

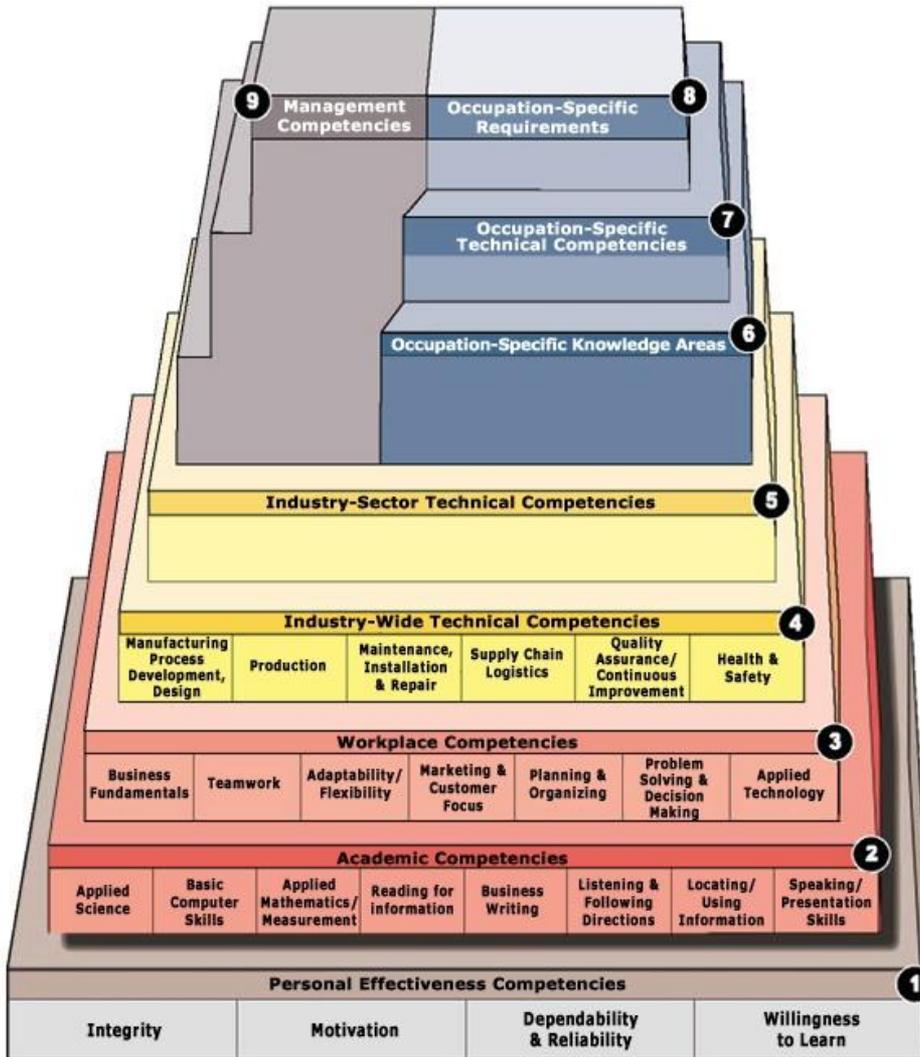


# Advanced Manufacturing Industry Competencies

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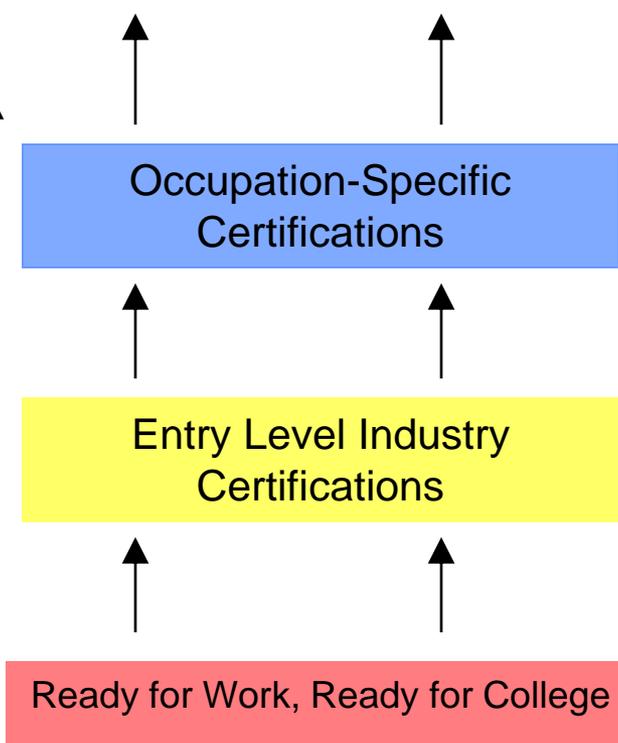
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# Advanced Manufacturing Competency Model



