Framework of Competencies by the Advanced Manufacturing Industry
Tier 1: Personal Effectiveness

<table>
<thead>
<tr>
<th>Personal Effectiveness Competencies</th>
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<tbody>
<tr>
<td>Integrity</td>
</tr>
<tr>
<td>Motivation</td>
</tr>
<tr>
<td>Dependability &amp; Reliability</td>
</tr>
<tr>
<td>Willingness to Learn</td>
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</tbody>
</table>

1. **Integrity**: Displaying accepted social and work behaviors.
   - Use good manners
   - Maintain confidentiality as appropriate about matters encountered in the workplace
   - Treat supervisors and co-workers with respect
   - Perform quality work
   - Practice honesty with regard to company time and property

2. **Motivation**: Demonstrating a willingness to work.
   - Take responsibility for completing one’s own work assignment
   - Show initiative in carrying out work assignments
   - Take initiative in seeking opportunities to learn new skills and tasks

3. **Dependability/Reliability**: Displaying responsible behaviors at work.
   - Avoid absenteeism
   - Demonstrate promptness
   - Maintain appropriate grooming and hygiene
   - Do not attend to personal business on the job
   - Manage stressful situations effectively

4. **Willingness to Learn**: Understanding the importance of learning new information for both current and future problem-solving and decision-making.
   - Accept help from supervisors and co-workers
   - Learn new/additional skills related to the job
   - Learn about the products or services of the organization
   - Contribute to solving problems on the job through suggestions, recommendations and communication

Tier 2: Foundation Academic Competencies

<table>
<thead>
<tr>
<th>Academic Competencies</th>
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<tbody>
<tr>
<td>Applied Science</td>
</tr>
<tr>
<td>Basic Computer Skills</td>
</tr>
<tr>
<td>Applied Mathematics/ Measurement</td>
</tr>
<tr>
<td>Reading for Information</td>
</tr>
<tr>
<td>Business Writing</td>
</tr>
<tr>
<td>Listening &amp; Following Directions</td>
</tr>
<tr>
<td>Locating/Using Information</td>
</tr>
<tr>
<td>Speaking/ Presentation Skills</td>
</tr>
</tbody>
</table>

1. **Applied Science**: Using scientific rules and methods to solve problems.
   - **Scientific Principles**
     - Understand the scientific principles involved in industry-specific production processes
     - Apply basic science principles to work-related problems & production processes
       - Physical
       - Chemical
       - Biological
       - Environmental

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

<table>
<thead>
<tr>
<th>Workplace Competencies</th>
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</thead>
<tbody>
<tr>
<td><strong>Business Fundamentals</strong></td>
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</table>

### 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.

<table>
<thead>
<tr>
<th>Work with Others</th>
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</thead>
<tbody>
<tr>
<td>- Work as part of a team to achieve mutual goals</td>
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<tr>
<td>- Develop and maintain good working relationships with supervisors and co-workers</td>
</tr>
<tr>
<td>- Choose behaviors and/or actions that best support the team and lead toward the accomplishment of work tasks</td>
</tr>
<tr>
<td>- Recognize a team’s goals and identify ways to accomplish those goals in increasingly complex workplace situations</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Influence/Negotiate</th>
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<tbody>
<tr>
<td>- Work through conflict constructively</td>
</tr>
<tr>
<td>- Persuasively present thoughts and ideas</td>
</tr>
<tr>
<td>- Respect the views of others</td>
</tr>
<tr>
<td>- Build toward consensus</td>
</tr>
<tr>
<td>- Influence, motivate, and persuade others in order to achieve company and client objectives</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Entertain new ideas</th>
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<tbody>
<tr>
<td>- Is open to considering new ways of doing things</td>
</tr>
<tr>
<td>- Actively seek out and carefully considers the merits of new approaches to work</td>
</tr>
<tr>
<td>- Willingly embrace new approaches when appropriate and discards approaches that are no longer working</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Deal with ambiguity</th>
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<tbody>
<tr>
<td>- Take effective action when necessary without having to have all the necessary facts in hand</td>
</tr>
<tr>
<td>- Change gears in response to unpredictable or unexpected events</td>
</tr>
<tr>
<td>- Effectively change plans, goals, actions or priorities to deal with changing situations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work with people from diverse backgrounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Is flexible and open-minded when dealing with a wide range of people</td>
</tr>
<tr>
<td>- Listen to and consider others’ viewpoints</td>
</tr>
<tr>
<td>- Alter opinion when it is appropriate to do so</td>
</tr>
<tr>
<td>- Work well and develop effective relationships with highly diverse personalities</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Understand customer needs</th>
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</thead>
<tbody>
<tr>
<td>- Identify internal and external customers</td>
</tr>
<tr>
<td>- Demonstrate a desire to understand customer needs</td>
</tr>
<tr>
<td>- Ask questions as appropriate</td>
</tr>
<tr>
<td>- Demonstrate awareness of client goals</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Provide personalized service</th>
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</thead>
<tbody>
<tr>
<td>- Provide prompt and efficient responses to meet the requirements, requests, and concerns of customers</td>
</tr>
<tr>
<td>- Provide thorough, accurate information to answer customers’ questions and to meet commitment times or performance guarantees;</td>
</tr>
<tr>
<td>- Actively look for ways to help customers by identifying and proposing appropriate solutions and/or services</td>
</tr>
<tr>
<td>- Establish boundaries as appropriate for unreasonable customer demands</td>
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</table>

