

# **Appendix P**

## **MANUFACTURING YOUTH APPRENTICESHIP**

### **PRODUCTION OPERATIONS MANAGEMENT (UNIT 9)**

## Unit 9: Production Operations Management Pathway

### Production Control

#### Competency

#### 1. Assist in purchasing materials and supplies

#### Performance Standard Condition

##### **Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

#### Performance Standard Criteria

- Learner purchases only from pre-qualified suppliers
- Learner tracks and maintains order and receipt schedules
- Learner uses re-order points to minimize back-orders.
- Learner assists worksite professional to inspect materials against quality specifications
- Learner reports material quality deviations to production
- Learner releases materials that meet specification to production
- Learner reports receipt of goods to correct parties
- Learner documents count and delivery accurately
- Learner reports back and documents any material and/or delivery issues to vendors

#### Learning Objectives

- Describe the supplier qualification process at the worksite
- Define logistics
- Describe how logistics is used in your facility to keep costs low
- Explain the process used to manage order, receipt, and delivery externally and internally with a manufacturing facility
- Explain the importance of tracking and documentation for inventory control and production processing
- Describe how to read bills of lading and routing sheets
- Explain how automated purchasing systems work to minimize waste
- Describe how purchasing costs are negotiated

#### Comments:

## Unit 9: Production Operations Management Pathway

### Production Control

Competency

#### 2. Distribute materials and products to customers

Performance Standard Condition

##### **Competence will be demonstrated**

- at the worksite
- internal and/or external customers

Performance Standard Criteria

- Learner monitors location of pieces/products during production
- Learner stores final products for distribution according to production requirements
- Learner stages or arranges for staging of order to be distributed
- Learner checks accuracy of order
- Learner assists worksite professional to verify order is packaged appropriately
- Learner ensures packaging includes proper labeling, safety requirements, and shipping/packaging instructions
- Learner checks that packaging meets customer specifications
- Learner uses packaging methods that keep returns and claims for damaged and improperly packaged goods to a minimum
- Learner verifies that most appropriate and cost-effective carrier or method is used to distribute product
- Learner creates packing slip and bill of lading
- Learner arranges for material or product transport
- Learner handles order in manner to prevent damage
- Learner makes sure product is shipped on time
- Learner tracks shipping of products sent
- Learner documents shipping activities
- Learner follows up with customer to ensure no customer complaints about the shipment or damaged goods
- Learner assists worksite professional to process claims as applicable

## Learning Objectives

- Explain the process used to manage order, receipt, and delivery externally and internally with a manufacturing facility
- Explain the importance of tracking and documentation for inventory control and production processing
- Describe the labeling for specific material hazards
- Explain how to open, handle, and transport any specially labeled item such as hazardous materials
- Explain how packing materials determine packing requirements
- Describe packing material
- Identify the three basic elements of a transportation system
- Identify the main methods of transporting products
- Analyze transportation trends
- Describe the role of the government in transportation of goods
- Interpret tariffs
- State what must be listed on the documentation that accompanies a hazardous materials shipment
- Explain how customer shipping instructions determine packing requirements
- Explain how packing materials determine packing requirements
- Compare packing materials to determine the safest and most cost-effective method of shipping
- Discuss how to schedule logistic functions with respect to production requirements and production levels

## Comments:

## Unit 9: Production Operations Management Pathway

### Production Control

Competency

#### 3. Manage inventory

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

- Learner checks container to verify that packing has proper labeling and meets safety regulations
- Learner checks containers to check for damage or contamination of materials
- Learner verifies that product matches the purchase order and description
- Learner identifies any defective materials
- Learner notifies appropriate parties and takes appropriate corrective action when defective materials are identified
- Learner monitors location of pieces/products during production
- Learner assists worksite professional to monitor master production schedule and inventory master file for ordering levels
- Learner assists worksite professional to perform inventory checks
- Learner checks that proper storage levels are maintained
- Learner checks that cycle counts for raw and finished goods meet established standards
- Learner rotates raw materials and stock to minimize old and outdated inventory
- Learner assists worksite professional to implement monitoring activities to prevent disruption of production flow and to ensure movement of inventory in an efficient and cost-effective way
- Learner helps prepare and distribute monitoring reports in a timely way to the proper parties, including any inaccuracies
- Learner assists with inventory inaccuracies investigations
- Investigations are complete, timely, and include indication of root cause

