ROGUE WORKFORCE PARTNERSHIP

# Rogue Advanced Manufacturing Partnership

**Date: Friday, February 17th ◆ 8:00 a.m. to 10:00 a.m.**

**Location: Lithia Corporate Headquarters ◆ 4th Floor, Porsche-Mercedes Room**

**150 N. Bartlett Road ◆ Medford**

**Agenda**

A. **Welcome & Introductions - Mike Donnelly**

B. **Meeting Objectives – Jim Fong**

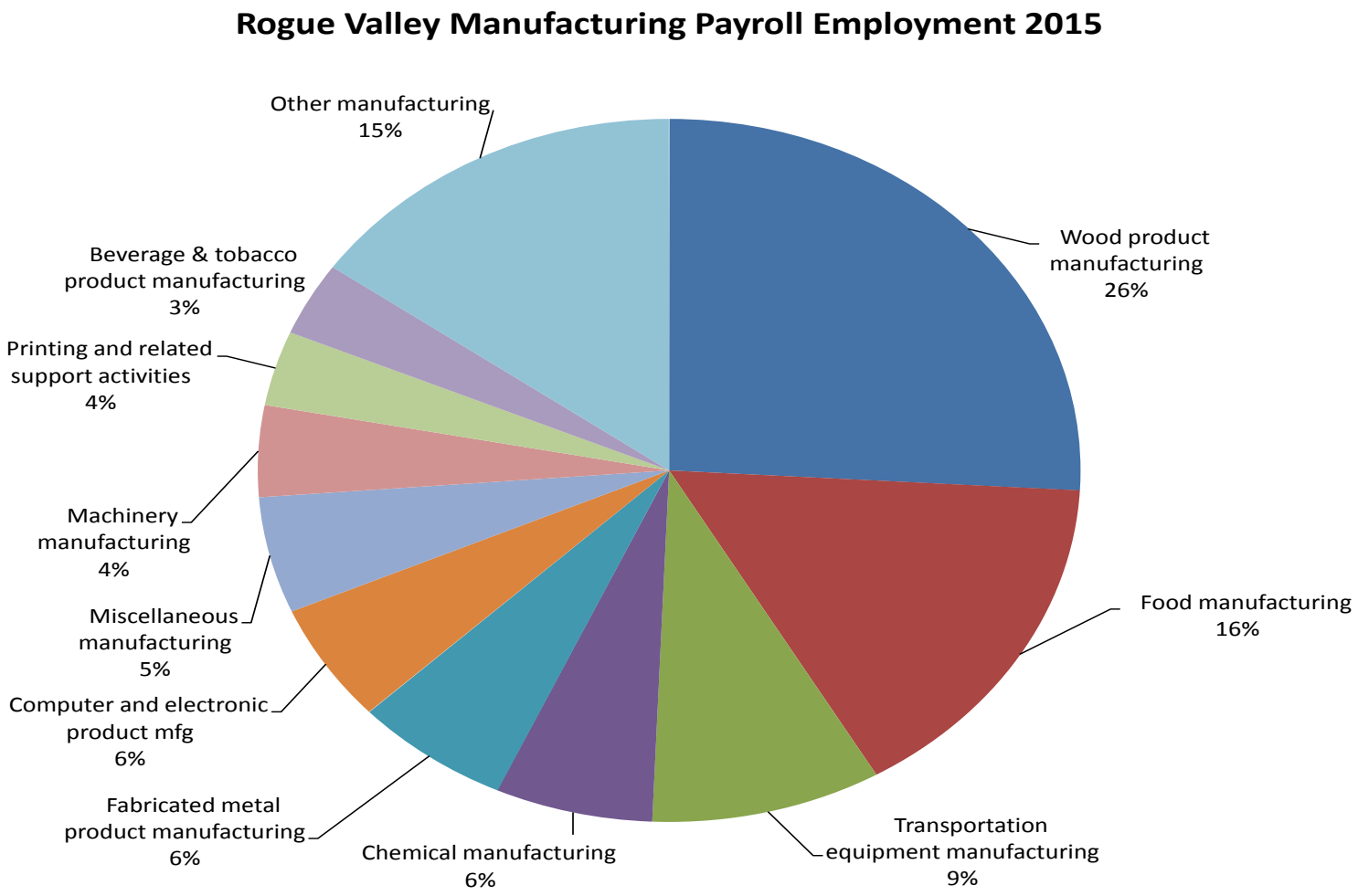
C. **Industry Survey Preliminary Results – Discussion**
   - **Findings**
   - **Implications**
   - **Next Steps**

D. **Draft RAMP Action Plan – Audrey Theis**
   - **Appropriate Goals and Strategies?**
   - **Timeframe?**
   - **Measurable Outcomes?**

E. **Prep for Meeting with Educational Leaders - Discussion**

F. **Next Steps**

# However, one-half of all manufacturing employment falls in transportation equipment, foods, and wood products.



# There are many small manufacturers in the Rogue Valley

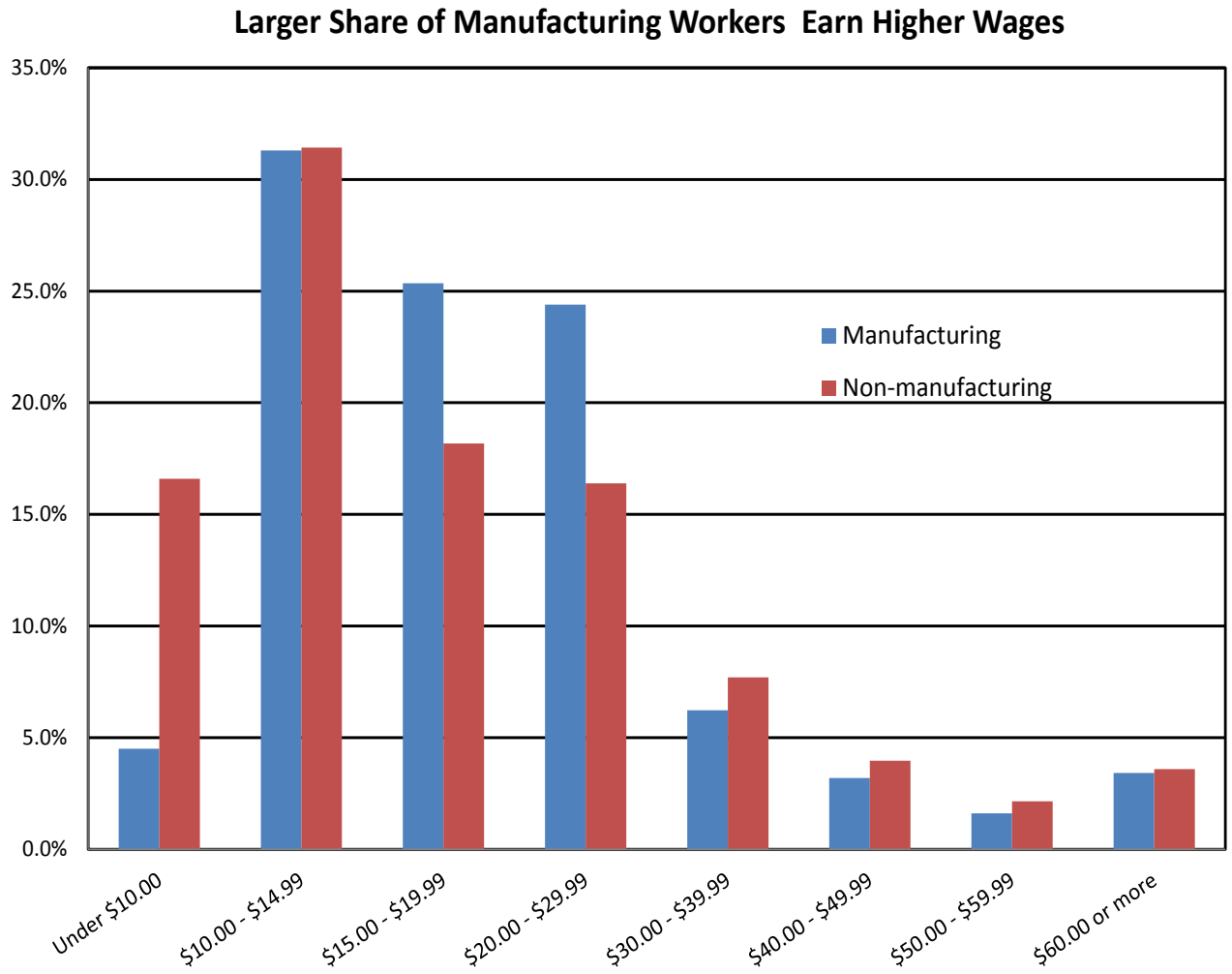
| NAICS | # of Firms | | | | | | |
|---|---|---|---|---|---|---|---|
| | A. 0-4 Employees | B. 5-9 Employees | C. 10-19 Employees | D. 20-49 Employees | E. 50-99 Employees | F. 100+ Employees | TOTAL |
| 311 - Food Manufacturing | 18 | 11 | 6 | 4 | 3 | * | 42 |
| 312 - Beverage and Tobacco Product Manufacturing | 19 | 12 | 6 | 3 | * | * | 40 |
| 314 - Textile Product Mills | 8 | 4 | * | * | * | * | 12 |
| 315 - Apparel Manufacturing | * | * | * | * | * | * | 6 |
| 316 - Leather and Allied Product Manufacturing | * | * | * | * | * | * | 2 |
| 321 - Wood Product Manufacturing | 5 | 5 | 9 | 6 | 4 | * | 29 |
| 323 - Printing and Related Support Activities | 12 | 4 | 4 | 3 | * | * | 23 |
| 324 - Petroleum and Coal Products Manufacturing | * | * | * | * | * | * | 3 |
| 325 - Chemical Manufacturing | 7 | 9 | * | * | 4 | * | 20 |
| 326 - Plastics and Rubber Products Manufacturing | 7 | 4 | * | * | * | * | 11 |
| 327 - Nonmetallic Mineral Product Manufacturing | 8 | 7 | * | 5 | * | * | 20 |
| 331 - Primary Metal Manufacturing | * | * | * | * | * | * | 2 |
| 332 - Fabricated Metal Product Manufacturing | 27 | 15 | 7 | 10 | * | * | 59 |
| 333 - Machinery Manufacturing | 6 | 7 | * | * | 4 | * | 17 |
| 334 - Computer and Electronic Product Manufacturing | 4 | * | 4 | 5 | 4 | * | 17 |
| 335 - Electrical Equipment, Appliance, and Component Manufacturing | * | * | * | * | * | * | 3 |
| 336 - Transportation Equipment Manufacturing | 9 | 3 | 6 | 8 | * | * | 26 |
| 337 - Furniture and Related Product Manufacturing | 18 | 6 | 7 | 3 | * | * | 34 |
| 339 - Miscellaneous Manufacturing | 28 | 9 | 7 | 6 | * | * | 50 |