Career Paths – Life Long Learning

*High Quality Middle Class Jobs*



# Framework of Competencies by the Advanced Manufacturing Industry

## Tier 1: Personal Effectiveness

Personal Effectiveness Competencies			
Integrity	Motivation	Dependability & Reliability	Willingness to Learn

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Personal Effectiveness
<b>1. Integrity: Displaying accepted social and work behaviors.</b>
<ul style="list-style-type: none"> <li>▪ Use good manners</li> <li>▪ Maintain confidentiality as appropriate about matters encountered in the workplace</li> <li>▪ Treat supervisors and co-workers with respect</li> <li>▪ Perform quality work</li> <li>▪ Practice honesty with regard to company time and property</li> </ul>
<b>2. Motivation: Demonstrating a willingness to work.</b>
<ul style="list-style-type: none"> <li>▪ Take responsibility for completing one's own work assignment</li> <li>▪ Show initiative in carrying out work assignments</li> <li>▪ Take initiative in seeking opportunities to learn new skills and tasks</li> </ul>
<b>3. Dependability/Reliability: Displaying responsible behaviors at work.</b>
<ul style="list-style-type: none"> <li>▪ Avoid absenteeism</li> <li>▪ Demonstrate promptness</li> <li>▪ Maintain appropriate grooming and hygiene</li> <li>▪ Do not attend to personal business on the job</li> <li>▪ Manage stressful situations effectively</li> </ul>
<b>4. Willingness to Learn: Understanding the importance of learning new information for both current and future problem-solving and decision-making.</b>
<ul style="list-style-type: none"> <li>▪ Accept help from supervisors and co-workers</li> <li>▪ Learn new/additional skills related to the job</li> <li>▪ Learn about the products or services of the organization</li> <li>▪ Contribute to solving problems on the job through suggestions, recommendations and communication</li> </ul>

## Tier 2: Foundation Academic Competencies

Academic Competencies							
Applied Science	Basic Computer Skills	Applied Mathematics/ Measurement	Reading for Information	Business Writing	Listening & Following Directions	Locating/Using Information	Speaking/ Presentation Skills

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Academic Competencies
<b>1. Applied Science: Using scientific rules and methods to solve problems.</b>
<b>Scientific Principles</b> <ul style="list-style-type: none"> <li>▪ Understand the scientific principles involved in industry-specific production processes</li> <li>▪ Apply basic science principles to work-related problems &amp; production processes                             <ul style="list-style-type: none"> <li>▪ Physical</li> <li>▪ Chemical</li> <li>▪ Biological</li> <li>▪ Environmental</li> </ul> </li> </ul>

## **2. Basic Computer Skills: Using a personal computer and related applications to convey and retrieve information.**

### **Navigation and File Management**

- Use scroll bars, a mouse, and dialog boxes to work within the computer's operating system.
- Access and switch between applications and files of interest

### **Internet and E-mail**

- Navigate the Internet to find information
- Open and configure standard browsers
- Use searches, hypertext references, and transfer protocols;
- Send and retrieve electronic mail (e-mail).

### **Word Processing**

- Use a computer application to type text, insert pictures
- Format, edit, print text
- Save, and retrieve word processing documents

### **Spreadsheets**

- Use a computer application to enter, manipulate, and format text and numerical data
- Insert, delete, and manipulate cells, rows, and columns
- Create and save worksheets, charts, and graphs.

### **Presentations**

- Use a computer application to create, manipulate, edit, and show virtual slide presentations.

