs.
					Communicate in a timely and accurate manner to the correct parties.
					Evaluate, track, and report back safety, training, and job-specific issues to original communicator.
					Track and document communications related to safety, training, and job-specific needs.

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Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Be timely and accurate in communicating material specifications and delivery schedules.	Make sure that communication reflects knowledge of material specifications.
					Communicate delivery schedules clearly.
					Make sure that communication shows knowledge of both customer and business needs.
					Make sure that communication is clear and relevant to material and delivery issues.
					Communicate in a timely and accurate manner to the correct parties.
					Evaluate, track, and report back material and delivery issues to original communicator.
					Track and document material specifications and delivery schedules.
				Communicate production requirements and product specifications.	Make sure that communication reflects knowledge of production requirements, levels, and product specifications.
					Initiate communication to meet production requirements, product specifications, or other customer or business needs cross-functionally as required.
					Notify all parties of production issues and problems in a timely way.
					Make sure that communication shows knowledge of both customer and business needs.
					Make sure that communication regarding production and products is clear and relevant.
					Evaluate, track, and report production and product issues back to original communicator.
					Track and document communications related to production requirements and product specifications as appropriate.

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Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
MNPA07.01	Continuous Improvement	#7: Strategies to Ensure Continuous Improvement	Suggest and/or implement continuous improvement actions.	Analyze data to identify potential problems.	Apply quality tools and techniques properly to determine the source of potential quality problems.
					Continuously reassess process capability.
					Validate process and product measurement systems.
					Adjust process and product measurement systems as required.
					Report quality data to appropriate parties in a timely manner.
				Monitor process capability.	Make sure processes meet manufacturer and other quality specifications.
					Make sure processes meet company or customer capability requirements.
					Make sure that process meets on-time delivery needs of the customer.
					Report analyzed process capability data according to procedures.
					Use results of capability studies to adjust product or process.
					Distribute results of capability studies to appropriate parties.
				Monitor customer satisfaction.	Use appropriate data to measure customer satisfaction.
					Implement surveys and other customer data techniques in a timely manner.
					Report returned goods to appropriate parties for review.
					Include vendor certifications with customer documentation.
					Document on-time delivery data appropriately.
					Review field failure and product life data in a timely manner.

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			(CONTINUED)	Measure and record product and process outcomes.	Use proper format to record product and process outcomes within the specified timeframe.
					Use appropriate quality analysis and statistical techniques to analyze performance.
					Report outcomes to all appropriate parties.
				Participate in making new work procedures.	Translate recommendations for continuous improvement into new work instructions.
					Publish work instructions in appropriate format.
					Distribute work instruction according to standard procedures.
					Discuss new work procedures or instructions with all stakeholders to ensure support for improvements.
				Implement approved recommendations.	Make recommendations for continuous improvement that are clear, concise, and based on data trends and patterns.
					Make recommendations in such a way that draws support for process improvement.
					Verify that all stakeholders understand their role in process improvement changes.
					Document accepted process improvements before translating into revised work processes and procedures.
				Check that final product meets customer and business needs.	Verify that final test results meet customer requirements.
					Produce product within company time and cost parameters.
					Take action to minimize negative customer feedback on quality issues.

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MNPA08.01	New Product Development	#9: Design for Manufacturability	Produce new product to meet customer needs.	Conduct research for new products.	Document research and test results properly.
					Complete testing, including trial runs, on new products and services.
					Use research to modify production processes as appropriate.
					Provide research on new products to the customer for approval before producing new product.
				Obtain required supplies.	Make correct supplies available at workstation.
					Communicate inventory shortages and defects effectively to correct parties.
					Check supplies against work order.
					Review supply records and history completely.
				Execute process to produce new product.	Follow standard operating procedures.
					Meet production timeline.
					Continually check product for quality.
					Analyze production sequence for capability and efficiency.
					Perform production sequence safely.
					Deliver product that meets specification to next production station in a timely way.
				Inspect product for deviations from specifications.	Evaluate product quality against specifications.
					Communicate deviations from specifications effectively to correct parties.
					Handle out-of-specification products properly according to company procedures.
					Document inspections properly according to company procedures.
					Conduct inspections continuously.

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Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Evaluate prototypes for manufacturability.	Pilot test prototype for manufacturability thoroughly.
					Check manufacturing plans for the prototype against existing resources.
					Communicate results of the evaluation effectively to correct parties in a timely way.
					Document evaluation properly according to company procedures.
					Solicit feedback from operators and accurately document it.
					Verify that resulting product meets customer requirements and specifications.
				Solve production process problems.	Document problems and suggested solutions properly.
					Communicate problems and solutions effectively to the correct parties.
					Solve problems with minimum downtime.
					Minimize negative impact on other workstations and the overall process while solving problems.
					Implement approved solutions efficiently and effectively.
				Deliver finished product to next stage in production process.	Deliver product according to schedule and customer delivery timelines.
					Include complete shipping records and documentation with the product.
					Notify customers of product status properly.
					Label package properly.

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Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
MNPA09.01	Production Process	#8: Manufacturing Production Processes	Improve production processes.	Conduct research for new products.	Collect all relevant data for the audit in a timely way.
					Use past production data and current production goals to evaluate audit data.
					Perform audits according to the proper schedule.
					Communicate discrepancies to the proper parties in a timely way.
					Make sure that audit report is complete including all supporting data and analyses.
					Submit audit report according to company procedure.
					Verify that problems are identified because audit results are used in a timely way.
				Propose changes to improve products and processes.	Make suggestions for improvement in a timely way.
					Verify that product quality improves.
					Verify that production time decreases.
					Follow-up on proposals containing supporting materials for justifications with correct parties.
					Use company procedures to make proposals.
					Evaluate suggestions for effectiveness.
					Verify that suggestions meet quality and safety standards.
					Document proposals properly.
					Implement proposed changes.

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Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Develop production improvement goals.	Set realistic and attainable goals.
					Make sure that goals meet technical standards.
					Write goals that are specific, simple, understandable, and measurable.
					Verify that goals are consistent with business objectives.
					Document goals properly according to company procedures.
					Communicate goals to correct parties in a timely way.
				Inspect product for deviations from customer and product standard(s).	Compare product to the correct customer and company standards.
					Perform inspections according to company procedures in a timely way.
					Verify that inspections completely and accurately identify deviation from specifications.
					Document inspections properly according to customer specifications and company procedures.
					Conduct inspections continuously to ensure that standards are maintained throughout the process.
					Handle out-of-compliance product correctly according to company procedure.

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Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Correct product or process problems.	Make corrections immediately upon identification of a problem.
					Make corrections according to company procedures.
					Identify underlying or root cause of problem.
					Address underlying or root cause of problem.
					Test corrective actions to determine if the problem is solved.
					Document problems and corrections properly.
					Communicate problems and corrections effectively to correct parties.
					Handle out-of-compliance product correctly according to company procedure.
					Perform any rework or remediation needed to bring product into specifications in a timely way.

Additional Recommended CTE/Degree Major Course:

#4: Applications in Manufacturing Technology

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