*This cell is confidential. Firm count and employment total is combined with the next lowest cell when possible.

*Two-thirds of Rogue Valley's manufacturing firms have fewer than 10 employees.*

# Manufacturing has a larger portion of workers in high-wage jobs.

1st Quarter 2015- Rogue Valley




*About 40% manufacturing workers at least $20.00 per hour, compared with one-third (34%) of workers in non-manufacturing industries. A much lower share of manufacturing workers earn less than $10 per hour*

# Expect many manufacturing job openings

- Net job gain of 11 percent (+1,080) in manufacturing expected in the Rogue Valley between 2014 and 2024.

- Growth opening are only part of the story. Replacement openings are expected to account for 2,276 of the manufacturing industry's nearly 3,360 total job openings from 2014 to 2024.

# Manufacturing Technician Level 1 (MT1) Skill Standards

***Measurement***

Demonstrate

1. Using a Decimal Inch Machinist's Rule to Measure a Length
2. Using a U.S. Ruler and Tape Measure to Measure a Length
3. Using a metric ruler
4. Measuring liquids/weights in Metric and U.S. Customary Units
5. Converting Between Common Fraction Inches and Decimal Inches.
6. Convert Between U.S. Customary Units and SI Metric Units.

***Algebra for Manufacturing***

1. Perform correct order of operation to simplify mathematical expressions.
2. Generate linear equations with one unknown for situations described in text.
3. Solve simple linear equations with one unknown.

***Math for Quality***

1. Read and interpret histograms, bar charts, line graphs, and scatter plots.
2. Interpret descriptive statistics: Mean median, mode, and range.
3. Demonstrate *qualitative* reasoning for situations involving statistical data and probabilities.
1. Visually translate from 2D drawings to 3D images and back
    1. Identifying different views for given isometric drawing of an object.
    2. Identifying the different elements of an object in various views
2. Predict behavior of visual representations of simple mechanisms

***Mechanics***

Demonstrate qualitative reasoning about mechanical force and systems involving pulleys, levers, and gears.

1. Determine mechanical advantage of different systems of pulleys
2. Determine effects of different lever configurations on the force required to lift an object
3. Generate different configurations of gears and axels to increase power or speed.

***Fluid Power and Thermodynamics.***

Generate causal explanations of behavior of (a) simple systems involving changes in pressure, temperature and volume, (b) simple hydraulic/pneumatic devices and (c) principles of heat transfer.

1. Predict the effects of changes in pressure on volume and temperature

2. Predict the effects of changes in temperature on volume and pressure
3. Predict the mechanical advantage of simple hydraulic and pneumatic systems.

### *Electricity*

1. Generate causal explanations of the relationship between electrical and magnetic forces and explanations of how electric motors, generators, solenoids, and relay switches behave.
2. Generate causal explanations and predictions of electric circuit behavior involving simple series and parallel circuits containing relays, capacitors, resistors and simple devices such as light bulbs and pumps.

### *Chemistry*

1. Core Concepts: Classify substances as a molecule, element, mixture, or compound; classify changes in substances as chemical reaction, mixture, or physical change; classify and apply characteristics acids and bases; interpret the periodic chart; and classify methods for separating mixtures (filtration, evaporation, distillation).
2. Chemical Reactions: Explain chemical bonding and structural changes that take place in common chemical reactions and interpret chemical formulas and equations.
3. Polymers: Generate explanations of molecular structural difference and physical characteristics between common types of polymers such as slime, flexi- putty, rubber and plastic bags.

### *Manufacturing Processes & Control*

1. Generates the *Sequence of Operation* and a *Flow Diagram* for production tasks and processes.
2. Generate explanations of how electrical-mechanical controls and sensors operate in simple systems and devices.
3. Create flow charts for models (mock-up) of simple computer controlled systems such as a traffic light or washing machine.

### *Quality and Lean Manufacturing Concepts*

1. Identify descriptions of manufacturing quality and lean production initiatives as examples of value stream mapping, waste elimination, 5S, DMAIC, and Total Productive Maintenance (TPM)
2. Create a process map and value stream map to improve a process or reduce waste
3. Demonstrate using a industry standard problem solving method such as DMAIC for improving production processes. Currently using DMAIC.

### *SPC Basic concepts*

1. Determine plausible causes in fluctuations in processes based on statistical information (mean, range, & variation patterns)

### *Business Acumen*

1. Predict how actions, strategies, and decisions impact the bottom line.
2. Classify examples of common business financial terms.