### **Databases**

- Use a computer application to manage large amounts of information
- Create and edit simple databases
- Input data,
- Retrieve detailed records
- Creating reports to communicate the information

### **Graphics**

- Work with pictures in graphics programs or other applications
- Creating simple graphics
- Manipulating the appearance
- Inserting graphics into other files/programs.

## **3. Applied Mathematics/Measurement: Using mathematics to solve problems.**

### **Computation**

- Add, subtract, multiply, and divide with whole numbers, fractions, decimals, and percents
- Calculate averages, ratios, proportions and rates; convert decimals to fractions
- Convert fractions to percents.

### **Basic algebraic functions**

### **Applied geometric principles**

- Analyze characteristics and properties of two- and three-dimensional geometric shapes
- Use geometric terms, such as spatial coordinates, with concrete objects and drawings.
- Use visualization, spatial reasoning, and geometric modeling to solve problems.

### **Measurement and estimation**

- Take measurements of time, temperature, distances, length, width, height, perimeter, area, volume, weight, velocity, and speed
- Use and report measurements correctly
- Convert from one measurement to another (e.g., from English to metric).
- Estimate sizes, distances, and quantities; or determine time, costs, resources, or materials needed to perform a work activity

**Application**

- Perform basic math computations accurately
- Translate practical problems into useful mathematical expressions
- Use appropriate mathematical formulas and techniques.

**4. Reading for Information: Understanding written sentences and paragraphs in work related documents.****Reading**

- Read and understand work-related instructions and policies, memos, bulletins, notices, letters, policy manuals, and governmental regulations
- Read documents ranging from simple & straightforward to more complex & detailed
- Read and interpret technical manuals and equipment specifications

**5. Business Writing: Using standard business English, defined as writing that is direct, courteous, grammatically correct, and not overly casual. The main requirement of workplace writing is clarity.****Organization and development**

- Create documents such as letters, directions, manuals, reports, graphs, and flow charts
- Communicate thoughts, ideas, information, messages and other written information, which may contain technical material, in a logical, organized, coherent, and persuasive manner
- Ideas are well developed with supporting information and examples

**Mechanics**

- Use standard syntax and sentence structure
- Use correct spelling, punctuation, and capitalization; uses appropriate grammar (e.g., correct tense, subject-verb agreement, no missing words)
- Tone – Write in a manner appropriate for business; uses language appropriate for the target audience; uses appropriate tone and word choice (e.g., writing is professional and courteous)

**6. Listening to and Following Directions: Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.****Listening**

- Receive, attend to, interpret, understand, and respond to verbal messages and other cues
- Pick out important information in verbal messages
- Understand complex instructions
- Appreciate feelings and concern of verbal messages.

**Following Directions**

- Act upon the instruction to complete an assignment.

**7. Locating and Using Information: Knowing how to find information and identifying essential information (information gathering).****Organize relevant information**

- Review information obtained for relevance and completeness
- Recognizes important gaps in existing information
- Take steps to eliminate those gaps
- Organize/reorganize information as appropriate to get a better understanding of the problem.

**8. Speaking/Presentation: Speaking so others can understand. Communicate in spoken English well enough to make oneself understood by supervisors and co-workers.****Speaking**

- Speak clearly
- Use correct grammar
- Effectively use eye-contact and non-verbal expression
- Present ideas in a persuasive manner

## Presentation

- Express information to individuals or groups taking into account the audience and the nature of the information
- Track audience responses and react appropriately

## Tier 3: Workplace Competencies

Workplace Competencies						
Business Fundamentals	Teamwork	Adaptability/ Flexibility	Marketing & Customer Focus	Planning & Organizing	Problem Solving & Decision-Making	Applied Technology

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### Workplace Competencies

**1. Business Fundamentals: Determining how an economy functions as a whole. Money is allocated and spent to get the work done, and accounting for these expenditures.**

#### Economic/Business/Financial Principles

- Economic Terminology
- Supply/Demand
- Characteristics of markets
- Cost and pricing of products
- Profit and loss
- Fundamentals of Accounting

#### Economic System as a Framework for Decision-making

- Understand how one's performance can impact the success of the organization.
- Consider the relative costs and benefits of potential actions to choose the most appropriate one.