## Learning Objectives

- Explain the purpose of an inventory plan
- Discuss the reason for the distribution network of the inventory plan
- Explain the importance of the maintaining inventory levels to minimize inventory value
- Maintain inventory of raw material and finished goods to meet customer demands.
- Identify the main types of inventory
- Identify the costs of maintaining inventory
- Define buffer management
- Identify the elements of a supply chain
- Explain how to read a production schedule and manufacturing work order
- List methods of productivity measurement and just-in-time inventory control
- Discuss the timing of inventory audits to production requirements
- Describe your facility's policy in the event of inventory shortage
- List examples of situations that indicate the need for a review storage and retrieval systems to determine if upgrades and replacement are warranted

## Comments:

## Unit 9: Production Operations Management Pathway

### Production Control

Competency

#### 4. Assist with resource planning

Performance Standard Condition

##### **Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

- Learner assists worksite professional to analyze a supply and distribution system
- Learner assists worksite professional to map the production flow of the materials and process
- Learner assist worksite professional to develop a materials requirements plan (MRP)
- Learner assesses equipment specification, site constraints, and process requirements
- Learner compares costs related to materials, structure issues, capacity, and staff performance and training
- Learner uses research and data to identify areas of waste
- Learner suggests improvements to process flow and to reduce lead time
- Learner assists worksite professional to develop a resource plan for implementation
- Learner assists worksite professional to implement resource plan
- Learner assists worksite professional to monitor and evaluate implemented resource plan

Learning Objectives

- Define the following resource planning terms: lean manufacturing, just-in-time production, process flow, lead time, build to demand, kanban, work cell design, and push-pull systems
- Compare and contrast the different types of production process flow design advantages, constraints, and costs
- Describe facility design issues and their impact on resource planning
- Describe equipment specification issues and their impact on resource planning
- Explain the impact of production, services, and maintenance on resource planning

**Comments:**

## Unit 9: Production Operations Management Pathway

### Production Control

Competency

#### 5. Assist with financial management

Performance Standard Condition

##### **Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

- Learner assists worksite professional to process financial information such as bills of lading, accounts receivable, and accounts payable records
- Learner assists worksite professional to evaluate costs involved in a specific production process
- Learner assists worksite professional to budget for new product development or production
- Learner assists worksite professional to prepare financial reports as requested

Learning Objectives

- Define cost estimating, cost justification, cost rollup, and activity based costing
- Describe the costs and need for sales and marketing in manufacturing
- Discuss the impact of globalization and international trade on manufacturing
- Compare tangible versus intangible costs and benefits in production of your product(s)
- Define accounts receivable and accounts payable
- Compare accounting systems and how they impact business operations
- Discuss the costs involved with facilities, equipment, materials, support services, and staff training as they impact cost to produce and distribute

**Comments:**

## Unit 9: Production Operations Management Pathway Quality Management

Competency

### 1. Analyze production processes

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional/team

Performance Standard Criteria

**Performance will be successful when:**

- Learner assists worksite professional/team to evaluate a production process
- Learner uses quality tools such as system maps, attribute data, and control charts to analyze the current process
- Learner analyzes the process to identify staff, tools, equipment, materials, environment, training, safety requirements, and procedures required to produce product
- Learner calculates productivity and/or cycle time for the process
- Learner assists worksite professional/team to identify gaps and brainstorm solutions in productivity

## Learning Objectives

- Identify trends in manufacturing
- Describe potential impacts of current trends
- Describe the management structure of the facility
- Relate quality to internal and external customer needs
- Explain the importance of producing quality products at the lowest possible cost
- List the major stages involved in producing products
- Identify resources needed for production
- Explain the impact of material specifications and delivery schedules to all internal and external customers
- Identify factors that influence which production processes and technology are used
- Describe how efficiency increases productivity
- Explain how processes are designed around customer needs and product specifications
- Discuss how staffing, equipment, materials, and environment are analyzed in developing production processes
- Explain the role of production in ensuring efficient use of resources
- Compare and contrast advantages and disadvantages of different types of production principles such as Lean, Mass, Batch, Unit, Continuous, Kanban, Kaizan, etc.
- Calculate productivity and/or cycle time
- Compare manual production with computer integrated manufacturing (CIM)
- Explain how staff training & safety requirements impact production processes
- Identify the roles of management and workers regarding quality
- List the key elements of a quality system
- Determine how quality monitoring processes are built in to produce a quality product
- Describe how new or revised Standard Operating Procedures (SOPs) are implemented in your facility

## Comments:

## Unit 9: Production Operations Management Pathway

### Quality Management

Competency

#### 2. Calibrate tools and instruments

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

- Learner follows schedule to calibrate tools and instruments
- Learner checks tool/equipment certification regularly by reviewing documentation and through observation of use
- Learner cleans and adjust instruments before calibrating
- Learner calibrates tools and instruments accurately and correctly
- Learner promptly re-calibrates tools out of calibration or sent out for recalibration repairs according to procedure
- Learner labels tools and equipment that have been calibrated
- Learner documents all calibration activities