# MSSC CERTIFIED PRODUCTION TECHNICIAN (CPT) KEY WORK ACTIVITIES FOR STANDARDS, TRAINING AND ASSESSMENTS

## SAFETY

1. Work in a Safe and Productive Manufacturing Workplace
2. Perform safety and environmental inspections
3. Perform emergency drills and participate in emergency teams
4. Identify unsafe conditions and take corrective action
5. Provide safety orientation for all employees
6. Train personnel to use equipment safely
7. Suggest processes and procedures that support safety of work environment
8. Fulfill safety and health requirements for maintenance, installation, and repair
9. Monitor safe equipment and operator performance
10. Utilize effective, safety-enhancing workplace practices

## MSSC QUALITY PRACTICES & MEASUREMENT

1. Participate in periodic internal quality audit activities
2. Check calibration of gages and other data collection equipment
3. Suggest continuous improvements
4. Inspect materials and product/process at all stages to ensure they meet specifications
5. Document the results of quality tests
6. Communicate quality problems.
7. Take corrective actions to restore or maintain quality
8. Record process outcomes and trends
9. Identify fundamentals of blueprint reading
10. Use common measurement systems and precision measurement tools

## MANUFACTURING PROCESSES & PRODUCTION

1. Identify customer needs
2. Determine resources available for the production process
3. Set up equipment for the production process
4. Set team production goals
5. Make job assignments
6. Coordinate work flow with team members and other work groups
7. Communicate production and material requirements and product specifications
8. Perform and monitor the process to make the product
9. Document product and process compliance with customer requirements
10. Prepare final product for shipping or distribution

## MAINTENANCE AWARENESS

1. Perform preventive maintenance and routine repair
2. Monitor indicators to ensure correct operations
3. Perform all housekeeping to maintain production schedule
4. Recognize potential maintenance issues with basic production systems, including knowledge of when to inform maintenance personnel about problems with:
   - Electrical systems
   - Pneumatic systems
   - Hydraulic systems
   - Machine automation systems
   - Lubrication processes
   - Bearings and couplings
   - Belts and chain drives

MANUFACTURING SKILL STANDARDS COUNCIL

**"Certifying the Industrial Athlete of the Future"**

# Production Standards

## 2016 Edition

**Manufacturing Skill Standards Council**
901 N. Washington St., Ste. 600
Alexandria, VA 22314
www.msscusa.org

# Background

The Manufacturing Skill Standards Council (MSSC) was officially recognized by the federal National Skill Standards Board (NSSB) in 1998 as the "Voluntary Partnership" for Manufacturing under the bipartisan National Skill Standards Act of 1994. MSSC was mandated to establish the industry-defined core skill standards and certifications needed for frontline work (entry-level through frontline supervisor) common across all sectors of manufacturing.

For this purpose, MSSC assembled in 1998-2001 one of the largest coalitions in U.S. workforce education history: 234 leading corporations and trade associations, 378 Career-Tech Ed (CTE) schools and the leading industrial unions collaborated in developing the standards, which were then validated nationwide with an additional 500 companies and 4,000 frontline workers. This public-private partnership expended $5 million in federal funds and $4 million in an industry in-kind match.

The NSSB formally approved the MSSC Standards in 2001. The U.S. Department of Education promptly used the MSSC Standards to define the manufacturing portion of its "Career Pathways" for the 16 clusters of the economy. The U.S. Department of Labor subsequently used these standards as the research foundation and nomenclature for its Advanced Manufacturing Competencies Model. To ensure that its standards remain current with industry best practice, MSSC updates them annually with industry subject matter experts.

MSSC has partnered with NOCTI, a leading assessment provider, to deliver assessments aligned with these standards, resulting in the Certified Production Technician (CPT) certification. MSSC has also partnered with Amatrol and the Indiana AFL-CIO Labor Institute for Training to develop state-of-the-art, multimedia, interactive computer-based simulation training.

To meet its certification mandate, MSSC developed an industry-defined assessment with NOCTI, a leading assessment provider for industrial occupations, to issue a Certified Production Technician (CPT) certification. Over the years, several other federal agencies and programs have used MSSC's standards-based training and certification programs including the Army, Air Force, Marines, the Department of Veterans Affairs, Job Corps and the federal prison system. In 2009, MSSC became a Founding Partner of the NAM-endorsed Skills Certification System. In 2011, the American National Standards Institute (ANSI) accredited MSSC under ISO Standard 17024 (Personnel Certification) for CPT, making MSSC the only national certification body with this esteemed recognition for manufacturing.

MSSC's Work Standards for Production are organized around five key activity areas.

- ***Safety***
- ***Quality Practices and Measurement***
- ***Manufacturing Processes and Production***
- ***Maintenance Awareness***
- ***Green Production****

*Green Production is not required for full-CPT certification.

# WORK STANDARDS

## Safety

### Key Activities and Performance Indicators

## 1. Work in a Safe and Productive Manufacturing Workplace

a. Recognize ways in which manufacturing affects the national and global economies
b. Recognize systems of safety used by high-performance manufacturers to produce quality products at lowest possible costs
c. Identify the role of production workers in helping to ensure competitive levels of cost, quality and delivery in a safe work environment
d. Identify external and internal customers

## 2. Perform safety and environmental assessments

a. Identify, report and monitor potential hazards in the work
b. Take corrective action to eliminate potential hazards
c. Review health, safety and environmental documentation and policies
d. Ensure that inspections meet all relevant health, safety and environmental laws and regulations
e. Perform inspections according to company schedule and procedures
f. Document inspections
g. Store inspection records correctly

## 3. Perform emergency drills and participate in emergency teams

a. Ensure that training and certification on relevant emergency and first aid procedures are complete and up-to-date
b. Follow company and regulatory procedures for responding to fire and electrical emergencies
c. Ensure that emergency response complies with company and regulatory policies and procedures
d. Document emergency drills and incidents according to company and regulatory procedures

## 4. Identify unsafe conditions and take corrective action

a. Identify, report and document conditions that present a threat to health, safety and the environment
b. Identify corrective actions
c. Consult appropriate parties about corrective actions
d. Take corrective actions according to company procedures
e. Track and report ongoing safety concerns until corrective action is taken

## 5. Participate in safety training

a. Follow orientation that covers all topics and procedures needed to facilitate employee safety
b. Follow orientation that identifies needs and processes to raise safety concerns, ask questions and receive additional training
c. Receive orientation on use of personal protective equipment
d. Document orientation according to company requirements
e. Follow safety orientation for relevant laws, policies and regulations
f. Participate in regular safety training

## 6. Participate in equipment safety training

a. Receive complete orientation to equipment and guidelines for ergonomic safety
b. Communicate all important information regarding equipment safety, including material handling equipment
c. Make suggestions regarding training materials and content to the correct parties
d. Provide evaluations and feedback to improve training materials and methods
e. Ensure trainee has the correct tools to do the job during training
f. Ensure that workers can operate equipment safely through post-training evaluation
g. Ensure that training and facilitation techniques used are appropriate for trainees
h. Document quality and effectiveness of training

## 7. Suggest processes and procedures that support safety of work environment

a. Consult health and safety representatives in the development of suggestions
b. Provide operator feedback to create a safer, more effective work environment
c. Make suggestions to correct parties, according to company procedure
d. Document suggestions
e. Ensure that content of suggestions responds to safety, quality and productivity issues

## 8. Fulfill safety and health requirements for maintenance, installation and repair

a. Participate in regular safety communications
b. Participate in job safety analyses regularly according to company policy
c. Follow hazardous materials procedures and policies, such as Safety Data Sheets (SDS) and right-to-know
d. Perform environmental testing of workplace on a regular basis as required by company policy and regulation
e. Audit equipment to ensure there are no by-passes of safety guards
f. Follow all regulatory and company safety procedures, including those related to lock-out/tag-out, confined space and ergonomics
g. Follow good housekeeping procedures

## 9. Monitor safe equipment and operator performance

a. Perform regular monitoring
b. Report out-of-compliance or unsafe conditions immediately
c. Take corrective action on out-of-compliance or unsafe conditions
d. Check equipment to ensure it is operating according to safety specifications
e. Check tools to ensure they are in compliance with safety specifications
f. Forward accident and injury data to appropriate personnel for inclusion in OSHA recordables
g. Gather information on equipment use from operators to reveal existing or potential safety problems
h. Document all safety monitoring data

## 10. Utilize effective, safety-enhancing workplace practices

a. Communicate clearly
b. Participate in work teams
c. Make production job assignments
d. Run training programs efficiently
e. Follows company code of good conduct