**Business Ethics**—Act in the best interests of the company, your co-workers, your community, and the environment.

- Legal/financial
  - Compliance with the spirit of applicable laws as well as the letter.
  - Proper use of company property, minimizing loss and waste; report loss, waste or theft of company property to appropriate personnel.
  - Maintain privacy and confidentiality of company information, as well as that of customers and co-workers
- Environmental/health/safety
  - Maintain a healthful and safe environment and report any violations/discrepancies
  - Ensure proper handling and disposal of toxic or hazardous materials
- Social
  - Treat co-workers fairly and with respect
  - Emphasize quality, customer satisfaction and fair pricing.
  - Deal with customers in good faith, no bribes, kickbacks, or excessive hospitality.

#### Marketing

- Demonstrate an understanding of market trends, company's position in the market place, defined market segments
- Understand position of product/service in relation to market demand
- Uphold the company and product brand through building and maintaining customer relations
- Integrate internal and external customer demands and needs into manufacturing product and process development

**2. Teamwork: Developed capacities used to work with people to achieve goals. Includes social perceptiveness, coordination, persuasion, negotiation, instructing, and service orientation.**

**Work with Others**

- Work as part of a team to achieve mutual goals
- Develop and maintain good working relationships with supervisors and co-workers
- Choose behaviors and/or actions that best support the team and lead toward the accomplishment of work tasks
- Recognize a team's goals and identify ways to accomplish those goals in increasingly complex workplace situations

**Influence/Negotiate**

- Work through conflict constructively
- Persuasively present thoughts and ideas
- Respect the views of others
- Build toward consensus
- Influence, motivate, and persuade others in order to achieve company and client objectives

**3. Adaptability/Flexibility: Being open to change (positive or negative) and to considerable variety in the workplace.**

**Entertain new ideas**

- Is open to considering new ways of doing things
- Actively seek out and carefully considers the merits of new approaches to work
- Willingly embrace new approaches when appropriate and discards approaches that are no longer working.

**Deal with ambiguity**

- Take effective action when necessary without having to have all the necessary facts in hand
- Change gears in response to unpredictable or unexpected events
- Effectively change plans, goals, actions or priorities to deal with changing situations.

**Work with people from diverse backgrounds**

- Is flexible and open-minded when dealing with a wide range of people
- Listen to and consider others' viewpoints
- Alter opinion when it is appropriate to do so
- Work well and develop effective relationships with highly diverse personalities.

**4. Marketing and Customer Focus: Actively looking for ways to identify market demands and meet the customer or client need.**

**Understand customer needs**

- Identify internal and external customers
- Demonstrate a desire to understand customer needs
- Ask questions as appropriate
- Demonstrate awareness of client goals.

**Provide personalized service**

- Provide prompt and efficient responses to meet the requirements, requests, and concerns of customers
- Provide thorough, accurate information to answer customers' questions and to meet commitment times or performance guarantees;
- Actively look for ways to help customers by identifying and proposing appropriate solutions and/or services
- Establish boundaries as appropriate for unreasonable customer demands.

**Act professionally**

- Is pleasant, courteous and professional when dealing with internal or external customers
- Develop constructive and cooperative working relationships with customers

- Display a good-natured, cooperative attitude; is calm and empathetic when dealing with hostile customers.
- Uphold the company and product brand in interactions with others

**Keep customers informed**

- Follow up with customers during projects and following project completion
- Keep clients up to date about decisions that affect them
- Seek the comments, criticisms and involvement of customers
- Adjust services based on customer feedback.
- Address customer comments, questions, concerns and objections with direct accurate and timely responses

**5. Planning/Organizing: Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions. For instance, finding ways to structure or classify multiple pieces of information.**

**Plan**

- Approach work in a methodical manner
- Plan and schedule tasks so that work is completed on time
- Keep track of details to ensure work is performed accurately and completely

**Prioritize**

- Prioritize various competing tasks
- Perform tasks quickly and efficiently according to their urgency
- Find new ways of organizing work area or planning work to accomplish work more efficiently.

**Allocate Resources**

- Estimate resources needed for project completion
- Allocate time and resources effectively
- Coordinate efforts with all affected parties
- Keep all parties informed of progress and all relevant changes to project timelines.

**Anticipate Obstacles**

- Anticipate obstacles to project completion
- Develop contingency plans to address them
- Take necessary corrective action when projects go off-track.