Learning Objectives

- Define calibration and how it is performed
- Compare and contrast accuracy versus precision
- Explain tolerance
- Describe how tolerances and precisions are developed for a piece/product
- Explain how calibration precision and schedules are determined
- Describe the proper use of selected precision measurement tools
- Explain how to determine and control potential sources of measurement error
- Discuss how to apply calibration methods to control product and process characteristics

**Comments:**

## Unit 9: Production Operations Management Pathway

### Quality Management

Competency

#### 3. Monitor operations for product and process quality

Performance Standard Condition

##### **Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

- Learner develops a piece/final product control/inspection plan from a technical drawing
- Learner reviews process control data to ensure process is meeting product specifications
- Learner evaluates process cycle time to ensure that customer and facility needs are met
- Learner samples and tests materials and products to ensure they meet customer specifications
- Learner regularly compares current equipment performance to optimal equipment operations
- Learner investigates and reports abnormal equipment conditions in a timely manner
- Learner continuously monitors equipment that is corrected to ensure that the corrective action solved the problem
- Learner applies quality tools and methods to situations
- Learner reviews all relevant data before making suggestions
- Learner documents all quality monitoring activities

## Learning Objectives

- Define statistical distributions
- Calculate mean, median, mode and standard deviation
- List possible sources of variation inherent in data collection
- Compare and contrast process vs. product control
- Explain the main functions of feedback control as it is used in quality control
- Identify the purpose of a control chart
- Identify conditions that require preventive or corrective actions
- Identify when to use preventive action and when to use corrective action
- Explain why verification is essential to prevention and correction
- Describe the process of reporting and documenting preventive and corrective actions
- Discuss why preventive/corrective records must be retained
- Explain ways to spot data inaccuracies and respond to them
- Describe quality statistical tools such as histograms, CpK, X bar, and R charts and range
- Describe how to create control charts (variables and attributes)
- Describe different methods of non-destructive materials and/or product testing such as hardness testing and tensile testing for metals.

## Comments:

## Unit 9: Production Operations Management Pathway

### Quality Management

Competency

#### 4. Take corrective action to restore or maintain quality

Performance Standard Condition

##### **Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

- Learner creates a flow chart for a given process
- Learner creates a cause & effect diagram for a given problem
- Learner applies problem solving steps to reported production issues
- Learner reviews previous documentation on similar production issues to identify possible solutions
- Learner creates an improvement plan at the worksite
- Learner determines appropriate action for sub-standard piece/product
- Learner corrects the piece/product and/or process to meet quality standards and bring process back into control
- Learner communicates quality problems
- Learner suggests continuous improvements to process, piece/product, and/or maintenance to improve production and/or reduce waste
- Learner documents corrective actions and their outcome
- Corrective actions occur in a timely manner
- Corrective actions are supported by data
- Learner continually monitors corrective action to validate effectiveness

Learning Objectives

- Define Closed loop corrective action
- Explain the process for root cause failure analysis
- Categorize defect types to determine root cause
- Know Pareto analysis to identify priorities for solving multiple sub-standard product problems

**Comments:**

## Unit 9: Production Operations Management Pathway

### Quality Management

Competency

#### 5. Participate in quality and continuous improvement processes

Performance Standard Condition

##### **Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

- Learner uses quality tools to map a production process
- Learner identifies performance and training issues related to quality
- Learner identifies performance indicators that should be monitored
- Learner assists worksite professional to monitor production operations, equipment, and/or operator performance measures for product and process quality
- Learner reviews quality measures for trends
- Learner assists worksite professional to perform periodic internal quality audit activities including testing of raw materials, of product at different production stages, and prior to final release
- Learner documents the results of quality tests or audits
- Learner assists worksite professional to evaluate customer feedback
- Learner participates in the creation of an improvement plan
- Improvement plan clearly outlines change
- Improvement plan is supported by data

Learning Objectives

- Explain why facilities become involved with improvement processes
- Define continuous improvement
- Explain the purpose of quality management systems
- Learner describes impact of Total Quality Management (TQM) principles and ISO9000 certification
- Explain the purpose of data collection and analysis to quality
- Identify statistical tools used in process improvement
- Describe inspection and auditing procedures
- Identify methods of inspecting materials, processes, and final products
- Explain the purpose of documentation and record keeping for inspections
- Explain the purpose of a quality audit
- Describe the procedures of a quality audit
- Describe how audit results are reported
- Explain how to develop quality procedures, check lists and methods using standards
- List hand held tools used to examine materials

**Comments:**