# MSSC Worker Standards

## SAFETY

### Basic Technical Core Competencies

## 1. Safe and Productive Workplace

1. Understand ways in which manufacturing affects the national economy and standard of living
2. Understand ways in which the global economy affects manufacturers
3. Understand major sub-industries within manufacturing
4. Understand common safety practices and systems
5. Understand responsibilities of a frontline production worker in a high-performance, safety-conscious work organization
6. Recognize different and common needs of internal and external customers
7. Maintain customer contact about product specifications and printed specs to ensure understanding of needs, including those related to safety

## 2. Safety procedures

1. Locate and use Safety Data Sheets (SDS)
2. Understand company first aid or first response procedures
3. Understand material handling techniques to safely move materials
4. Respond proactively to a safety concern and document occurrences
5. Know where to find emergency exits
6. Understand various emergency alarms and procedures
7. Understand clean-up procedures for spills
8. Understand lock out/tag out requirements
9. Inspect work area and report possible safety risks
10. Understand machinery and equipment safety functions to determine if all safeguards are operational
11. Understand safety procedures in case of smoke or chemical inhalation
12. Follow procedures for handling hazardous material
13. Develop safety checklists
14. Follow equipment shutdown procedures
15. Perform leak checks to determine if toxic or hazardous material is escaping from a piece of equipment
16. Understand proper and safe installation techniques as described in manuals, checklists and regulations

## 3. Personal Safety Practices

1. Identify and report unsafe conditions
2. Select and use proper personal protective equipment
3. Understand ergonomic impact of work techniques
4. Use proper techniques for lifting loads
5. Understand safety requirements for platforms, man lifts and ladders
6. Understand safety requirements for material handling equipment such as forklifts, cranes, rigging and pry trucks
7. Understand safety requirements for manual, electrical-powered and pneumatic tools
8. Understand safety requirements for operation of automated machines/processes

## 4. Safety Policies and Regulations

1. Follow basic filing procedures to properly store inspection records
2. Understand safety requirements and environmental regulations related to performing inspections
3. Understand policies and procedures needed to perform audits and train employees about hazardous conditions
4. Understand company safety standards for handling potential hazards
5. Store, identify and use hazardous materials and pressurized vessels safely
6. Understand OSHA and other health and safety requirements as applied to the workplace
7. Understand government policies, procedures and regulations governing the safe use of equipment
8. Follow procedures to prevent or reduce emissions and spills
9. Understand Hazardous Materials (HAZMAT) procedure information
10. Understand the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
11. Understand Safety Data Sheets (SDS)
12. Understand applicable safety standards
13. Understand which tools and equipment require safety certification
14. Understand what the law requires companies to post or publish in order to keep employees abreast of OSHA and other government regulations
15. Understand EPA required documentation for disposal of hazardous waste generated during maintenance or transportation of contaminated items
16. Understand accident documentation procedures

## 5. Safety-related Maintenance Procedures

1. Understand equipment operation and design parameters to determine if machine is operating safely
2. Review environmental data systems in the factory
3. Make adjustments to equipment to ensure that it is operating within established safety and environmental parameters
4. Monitor equipment for unsafe conditions

## 6. Safety Training

1. Develop and/or deliver safety training per guidelines
2. Understand health and safety education requirements
3. Identify safety training courses
4. Understand equipment manual and standard practice manual to repair equipment safely
5. Understand certifications needed for regulatory compliance (i.e., Cardio Pulmonary Resuscitation (CPR), fire extinguisher, and blood-borne pathogens)
6. Conduct equipment safety demonstrations
7. Train other workers in proper safety procedures during maintenance process
8. Understand the tools and materials needed to operate equipment to train others
9. Use monthly safety meetings to improve the safety environment and communicate changes in regulations

## 7. Communication Skills that Enhance Safety

1. Understand ways to improve reading, listening and writing skills
2. Understand techniques for making effective presentations to internal and external customers, including safety orientations
3. Use different forms of communication, such as e-mail, fax and phone
4. Provide effective feedback and making suggestions

5. Communicate customer needs effectively to others including shift-to-shift, co-workers and managers, including needs that impact safety.

## 8. Teamwork skills that Enhance Safety

1. Understand the characteristics of a high-performance team
2. Understand roles and responsibilities of production team members
3. Use teamwork to deal with customer requests
4. Align team goals to customer and business production needs
5. Ensure that team goals are specific, documented, measurable and achievable
6. Communicate production information to team members
7. Use team problem-solving and conflict resolution processes
8. Understand workplace codes of conduct and responsibilities for ethical and responsible behavior in all work activities

## 9. Training skills that Enhance Safety

1. Understand how training needs are assessed regularly to identify new requirements and training issues
2. Conduct training in an effective and appropriate manner to achieve training goals
3. Ensure training materials are documented and available
4. Ensure training is relevant to equipment, tools, materials and processes at the workstation
5. Provide appropriate cross-training
6. Ensure that training documentation is accurate and current and meets all company and regulatory requirements

# MSSC Work Standards

## QUALITY PRACTICES & MEASUREMENT

### Key Activities and Performance Indicators

## 1. Participate in periodic or statistically based internal quality audit activities

a. Ensure audit data are relevant and correct
b. Complete all relevant audit forms and forward to proper parties in a timely manner
c. Assess and document conformances to quality standards
d. Include observation of operation in audit to ensure process and product meet specifications, when appropriate
e. Participate in audits in accordance with company and other required schedules and procedures
f. Participate in ongoing audits to optimize the outcomes of corrective actions

## 2. Check and document calibration of gauges and other data collection equipment

a. Follow calibration schedule according to specifications
b. Check instrument certification by reviewing documentation and observing during use
c. Recalibrate instruments out of calibration or refer to appropriate parties for recalibration repairs

## 3. Suggest continuous improvements

a. Recognize potential improvements through observation and data analysis
b. Include measurable and data-driven benefits to the company, customers and employees in suggestions
c. Make suggestions according to proper procedures and documentation
d. Review all relevant data before making suggestions

## 4. Inspect materials and product/process at all stages to ensure they meet specifications

a. Perform sampling and inspection according to schedule and procedures
b. Select and use correct inspection tools and procedures
c. Verify calibration of testing equipment
d. Inspect materials against specifications
e. Identify products, processes and materials that do not meet specifications
f. Verify implementation of corrective actions through spot checks
g. Document and report inspection results to correct parties

## 5. Document the results of quality tests

a. Check data forms to ensure that they are complete and accurate
b. Evaluate and interpret information
c. Forward data to correct parties
d. Select and use correct analytical tools, including statistical process controls (SPC)
e. Store reports for the specified time frames

## 6. Communicate quality problems

a. Review quality problems with production operators and supervisors
b. Communicate quality problems to appropriate parties

c. Document quality problems according to established processes
d. Summarize and report defect trends to appropriate parties

## 7. Take corrective actions to restore or maintain quality

a. Identify appropriate corrective actions and obtain approvals when needed
b. Make clear, concise, data-supported recommendations for action
c. Make recommendations to the appropriate parties
d. Make adjustments in a timely manner to eliminate deviations and bring process back into control
e. Document adjustments and follow-up product quality checks in correct format
f. Implement corrective action/quality improvements in standardized manner

## 8. Record process outcomes and trends

a. Maintain records on quality process
b. Chart outcomes of quality processes according to appropriate methods and standards
c. Ensure data on quality process performance is accurate
d. Analyze quality process performance data to identify trends
e. Report quality process performance data to appropriate parties in a timely manner
f. Examine previous documentation on similar process issues to identify possible solutions

## 9. Identify fundamentals of blueprint reading

a. Visualize objects in a drawing
b. Identify blueprint features
c. Read and understand dimensions of an object in a technical drawing
d. Recognize functions of sectional drawings

## 10. Use common measurement systems and precision measurement tools

a. Use and convert U.S. measurement and standard international metric systems
b. Measure parts using a machinist's rule and tape measure
c. Measure part dimensions using a caliper and micrometer
d. Measure data from a digital gauge using a computer