**6. Problem Solving/Decision-making: Considering the relative costs and benefits of potential actions to choose the most appropriate one.**

**Identify the problem**

- Recognize the existence of a problem
- Define the problem
- Identify potential causes of the problem by analyzing its component parts
- Use all available reference systems to locate and obtain information relevant to the problem
- Recall previously learned information that is relevant to the problem.

**Communicate the problem to appropriate personnel**

**Use team-building skills to analyze the problem**

- Identify potential causes of the problem by analyzing its component parts
- Use all available reference systems to locate and obtain information relevant to the problem
- Recall previously learned information that is relevant to the problem

**Use team-building skills to generate possible solutions**

- Generate a number of different approaches to problems
- Evaluate the relative merits of the various solutions

**Choose a solution**

- Decisively choose the best solution after contemplating available approaches to the problem
- Make difficult decisions even in highly ambiguous or ill-defined situations;
- Quickly choose an effective solution without assistance when appropriate.

### Implement the solution

- Commit to a solution in a timely manner
- Develop a realistic approach for implementing the chosen solution
- Observe and evaluate the outcomes of implementing the solution to assess the need for alternative approaches and to identify lessons learned.
- Solve problems of a technological nature using logic & reasoning

## 7. **Applied Technology:** Developed capacities used to design, set-up, operate, and correct malfunctions involving application of machines or technological systems.

### Use Technology

- Use appropriate computer-based technology (see basic computer skills).
- Use a telephone, pager, radio, or other device to convey and receive information.
- Use appropriate methods and instructions to insure equipment is used safely and without damage to the equipment.

### Equipment Selection and Troubleshooting

- Determine and select the appropriate tools and equipment needed to do a job.
- Determine when and what kind of maintenance is needed.
- Determine sources of operating error of equipment and appropriate responses.

## Tier 4—Industry-wide Technical Competencies - Entry-Level

Industry-Wide Technical Competencies					
Manufacturing Process Development/Design	Production	Maintenance, Installation & Repair	Supply Chain Logistics	Quality Assurance/Continuous Improvement	Health & Safety

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## 1. **MANUFACTURING PROCESS DESIGN/DEVELOPMENT:** Research, design, implement, and continuously improve the manufacturing process to ensure product meets customer needs.

### Entry-Level Critical Work Functions:

- Support manufacturing process design and development.
- Communicate about and respond to requirements of internal and external customers.

### Entry-Level Technical Content Areas:

#### Fundamentals of Research & Development

- Awareness of basic Product R&D
- Awareness of basic Process R&D

#### Technical Drawings and Schematics

- Print Reading
- Interpretation of Drawings
- Interpretation of Schematics
- Geometric Dimensions and Tolerances

#### CAD Drawing Fundamentals

- Creation of Computer Aided Design (CAD) Drawings
- Interpretation of CAD Drawings
- Updating and Editing CAD Drawings
- CAD/CAM/CAE Applications

#### Troubleshooting Processes

- Knowledge of Statistical Process Control
- Problem Solving Skills

#### Process Assessment

- Procedure Analysis and Verification
- Documentation Fault Finding Skills

**2. PRODUCTION:** Set up, operate, monitor, control and improve manufacturing processes and schedules to meet customer requirements.

**Entry-Level Critical Work Functions:**

- **Manage raw materials/consumables**
- **Operate and control production/lab equipment.**
- **Perform manufacturing process applications and operations**

**Entry-Level Technical Content Areas:**

**Production Basics**

- Types of Production
- Lean Manufacturing/Continuous Improvement

**Production Materials**

- Sources
- Types of Materials

**Precision Measurement**

**Manual Tool & Equipment Operations**

**Basic Automated Systems & Control Operations**

- Automated Equipment
- Automated Systems
- Computer Control
- Robotics
- Process Control
- Analytical Testing

**Basic Manufacturing Process Applications & Operations**

- Assembly Processes
- Fabrication Processes
- Electrical/Electronics Manufacturing Processes
- Continuous Flow/Line Balancing Processes
- Finishing Processes
- Clean Room Processes
- Experiment Design/Implementation Processes
- Implementation of Approved Protocols