<table>
<thead>
<tr>
<th>Act professionally</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Is pleasant, courteous and professional when dealing with internal or external customers</td>
</tr>
<tr>
<td>- Develop constructive and cooperative working relationships with customers</td>
</tr>
</tbody>
</table>
- 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.

<table>
<thead>
<tr>
<th>Plan</th>
<th>Prioritize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach work in a methodical manner</td>
<td>Prioritize various competing tasks</td>
</tr>
<tr>
<td>Plan and schedule tasks so that work is completed on time</td>
<td>Perform tasks quickly and efficiently according to their urgency</td>
</tr>
<tr>
<td>Keep track of details to ensure work is performed accurately and completely</td>
<td>Find new ways of organizing work area or planning work to accomplish work more efficiently.</td>
</tr>
</tbody>
</table>

**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.

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

<table>
<thead>
<tr>
<th>Industry-Wide Technical Competencies</th>
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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:**

<table>
<thead>
<tr>
<th>Production Basics</th>
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<tbody>
<tr>
<td>Types of Production</td>
</tr>
<tr>
<td>Lean Manufacturing/Continuous Improvement</td>
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<table>
<thead>
<tr>
<th>Production Materials</th>
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<tbody>
<tr>
<td>Sources</td>
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<tr>
<td>Types of Materials</td>
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<table>
<thead>
<tr>
<th>Precision Measurement</th>
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<tbody>
<tr>
<td>Manual Tool &amp; Equipment Operations</td>
</tr>
<tr>
<td>Basic Automated Systems &amp; Control Operations</td>
</tr>
<tr>
<td>Automated Equipment</td>
</tr>
<tr>
<td>Automated Systems</td>
</tr>
<tr>
<td>Computer Control</td>
</tr>
<tr>
<td>Robotics</td>
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<tr>
<td>Process Control</td>
</tr>
<tr>
<td>Analytical Testing</td>
</tr>
<tr>
<td>Basic Manufacturing Process Applications &amp; Operations</td>
</tr>
<tr>
<td>Assembly Processes</td>
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<tr>
<td>Fabrication Processes</td>
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<tr>
<td>Electrical/Electronics Manufacturing Processes</td>
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<tr>
<td>Continuous Flow/Line Balancing Processes</td>
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<tr>
<td>Finishing Processes</td>
</tr>
<tr>
<td>Clean Room Processes</td>
</tr>
<tr>
<td>Experiment Design/Implementation Processes</td>
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<tr>
<td>Implementation of Approved Protocols</td>
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</table>

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:**

<table>
<thead>
<tr>
<th>General Skills</th>
</tr>
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<tbody>
<tr>
<td>Use of Hand Tools</td>
</tr>
<tr>
<td>Schematic Drawings and Control Documents</td>
</tr>
<tr>
<td>Calibrated Measuring Instruments</td>
</tr>
<tr>
<td>Knowledge of Basic AC/DC Electrical Systems</td>
</tr>
<tr>
<td>Installation of Parts for Industrial Equipment</td>
</tr>
</tbody>
</table>
### 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
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)
  - 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)

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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