# MSSC Worker Standards

## QUALITY PRACTICES AND MEASURMENT

### Basic Technical Core Competencies

## 1. Overall Quality Process

1. Understand quality standards and how they apply to products to make effective decisions about quality problems
2. Understand quality procedures and product specifications to identify nonconformance
3. Understand roles and responsibilities for quality in an organization
4. Identify product defects and defect patterns
5. Check and test good products and non-conforming products
6. Understand corrective action methods for dealing with non-conformances to avoid future occurrences
7. Follow procedures for rejecting substandard products
8. Develop and document quality procedures, check lists and methods
9. Identify inaccuracies in quality data and responding to them
10. Understand quality terminology
11. Understand company quality assurance procedures

## 2. Quality Systems and Inspection Tools

1. Understand quality systems such as Statistical Process Control (SPC), Six Sigma, Total Quality Management (TQM), Lean Management, "Plan-Do-Check-Act" and International Organization of Standardization standards, especially ISO 9001 for manufacturers
2. Select and use quality systems to identify problems and record quality issues
3. Use statistical quality tools (e.g., Root Cause Failure Analyses and Pareto charts) to reach accurate decisions about quality data
4. Accurately troubleshoot and categorize defect types to determine root cause
5. Create control charts (e.g., variables and attributes)
6. Record and analyze quality issues in the production process, using tools such as Root Cause Failure Analyses (RCFA)
7. Use Pareto analysis to identify priorities for solving multiple sub –standard product problems
8. Determine accuracy and precision when using measuring equipment
9. Use performance indicators that can be readily understood by operators
10. Use inspection tools, equipment and procedures
11. Understand inspection equipment calibration standards and requirements
12. Verify calibration of inspection equipment
13. Use appropriate automated inspection system
14. Use hand-held inspection devices to examine materials
15. Maintain and store inspection tools

## 3. Corrective Action

1. Determine appropriate corrective action
2. Follow corrective action procedures to follow up on quality problems and corrective measures
3. Understand health and safety standards to ensure quality problems are addressed correctly without impairing health and safety
4. Conduct follow-up activities to validate that corrective action has been taken
5. Access and previous documentation to help develop solutions
6. Know when to stop process to prevent production of defective product
7. Tag and segregate non-conforming material
8. Investigate non-conformances (e.g., rejection tags) to determine root cause and recommend corrective action

## 4. Quality Documentation

1. Complete proper forms to document problems and corrective action
2. Use computer systems to document and track substandard and scrapped parts, materials and assemblies as required by quality processes
3. Understand documentation process and requirements to ensure verifiable evidence of product quality
4. Follow quality system protocol for performing an audit
5. Follow procedure for reviewing quality problems with operators to provide feedback
6. Follow correct approval procedures to document inspection results
7. Follow procedures for recording and storing product history and maintaining records
8. Use route sheets and statistical method charts to document process
9. Understand follow-up and reporting documentation procedures to ensure proper communications

## 5. Blueprint Reading Fundamentals

1. Visualize objects from a multi-view drawing
2. Identify product features from a multi-view drawing
3. Identify dimensions and tolerances of an object from a multi-view drawing
4. Interpret geometric dimensioning and assembly tolerances on a drawing
5. Interpret of title blocks
6. Interpret assembly drawings

## 6. Basic Measurement

1. Convert measurements in U.S. measurement and standard international metrics systems
2. Use a machinist's rule to measure parts
3. Use a tape measure to measure parts
4. Use dial and digital calipers to measure parts
5. Use a micrometer to measure parts
6. Use a dial indicator to measure parts
7. Collect measurement data from a digital gauge using a computer

# MSSC Work Standards

## MANUFACTURING PROCESSES & PRODUCTION

### Key Activities and Performance Indicators

## 1. Identify customer needs

a. Recognize the different and common needs of internal and external customers
b. Maintain customer contact about product aspects and printed specifications to ensure understanding of needs
c. Review customer needs on a regular basis
d. Ensure customer specifications are up-to-date
e. Communicate customer needs to others including shift-to-shift, co-workers and managers
f. Address issues preventing customer needs from being met

## 2. Determine resources available for the production process

a. Check raw materials against work orders
b. Check tools and equipment against work orders
c. Communicate discrepancies to the proper parties
d. Ensure that necessary resources are at workstation when required
e. Schedule workers with appropriate skills according to production needs
f. Use advanced technologies to increase productivity

## 3. Set up and verify equipment for the production process

a. Make proper repairs and adjustments to production equipment prior to putting into service
b. Ensure set-up meets process requirements and product specifications
c. Ensure first piece or production run meets specifications
d. Document set-up procedures to ensure repeatability
e. Ensure set-up meets ergonomic and other relevant health, safety and environmental standards
f. Ensure set up meets equipment specifications

## 4. Set team production goals

a. Set team goals that are specific, measurable and achievable
b. Align team goals with customer and business needs
c. Ensure team goals focus the team in order to meet team objectives
d. Document team goals and communicate them to all parties

## 5. Make job assignments

a. Ensure job assignments match skills with the production work to be done
b. Ensure job assignments maximize the use of available skills
c. Ensure business and customer needs are met
d. Ensure workers are notified of job assignments effectively

## 6. Coordinate work flow with team members and other work groups

a. Meet production schedules
b. Notify team members of schedule requirements in a timely way
c. Ensure production workflow runs efficiently
d. Minimize downtime
e. Work with others to facilitate effective workflow
f. Participate in meetings and problem-solving groups

## 7. Communicate production and material requirements and product specifications

a. Ensure communication reflects knowledge of production requirements, levels and product specifications
b. Ensure communication reflects knowledge of material specifications and delivery issues and schedules
c. Ensure communication demonstrates knowledge of customer and business production needs
d. Initiate cross-functionally in a timely and accurate manner to the correct parties
e. Ensure communication is clear and relevant to production and products
f. Track and document communications, as appropriate

## 8. Perform, monitor and document the process to make the product

a. Monitor process control data to ensure that the manufacturing process is meeting product specifications
b. Ensure manufacturing process cycle time meets customer and business needs
c. Ensure product meets customer specifications
d. Label products appropriately for compliance or non-compliance
e. Perform production operations in a manner that fully complies with all health, safety, and environmental policies and practices

## 9. Document product and process compliance with customer requirements

a. Complete documentation of compliance legibly
b. Write documentation of compliance in the appropriate format and store correctly
c. Forward documentation of compliance to the proper parties
d. Complete documentation and obtain “sign off”
e. Label products appropriately for compliance or non-compliance

## 10. Prepare final product for shipping or distribution

a. Ensure packaging materials meet packaging and shipping specifications, including proper labeling and safety requirements
b. Ensure completed documentation of customer packaging and shipping instructions accompany product to next destination
c. Communicate product availability to the proper parties in a timely manner
d. Check product and all relevant information, such as quantity, destination and packaging instruction, against the work order
e. Store or stage product for shipping
f. Follow all laws and regulations with regard to labeling, packaging and transport
g. Follow material handling procedures to prevent product damage

# MSSC Worker Standards

## MANUFACTURING PROCESSES AND PRODUCTION

### Basic Technical Core Competencies

## 1. Work Flow Planning and Control

1. Understand principles of Lean Manufacturing and High Performance Work Organizations
2. Make job assignments and coordinating workflow
3. Ensure appropriate resources are available to meet customer specifications
4. Ensure set-up and operation procedures are available and up-to-date
5. Read and interpret a production schedule and manufacturing work order
6. Understand production process, including flow and bottlenecks
7. Understand lead-time required for a production plan
8. Read and interpret bills of materials and routing sheets
9. Understand methods of productivity measurement and improvement
10. Understand principles and practice of Just-in-time (JIT) inventory control
11. Perform a physical inventory

## 2. Production equipment operations

1. Start and operate production machines
2. Perform emergency shutdown of production machines
3. Recognize and address machine malfunctions
4. Understand common types of mechanisms used in machines
5. Understand ways in which force and torque are used in machine operations
6. Understand impact of friction on machine operation and methods
7. Understand use of cams
8. Understand ways in which machines use pulley and gear drives
9. Understand which manufacturing processes are used to make and finish parts
10. Use basic types of manual machine tools, such as drill press and cutoff saw
11. Understand basic machine tooling
12. Understand basic casting, molding and stamping processes
13. Understand basic direct digital and additive manufacturing