**3. MAINTENANCE, INSTALLATION AND REPAIR:** Maintain and optimize manufacturing equipment and systems.

**Entry-Level Critical Work Functions:**

- **Identify, diagnose and/or repair equipment problems.**
- **Communicate with others to ensure maintenance and repairs meet operational needs.**
- **Maintain hands-on knowledge of equipment operations.**
- **Maintain equipment, tools and workstations.**

**Entry-Level Technical Content Areas:**

**General Skills**

- Use of Hand Tools
- Schematic Drawings and Control Documents
- Calibrated Measuring Instruments
- Knowledge of Basic AC/DC Electrical Systems
- Installation of Parts for Industrial Equipment

**Basic Disassembly/Assembly Skills****Basic Maintenance and Troubleshooting Skills**

- Mechanical Systems
- Electrical Systems
- Electronic Systems
- Hydraulic/Pneumatic Systems
- High Vacuum Systems
- Laser Systems
- Computer Systems

**4. HEALTH AND SAFETY: Maintain a safe, healthy work environment.****Entry-Level Critical Work Functions:**

- Follow established personal safety practices.
- Ensure that equipment is being used safely.
- Comply with local, federal and company health, safety and environmental regulations.
- Identify unsafe conditions and take corrective actions.

**Entry-Level Technical Content Areas:****Personal Safety**

- Use of Personal Protective Equipment and Clothing
- Safety Procedures for Clean and Safe Working Environment
- Following Established Safety Practices

**Safety Procedures**

- First Aid or First Response Procedures
- Use of Safety Equipment
- Safe, Prescribed Operation of Equipment and Tools
- Use, Maintenance and Inspection of Machine Safeguards
- Inspecting Material, Equipment and Fixtures for Defects
- Safe Moving of Materials
- Safe Evacuation of Facility
- Response to Shop Emergencies
- Material Safety Data Sheets (MSDS)
- Confined Spaces
- Lock /Tag Out Practices

**Regulatory Compliance**

- Role of OSHA/EPA in the Workplace
- Regulations Governing Safe Use of Equipment
- Hazardous Material Information System Labeling and Storage (HMIS)
- Hazardous Material Handling and Disposal (HAZMAT)
- Hazardous Material Communication (HAZCOM)

**5. SUPPLY CHAIN LOGISTICS: Plan and monitor the movement and storage of materials and products in coordination with suppliers, internal systems and customers.****Entry-Level Critical Work Functions:**

- Ship and receive products and materials.

**Entry-Level Technical Content Areas:**

**Basics of Supply-Chain Management**

- Elements of the Supply Chain
- Just-in-Time/Lean Manufacturing

**Managing Inventory**

- Inventory Forecasting
- Ordering Materials and Supplies
- Inventory Monitoring and Audits
- Stock Rotation Requirements
- Expediting

**Work Flow**

- Material Handling
- Plant Facility and Capacity
- Production Scheduling

**Production Systems**

- Lead and Cycle Time
- Change Orders, Bills of Material, Work Orders, etc.

**Packaging and Distributing Product**

- Packaging Product
- Labeling Product- Inventory Tags and Bar Codes
- Warehouse Management Systems
- Transportation Methods
- Customs and Export Control (Basic Paperwork)

**6. QUALITY ASSURANCE AND CONTINUOUS IMPROVEMENT: Ensure product and process meets quality system requirements as defined by customer specifications.**

**Entry-Level Critical Work Functions:**

- **Ensure materials, processes and final product meet quality specifications.**
- **Support and maintain quality systems.**

**Entry-Level Technical Content Areas:**

**Quality Assurance**

- Meeting Customer Needs
- Lean Manufacturing
- Quality Management Systems and Tools
- Industry Standards

**Improving Quality**

- Introduction to Statistical Process Control
- Sampling and Charting
- Problem Solving Tools

**Inspecting for Quality**

- Inspecting Raw/Incoming Materials
- Inspecting In-Process Product
- Inspecting Final Products

**Continuous Improvement**

- Business Process Reengineering
- Systems Analysis
- Data Analysis
- Performance improvement strategies

## Tier 4—Industry-wide Technical Competencies - Technician Level

Industry-Wide Technical Competencies					
Manufacturing Process Development/Design	Production	Maintenance, Installation & Repair	Supply Chain Logistics	Quality Assurance/Continuous Improvement	Health & Safety

4

**1. MANUFACTURING PROCESS DESIGN/DEVELOPMENT:** Research, design, implement, and continuously improve the manufacturing process to ensure product meets customer needs.

### Technician-Level Critical Work Functions:

- Interpret and clarify customer expectations and product specifications.
- Design manufacturing production and production support systems.

### Technician-Level Technical Content Areas:

#### Research & Development

- Product R&D
- Process R&D
- Market/Sales/Life Cycle Analysis
- Intellectual Property Protection

#### Product Realization

- Design for Manufacturing and Design for Logistics
- Production System Design and Development
- Equipment/Tool Design and Development
- Support Systems Design and Development
- Development of Prototype Processes and Products
- Production System Design, Testing and Costing

#### Technology Applications

- Integrated Graphics Technologies
- Machining and Forming Technologies
- Nano- and Micro-nano-Technology
- Alternative Energies Technologies

#### Troubleshooting Processes

- Advanced Fault Finding Skills on Actual Equipment
- Setup of SPC
- Data Analysis and Verification
- Data Interpretation and Corrective Action Implementation

**2. PRODUCTION:** Set up, operate, monitor, control and improve manufacturing processes and schedules to meet customer requirements.

### Technician-Level Critical Work Functions:

- Develop manufacturing process plans and documentation.
- Monitor manufacturing processes and systems.
- Manage continuous improvement process.

**Technician-Level Technical Content Areas:**

**Production Planning and Work Flow**

**Production Components**

- Continuous Improvement
- Time, Materials and Costs
- Production Systems

**Advanced Production/Process Operations**

- Assembly Processes
- Fabrication Processes
- Electrical/Electronics Manufacturing Processes
- Process Overview Knowledge
- Finishing Processes
- Continuous Flow/Line Balancing Processes
- Cell Culture/Fermentation/Media Processes
- Recovery/Filtration Processes

**Production/Process Monitoring**

- Controlling Process Flow
- Documentation and Reporting
- Performance of Analytical Tests
- Calibration and Troubleshooting
- Environmental Parameters
- Write/Execute Protocols

**Manufacturing Management**

- Organizational Design and Management
- Project Management
- Personnel Management Methods
- Human Behavior/Motivation/Leadership
- Material and Resource Management
- Training Skills

**3. MAINTENANCE, INSTALLATION AND REPAIR: Maintain and optimize manufacturing equipment and systems.**

**Technician-Level Critical Work Functions:**

- **Support the installation, customization or upgrading of equipment.**
- **Coordinate preventive maintenance to ensure production process runs smoothly.**

**Technician-Level Technical Content Areas:**

**Advanced Installation and Repair Skills**

- Mechanical Power Transmissions Systems
- Piping Operations

**Advanced Maintenance and Troubleshooting Skills**

- Process Controls
- Pump Systems
- Thermal Systems (HVAC)
- Refrigeration Systems
- Mechanical/Fluid Power Systems
- Separation/Heat Exchange Systems
- Water Treatment/Destruction Systems
- High Voltage/Utility Systems

- Programmable Logic Controlled Industrial Equipment
- Reliability and Maintainability**
- Basic Reliability Models
  - Reliability of Systems
  - Design for Reliability
  - Design for Maintainability
  - Investigative Techniques
  - Analysis of Failure Data

**4. HEALTH AND SAFETY: Maintain a safe, healthy work environment**

**Technician-Level Critical Work Functions:**

- **Conduct health, safety and/or environmental incident and hazard investigations.**
- **Conduct preventive health, safety and/or environmental incident and hazard inspections.**
- **Implement continuous improvement in health, safety and/or environmental practices.**

**Technician-Level Technical Content Areas:**

**Incident and Hazard Investigations**

- Investigation of Health, Safety, or Environmental Incidences/Hazards
- Documentation of Findings
- Developing Corrective Actions
- Follow-up Investigation
- Violations Reports to Proper Authorities
- Workers Compensation

**Additional Knowledge**

- Insurance (Property)
- Life Safety Code/National Fire Protection Association 101
- Engineering Principles for Safety