## 3. Production Materials, Tools and Equipment

1. Understand various materials used in production
2. Understand machinery operation, set up and testing
3. Read and interpret gauges (i.e., analog, digital and vernier)
4. Determine whether additional tools need to be purchased
5. Understand lubricants and coolants to make the proper selection
6. Set up, program and operate computerized control process
7. Understand equipment capabilities to maximize productivity
8. Make machine adjustments
9. Order tools and materials

## 4. Work Orders and Documentation

1. Interpret work orders to meet customer needs
2. Review order sheets to determine if on-site adjustments are needed
3. Use diagrams and technical drawings
4. Interpret route sheets and operation sheets to set-up and operate machine
5. Complete compliance tag to indicate that the sub-assembly meets the customer requirements
6. Determine packing requirements based upon customer specifications
7. Determine packing requirements based upon available packing materials
8. Determine the safest method of shipping the product based upon available packing materials

## 5. Advanced Technologies

1. Understand advanced technologies that are now in common use, such as Computer Numerically Controlled machines (CNC), Industrial Robotics, Programmable Logic Controllers (PLC), Lean Processes, Sensors and Lasers
2. Understand emerging technologies that could become commonly used in the next one to four years, such as Additive Manufacturing (3D Printing), Advanced Materials, Internet of Things, Mass Customization, Mechatronics, Mobile Internet, Nanotechnology and Next Generation Robotics

# MSSC Work Standards

## MAINTENANCE AWARENESS

### Key Activities and Performance Indicators

## 1. Perform preventive maintenance and routine repair

a. Monitor preventive maintenance schedule
b. Follow preventive maintenance schedule
c. Document preventive maintenance in a timely manner
d. Communicate repair needs to the correct parties using correct procedures and forms
e. Check any necessary repair work through follow up
f. Ensure necessary supplies are available to perform preventive maintenance
g. Communicate preventive maintenance schedules, documentation, equipment needs and outstanding repairs from shift-to-shift, to team members, to managers and to others as required
h. Follow all safety procedures when performing repairs

## 2. Monitor indicators to ensure correct operations

a. Compare current equipment performance to optimal equipment operations regularly
b. Investigate abnormal equipment conditions
c. Correct abnormal equipment conditions in a timely manner
d. Monitor equipment to ensure that corrective action solved the problem
e. Document equipment repair history

## 3. Perform all housekeeping to maintain production schedule

a. Store tools in proper locations
b. Store materials in a safe manner
c. Identify and promptly report unsafe conditions
d. Take corrective action to address unsafe conditions
e. Ensure workstation is clean and clear of safety hazards
f. Pass scheduled housekeeping inspections
g. Organize workstation to maximize efficiency

## 4. Recognize potential maintenance issues with basic production systems, including knowledge of when to inform maintenance personnel about problems with:

a. Electrical systems
b. Pneumatic systems
c. Hydraulic systems
d. Machine automation systems
e. Lubrication processes
f. Bearings and couplings
g. Belts and chain drives
h. High vacuum systems
i. Laser systems

# MSSC Worker Standards

## MAINTENANCE AWARENESS

### Basic Technical Core Competencies

## 1. Overall Maintenance Process

1. Understand principles of Total Productive Maintenance (TPM)
2. Understand what equipment is to be maintained and monitored
3. Troubleshoot to identify a problem with equipment
4. Follow preventive maintenance schedules
5. Understand job specific guidelines or collective bargaining agreement that affect maintenance
6. Recognize significant wear and tear on equipment components
7. Follow procedures for logging repairs and work order requests
8. Understand the most common causes of failure of equipment to diagnosis problem quickly
9. Understand what equipment alarms mean
10. Make on-process adjustments during production

## 2. Maintenance of Tools and Equipment

1. Understand materials management to know what is recyclable and what is not
2. Use appropriate maintenance tools to maintain machines
3. Use monitoring or diagnostic devices to find out when equipment is operating correctly

## 3. Documentation of Maintenance

1. Ensure that equipment is producing a quality product using statistical methods charts
2. Understand which forms and procedures to correctly documenting processes (e.g., preventative maintenance forms)
3. Repair equipment using diagrams, schematics, manuals and specifications
4. Document repairs, replacement parts, problems and corrective actions to maintain log to determine patterns of operation
5. Review maintenance log/checklist to ensure that recommended preventative procedures are followed

## 4. Maintenance-related Safety

1. Verify machine safety through proper set-up
2. Understand safety procedures to prevent accidents
3. Know the certification/license requirements to operate specific equipment
4. Use and store hazardous materials and chemicals (e.g., compliance with SDS)
5. Understand Lock out/Tag out policies and procedures
6. Visually inspect equipment to ensure safety compliance before operating
7. Identify and report unsafe work conditions
8. Understand materials management to know what is recyclable and what is not

## 5. Potential maintenance issues with basic production systems

1. Understand electrical systems reliability issues, including knowledge of when to inform maintenance personnel
2. Understand pneumatic systems reliability issues, including knowledge of when to inform maintenance personnel
3. Understand hydraulic systems reliability issues, including knowledge of when to inform maintenance personnel
4. Understand machine automation systems reliability issues, including knowledge of when to inform maintenance personnel

## 6. Proper lubrication procedures

1. Take and analyze oil samples
2. Use correct lubricants for various types of equipment
3. Operate grease guns correctly for various types of lubrication
4. Store and dispose of lubricants safely

## 7. Bearings and coupling reliability

1. Understand proper functioning of mechanical power transmission equipment, including knowledge of when to inform maintenance personnel
2. Understand proper functioning of bearings and shafts, including knowledge of when to inform maintenance personnel
3. Understand proper functioning of couplings, including knowledge of when to inform maintenance personnel

## 8. Belt and chain drive reliability

1. Understand proper functioning of belt drive systems, including knowledge of when to inform maintenance personnel
2. Understand proper functioning of roller chain drive systems, including knowledge of when to inform maintenance personnel
3. Understand proper adjustment of chain sags is recognized, including knowledge of when to inform maintenance personnel

# MSSC Work Standards

## GREEN PRODUCTION

### Key Activities and Performance Indicators

## 1. Train workers in environmental issues

a. Include basic characteristics of a "green" manufacturing environment, including new trends and their impact on production workers, the company and society in workforce training
b. Include the benefits of workplace environmental assurance programs to the worker, the company and society in workforce training
c. Participate in environmental training for employees both at time of hire and on a recurrent basis
d. Document required environmental training
e. Participate in environmental training courses regarding the latest technology advancements
f. Incorporate input from instructors and the results of course evaluations into routine updates of environmental training courses

## 2. Implement and promote environmental programs, projects, policies or procedures

a. Document regulatory compliance
b. Ensure company, local, state and federal environmental policies and procedures are communicated and posted as required
c. Identify and report practices inconsistent with established environmental policies and procedures
d. Report violations
e. Ensure materials supporting environmental assurance programs are written consistent with needs of the intended audience
f. Keep environmental assurance materials on file and readily accessible

## 3. Conduct environmental incident and hazard investigations

a. Investigate environmental incidents and hazards, including near misses
b. Document environmental investigation findings
c. Review all environmental investigations and audits and assign corrective actions
d. Check and implement prescribed actions to correct environmental problems

## 4. Conduct preventive environmental inspections

a. Identify, report and document conditions that present a threat to the environment
b. Identify, report and monitor potential environmental hazards in the work area
c. Take corrective action to eliminate potential hazards
d. Gather environmental documentation required from workers is gathered and ensure policies are followed
e. Ensure inspections and audits include all relevant and required environmental laws and regulations

## 5. Monitor environmental aspects at each stage of production

a. Environmental issues involved in production processes are recognized
b. Identify and monitor relevant environmentally significant aspects in the production process for each stage of production to determine whether practical environmental improvements can be made
c. Program equipment to control and monitor the environmental impact of production processes at each stage

d. Monitor environmental indicators and gauges according to established procedures and use computers and/or other instruments to inspect and analyze results
e. Monitor consumption and conservation of resources throughout the production process
f. Monitor environmentally impactful agents in the production process are to reduce environmental impact
g. Monitor and evaluate energy use, areas of energy waste and emissions leakage in industrial facilities and production processes
h. Identify and evaluate opportunities for enhancing energy-efficiency and reducing energy-related carbon emissions

## 6. Implement continuous improvement in environmental assurance practices

a. Prioritize and inspect root causes or problems according to established hierarchy
b. Maintain worker knowledge of policies and procedures for environmental issues
c. Participate in meetings with all relevant groups about environmental assurance programs and developments
d. Make suggestions to management for improvement in environmentally-related practices

## 7. Use advanced materials in production to reduce weight and increase life

a. Use designated equipment to monitor, measure and handle advanced materials
b. Take and document measures to ensure cost-effective production line energy efficiency
c. Read and interpret instruments to ensure required controls, including Personal Protective Equipment (PPE)
d. Use environmental controls/levels required for production with advanced materials
e. Adhere to environmental and quality requirements of advanced materials
f. Handle advanced materials, surplus and waste according to established requirements to minimize waste
g. Identify opportunities to reduce materials and volume of waste

## 8. Reprocess materials by recycling and reuse throughout product life cycle to optimize waste reduction

a. Sort waste and used or rejected materials to determine which should go to re-cycling and which can be reused or repurposed inside the company
b. Place waste designated for recycling into prescribed containers
c. Coordinate recycling activities with contractors or other third-party representatives
d. Code and label materials designated for reuse or repurpose
e. Assess rejected products to determine whether the product should be repaired, reused or recycled
f. Break down rejected products when necessary for reuse, repurpose or recycling

# MSSC Worker Standards

## GREEN PRODUCTION

### Basic Technical Core Competencies

## 1. Workforce Training

1. Understand costs and impact of environmental incidents and the value of training
2. Provide input into scheduling and conducting environmental training for frontline production workers and ensuring that evaluations, test results and certifications reflect training effectiveness
3. Document environmental training, including attendance records and job training profiles

## 2. Implementation and Promotion of Environmental Policies, Programs, Projects or Procedures

1. Understand basic EPA, OSHA and other federal, state and local government regulations, reporting requirements and permit conditions related to manufacturing production and processes
2. Understand company policies, programs and procedures related to environmental performance improvement including environment management systems (EMS)
3. Understand company policies and procedures to ensure timely compliance, accurate, accessible and complete documentation
4. Communicate and advocate company environmental policies and procedures using multiple methods as provided, including visible posters, worker notifications and meetings
5. Prepare for environmental emergencies, including participating with emergency plan development team, ensuring compliance with those plans during an emergency, keeping emergency equipment in good order and participating in emergency drills on a regular basis

## 3. Environmental Incident and Hazard Investigations

1. Provide input into documenting findings to ensure that they are timely, accurate and include recommended corrective actions, including visual inspections
2. Conduct sensory (e.g., visual, auditory, olfactory, etc.) inspections of environmental incident hazard issues
3. Provide input to auditors to ensure that recommended corrective actions have been taken

## 4. Preventive Environmental Incident and Hazard Investigations

1. Identify and communicate conditions that could present an environmental threat
2. Understand company policies and procedures for auditing compliance and non-compliance issues related to prevention
3. Understand EPA compliance assistance information for relevant manufacturing processes
4. Provide input into preventive investigations to ensure that they are timely, accurate and include recommended corrective actions

## 5. Monitoring of Environmental Aspects at Each Stage of Production

1. Understand production-related environmental impact, such as acids, batteries, chemicals, compressed gas, fluorescent lighting, paints & coatings, liquid waste streams, petroleum & oils, solvents, packaging, plastics, metallic wastes and rubber-based products
2. Analyze role of production-related environmental impact at each stage of production

3. Understand resources used in production processes and the concepts of life-cycle assessment and gate-to-gate processes
4. Understand energy-efficient production processes such as the tradeoffs and energy use differences between Just-In-Time operations, lean manufacturing processes, batch processing and continuous vs. single shift operations
5. Understand energy auditing procedures and techniques and apply them to identify energy use, waste and emissions leakage
6. Understand resources, methods and tools for reducing energy waste and emissions leakage and enhancing energy-efficiency in industrial facilities and in production processes, systems and equipment (in particular, motors, compressed air systems, data centers, steam systems, fan systems, process heating and pumping systems)
7. Understand carbon footprint concept and how it can be used to evaluate environmental impacts
8. Understand environmentally impactful agents
9. Understand fundamentals of "green" chemistry and its implications on current Safety Data Sheets (SDS)
10. Use proper environmental labeling

## 6. Continuous Improvement in Environmental Assurance Practices

1. Understand techniques for tracking resource use, environmental compliance and identifying environmental improvements
2. Participate in meetings with all relevant groups about company environmental assurance program
3. Form useful recommendations to management for continuous improvement
4. Understand worker responsibilities (including cost implications for the company) in effective implementation of environmental assurance programs
5. Understand how ISO 14000 and Leadership in Energy and Environmental Design (LEED) outcomes impact environmental quality and energy use at both plant-wide and worker levels.

## 7. Energy Efficient Materials in Manufacturing Production Processes

1. Understand benefits of using advanced materials
2. Understand processes and equipment required to manufacture products out of advanced materials
3. Operate exposure control technology and Personal Protective Equipment (PPE) required to work with advanced materials
4. Contain unique environmental hazards associated with advanced materials
5. Understand when to reuse, repurpose and/or recycle advanced materials in the production process
6. Understand traditional energy use and energy-efficiency measures in production processes
7. Understand impact of equipment usage during peak demand and its effects on energy use and production schedules

## 8. Material Re-processing

1. Use 4R's to organize: Refuse – Reduce – Reuse – Recycle
2. Understand origins of waste in production processes and the differences between energy/material optimization and waste minimization
3. Understand the goal of "zero landfill"
4. Understand different types of reprocessing
5. Follow procedures for sorting materials for recycling or reuse
6. Follow procedures for reusing materials within the company
7. Understand processes for determining whether the production workforce or an outside contractor should break down a given defective product for recycling or reuse

# Side-by-Side Analysis of Foundation Level Manufacturing Certifications (CPT and MT1)

| | **Certified Production Technician (CPT)** | **Manufacturing Technician Level 1 (MT1)**<br>**Manufacturing Specialist (MS)** ***(lower level certification)*** |
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| Sponsor | Manufacturing Skill Standards Council (MSSC) | Manufacturing Skills Institute (MSI) |
| Purpose | To recognize through certification individuals who demonstrate mastery of the core competencies of manufacturing production at the front-line (entry-level through front-line supervisor) through successful completion of the certification assessments. CPT certification "stacks" on the National Career Readiness Certificate. | To document individuals' mastery of the critical competencies required for modern manufacturing production and production-related occupations. MS and MT1 are industry-wide technical skills certifications and "stack" upon the National Career Readiness Certificate. |
| Goal | • Provide an industry-led, standards-based training, assessment and certification system focused on the core technical skills and knowledge needed by the nation's front-line production workers.<br>• Raise the level of performance of production workers so individuals can find higher-wage jobs and to help employers ensure their workforce increases the company's productivity and competitiveness.<br>• Credential the skills increasingly needed in the technology-intensive jobs of 21st century advanced manufacturing: the *"Industrial Athlete of the Future."* | • Develop a workforce pipeline capable of meeting the requirements of existing and emerging employers in advanced technology industries such as manufacturing;<br>• Provide a customized fast track pathway to stackable credentials for 21st Century advanced technology careers in industry; and<br>• Provide a pathway to advanced level training and specialized training based on industry requirements for potential new hires and incumbent workers. |
| Standards | • Safety: 10 Key Work Activities<br>• Quality Practices & Measurement: 10 Key Work Activities<br>• Manufacturing Processes & Production: 10 Key Work Activities<br>• Maintenance Awareness: 4 Key Work Activities<br>(See attached PDF for Overview & Detailed Outline of Key Work Activities for Industry Standards, Training & Assessments) | • Mathematics & Measurement Category: 3 Critical Technical Skills<br>• Spatial Reasoning & Manufacturing Tech Category: 6 Critical Technical Skills<br>• Quality & Business Acumen Skills Category *(required for MT1 only)*: 3 Critical Technical Skills<br>(See attached PDF for Overview of Manufacturing Technician Level 1 (MT1) Skill Standards) |
| Assessments (reflect the Standards as outlined above) | Four (4) Assessments: Safety; Quality Practices & Measurement; Manufacturing Processes & Production; and Maintenance Awareness. Assessments are taken individually. Candidates must pass all four required CPT module assessments within two years in order to achieve the full-CPT certification. (Note: Green Production is offered as a fifth module, but is not required for CPT certification at this time) | Three (3) Assessments: Math and Measurement; Spatial Reasoning and Manufacturing Technology; and Quality and Business Acumen.<br>If candidates pass the first two assessments, they earn the Manufacturing Specialist (MS) certification. If they also pass the Quality and Business Acumen assessment, they qualify for the MT1 Certification |