**Environmental Protection/Waste Management**

- Chemical Hazard Assessment

**Preventive Health, Safety or Environmental Inspections**

- Audit of Records and Documentation
- Conducting Inspections
- Clean Room Protocol
- Documentation of Inspection Findings
- Emergency Response Preparedness
- Fire Protection and Control

**Continuous Improvement in Health and Safety**

- Root Cause Analysis
- Analysis of Health/Safety/Environmental Data
- Identification of Projects and Priorities

**5. SUPPLY CHAIN LOGISTICS: Plan and monitor the movement and storage of materials and products in coordination with suppliers, internal systems and customers.**

**Technician-Level Critical Work Functions:**

- **Manage purchasing and just-in-time materials flow, shipping and receiving, packaging and transportation.**
- **Control inventory of materials and products.**

- **Develop and maintain production/delivery schedules and supplier networks.**

**Technician-Level Technical Content Areas:**

**Supply-Chain Management**

- Manufacturing Resources Planning
- Collaborative, Planning, Forecasting and Replenishment
- Vendor Managed Inventory Systems
- Centralized versus Decentralized Control
- E-Business and Direct Shipment

**Automated Material Handling**

- Automated Material Handling and Distribution Systems
- Integrated Supply Chain Information Technology

**Resources Planning**

- Demand Management
- Sales and Operations Planning
- Master Scheduling
- Measuring Business Performance

**Detailed Scheduling and Planning**

- Techniques of Inventory Management
- Detailed Material Planning

**Executing Operations**

- Procurement and External Source of Supply
- Prioritizing and Sequencing Work
- Executing Plans and Implementing Controls
- Evaluating Performance
- Ergonomics
- Sharing and Collaboration across the Supply Chain

**Awareness of Global Impacts**

- Intellectual Property
- Taxes and Duties
- Shipping, Receiving, and Freight
- Customs and Export Control (Legal Aspects)

**6. QUALITY ASSURANCE AND CONTINUOUS IMPROVEMENT: Ensure product and process meets quality system requirements as defined by customer specifications.**

**Technician-Level Critical Work Functions:**

- **Monitor production for product and process quality.**
- **Employ audits and inspections to maintain the quality and continuous improvement process.**
- **Correct the product and process to meet quality standards.**
- **Suggest and/or implement continuous improvement actions.**

**Technician-Level Technical Content Areas:**

**Probability and Statistics**

**Data Analysis and Presentation**

- Presentation Skills
- Query-Based Intermediate Computer Skills
- Facilitation Skills
- Business Case

**Statistical Process Control Methods**

- Factor Analysis
- Capability Analysis
- Inspection/Test/Validation
- Reliability Analysis
- Acceptance Sampling

**Quality Assurance Audits**

- ISO 9000
- Audit Procedures

**Corrective and Preventive Actions**

- Eliminating Non-Conformities
- Verification and Documentation
- Documentation Creation

**Benchmarking and Best Practice**



# MSSC Assessment

MSSC assesses core understanding of the key work activities and basic technical knowledge and skills needed in high-performance manufacturing, as defined by MSSC's industry-led Production Standards. Given online, these assessments also help measure basic computer, problem-solving and analytical skills and one's ability to apply knowledge to specific situations identified in the assessments. There are no experiential requirements for MSSC certification as it is expected that individual employers will determine those requirements based upon needs determined by their respective industry sector or environment.



MSSC assessments do include computer-based simulations of actual factory floor situations. Those simulations assess both computer and problem-solving skills. See reverse side for a list of MSSC's Key Work Activities for its standards, training, and assessments. Embedded in these are not only basic technical skills, but also the following employability and academic skills.

## Employability Skills

- Problem Solving
- Decision Making
- Teamwork
- Organization and Planning
- Training Skills
- Good Workplace Practices
- Adaptability

## Academic Skills

- Math
- Science
- Reading
- Writing
- Listening
- Speaking
- Computer
- Gathering and Analyzing Information

**Manufacturers such as Cummins have confidence in the MSSC certification process. So much confidence, in fact, that as Cummins re-designs its recruiting and hiring process we will integrate an MSSC program and certification exam as a key part of our hiring criteria. Having this certification will make a difference for the candidate.**

-Joe Loughrey, President and COO, Cummins Engine



# MSSC 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

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