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| Assessment Cost per High School Student | MSSC charges a one-time registration fee of $28 per student.<br><br>The charge for each assessment is $23. So if a student takes two assessments, the cost would be $28 + $46 = $74. If they take all four assessments, the cost would be $28 +$92 = $120. There are no discounts for assessment retakes.<br><br>These costs assume that high schools would provide their own instructional program. For high schools with robust manufacturing programs, many of the competencies needed to pass the assessments may already be embedded in the current curriculum.<br><br>However, if a school wants to purchase online curriculum, several options are available at an additional cost, as outlined below. | The Manufacturing Specialist (MS) assessment fee is $200. The MT1 assessment fee is an additional $100, for a total of $300.<br><br>Assessment fees include eCourses for self-study and one (1) retake at no additional cost. Additional MS and MT1 assessments (retakes) can be purchased for $50 per certificate module. Any or all three assessments may be taken.<br><br>NOTE: The fees for the MS and MT1 certifications build in the costs for access to their curriculum, so there is no option to embed the instruction into existing courses. The online curriculum would be used as a stand-alone offering or as a complement to an existing program. |
| Assessments | "Cut" scores range from 73-76% for the required modules. | Successful pass rate is 75% for each module. |
| Assessment Centers/ Proctors | Testing sites must be registered and approved by MSSC and its assessment subcontractor, National Occupational Competencies Testing Institute (NOCTI). Assessment center registration fees are waived for high schools. Site coordinators and/or proctors must be designated and trained (training delivered via webinar twice monthly). A security agreement is required. | Assessments may be taken at any MSI Certified Assessment Center or onsite at any company as long as a certified proctor is available during the entire testing period. Centers may be certified for $500 (one center) or $1000 (unlimited, multiple centers per region). |
| Pre-Packaged Curriculum | If a high school wants to purchase curriculum, courses can be delivered to students in two formats:<br>(1) Modular Courses: 35-45 hours, 3-credit equivalent, one course for each of the CPT modules. Can be given in a blended environment with classroom instruction by an instructor or in a fully online format with an online instructor.<br>(2) E-Learning: MSSC has partnered with Amatrol to develop online interactive learning units for the CPT training program. Currently there are over 38 online units, each requiring about 2 hours to complete. | Training is available in two formats for schools:<br>(1) Online Learning Lab™ via a web-based portal that is password protected and accessible 24/7;<br>(2) Instructor-led Action Learning Lab™ at the school. |

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| Optional Curriculum Cost | The cost for each online course module (option #1) is $70, so all four instructional modules would cost $280. Volume course pricing per module is also available:<br><br>$70 per student (1-40 students)<br>$63 per student (41-100 students)<br>$60 per student (101-200 students)<br>$56 per student (201-600 students)<br>Bulk pricing is also available, as are statewide purchase arrangements.<br>The Amatrol curriculum (option #2 above) is state-of-the-art, virtual training. A one-time, on-site installation that includes unlimited access to 25 seats of each of the 4 modules = $24,000. See details at: CPT High School Curriculum by Amatrol | Access to the eCourses available in the Online Learning Lab is included in the overall charge. |
| Training (for instructors) | CPT Authorized Instructor Training can be attended in one of two ways. Each option comes with an 'Instructor's Package' that includes all materials needed by an instructor or teacher: PowerPoint presentations, facilitator notes, visuals, play maps, unit completion times, optional delivery methods, math problems and answers, and instructions on assisting students with the MSSC online course material.<br>(1) Online CPT Instructor Authorization Training: Provided with a 3-hour webinar with or without assistance by a MSSC Master Trainer. Includes 180-day access to online e-learning materials as a student, unlimited administrative access to online learning management system, course syllabi, etc.<br>(2) CPT Instructor Authorization Training Class: 3-day, in person training class with MSSC Master Trainer located at Scottsburg, Indiana training site. Includes 180-day access to online e-learning materials as a student, unlimited admin access to online learning management system, course syllabi, etc. Remote Training-MSSC can send a Master Trainer to your location; 6 trainees required.<br>Instructor must complete training program and pass assessments before delivering their first course. Instructors have 6 months to complete all assessments. | The MT1 Certified Trainer Course is a three-day intensive train-the-trainer program to teach instructor candidates how to deliver the MSI-approved MT1 instructor-led curriculum. In person training is held in Virginia each month (except December), but remote training can be provided with a minimum of five (5) participants. Individuals interested in becoming a Certified MT1 Trainer should have experience in industry; however, this is not a requirement. Academic faculty and staff with a contextual understanding of advanced manufacturing or experience in the skilled trades are also good candidates to become certified trainers.<br><br>Certified MT1 Trainers must be able to demonstrate a comprehensive understanding of the MT1 Body of Knowledge as evidenced by successfully obtaining the MT1 Certification. Certified trainers will be included in continuing professional education seminars, webinars and programs hosted regularly by the MSI. Topics may include best practices, tax/funding incentives, "how to" disaggregate the MT1 curriculum into modular courses, etc. MSI Academic Partners receive a list of workshop topics and meeting dates, which are also included in the MT1 Certified Trainer Learning Management System (private access). |

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| Instructor Training cost | Online with webinar: $1,500 per instructor<br>In-person (Scottsburg, IN): $2,200 per instructor for 5 or fewer trainees or $1,760 per instructor for 6-12 trainees. Costs for training at your location can be negotiated. | $2,800 (discounts may be available) and includes: Instructor Resource Guide, Student Workbooks, MSI Learning Network eCourse Guide, PowerPoint Instructional Slides and MT1 assessment testing (pre- and post-course). All trainer candidates are required to have a laptop. |
| College Credit | MSSC Courses have earned a college credit recommendation from the National College Credit Recommendation Service (NCCRS) for all modules in the CPT, up to twelve (12) hours, with dual credit available for high school students | MT1 attainment can receive up to six (6) advanced standing credits toward higher education degrees with specific educational institutions *(ECPI and partner institutions)*. |
| Website reference | http://www.msscusa.org/certification/production-certification-cpt | http://manufacturingskillsinstitute.org/manufacturing-technician-level-1-skill-standards |
| Contact for more information | Neil Reddy, Executive Director<br>(703) 739-9000 x2221<br>reddyn@msscusa.org | Vanessa Rastberger, Director Workforce Solutions<br>(804) 709-1320<br>training@manufacturingskillsinstitute.org<br><br>OR<br><br>Shawn Brown, Workforce Solutions Coordinator – MT1<br>(804) 709-1328<br>order@manufacturingskillsinstitute.org |

IMPORTANT NOTE: Two MSSC Modules (Safety and Quality Practices/Measurement) are currently on the "approved" list of certifications to receive incentive funding from the Oregon Department of Education. With the endorsement of the Rogue Advanced Manufacturing Partnership (RAMP), the other two MSSC Modules and the MT1 certification will likely be added.