PIPPLEINE Program

Competency Model for Advanced Manufacturing

Occupation: Maintenance and Repair Worker

Employer-Specific Requirements

Occupation-Specific Competencies*

- Mechanical Power Transmissions
- Hydraulic/Pneumatic Systems
- Compressors
- Laser Shaft Alignment
- Industrial Belting
- Boring Mills
- Machinery Alignment
- Grinders
- Advanced Optical Alignment
- CNC
- Supplemental Skills: Metal Fabrication
- Welding (SMAW/GMAW/GTAW), Oxy-Acetylene Cutting
- Lubricants, Lubrication Systems
- Troubleshooting and Analysis
- Robotics Inspection Criteria
- Motor Controls, PLC
- Electrical, Fluid, Pneumatic Power Systems
- Blueprint Reading
- Lubricants, Lubrication Systems
- Troubleshooting and Analysis
- Robotics Inspection Criteria
- Motor Controls, PLC
- Electrical, Fluid, Pneumatic Power Systems
- Blueprint Reading

Industry-Sector Technical Competencies*

- Ergonomics Preventive Maintenance
- Lubricants, Lubrication Systems
- Troubleshooting and Analysis
- Robotics Inspection Criteria
- Motor Controls, PLC
- Electrical, Fluid, Pneumatic Power Systems
- Blueprint Reading

Industry-Wide Technical Competencies

- Manufacturing Process Design & Development
- Production
- Maintenance, Installation and Repair
- Supply Chain Logistics
- Quality Assurance, Continuous Improvement
- Sustainable and Green Manufacturing
- Health, Safety, Security and Environment

Workplace Competencies

- Business Basics
- Teamwork
- Adaptability and Flexibility
- Marketing, Customer Focus
- Planning and Organizing
- Problem Solving, Decision Making
- Working With Tools, Technology
- Checking, Examining and Recording
- Sustainable Practices

Academic Competencies

- Science
- Basic Computer Skills
- Mathematics
- Reading and Writing
- Communication: Listening & Speaking
- Critical & Analytic Thinking
- Information Literacy

Personal Effectiveness Competencies

- Interpersonal Skills
- Integrity
- Professionalism
- Initiative
- Dependability and Reliability
- Lifelong Learning

Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

* The PIPELINE Program recommends the Industry-Specific Technical Competencies as formal training opportunities (provided through related instruction) and the Occupation-Specific Competencies as on-the-job training opportunities.
Competency Model for Advanced Manufacturing

Maintenance and Repair Worker

Industrial machinery mechanics and maintenance workers maintain and repair factory equipment and other industrial machinery, such as conveying systems, production machinery, and packaging equipment.

Industry-Sector Technical Competencies

- **Ergonomics** – Knowledge of how to modify machines so operation is safe and productive for operator.
- **Preventative maintenance** – Training to anticipate and prevent potential malfunction of tools and machinery.
- **Lubricants/lubrication systems** – Understanding of why lubricants and lubricant systems are used and when it is most beneficial to use them.
- **Troubleshooting and analysis** – Training in troubleshooting issues with machinery using tools and knowledge of machinery.
- **Robotics** – Understand how to maintain and repair robotic devices.
- **Inspection Criteria** – Training in proper machine inspection.
- **Motor Controls and PLCs** – Understanding of how to program motor controls and PLCs and how to use them for interfacing, operation, and programming.
- **Blueprint reading** - Training on how to interpret blueprints and use those blueprints to build reliable and serviceable objects.
- **Power systems** – Instruction on how electrical, fluid, and pneumatic power systems function and how to maintain them.

Occupation-Specific Competencies

- **Mechanical power transmissions** – Demonstrate machine operation with power transmissions and how to maintain and repair them.
- **Hydraulic/Pneumatic systems** – Demonstrate function and operation of hydraulic and pneumatic systems and how to maintain and repair them.
- **Machinery alignment** – Ability to align machinery for proper operation.
- **Optical Alignment** – Ability to align advanced optical systems.
- **CNC** – Perform maintenance and repair on CNC machines.
- **Compressors** – Perform repair and maintain compressors.
- **Laser Shaft Alignment** – Demonstrate proper alignment principles and practices including troubleshooting.
- **Industrial Belting** – Maintain and repair industrial belting assembly systems.
- **Boring Mills** - Maintain and repair boring mills.
- **Grinders** – Perform grinding on parts as needed, as well as maintain grinding equipment.

**Supplemental Skills – may be required depending on employer**
- **Welding** - Exhibit knowledge of the safe operation of welding equipment and the welding skills needed to perform repair to machines.
- **Metal Fabrication** – As needed, perform metal fabrication.
- **Oxy-Acetyl Cutting** - As needed, perform oxy-acetyl cutting.
- **Scaffold use** - Demonstrate with how to safely ascend and perform job functions while using a scaffold.

### Maintenance and Repair Worker Occupational Competency Training Plan

<table>
<thead>
<tr>
<th>Course</th>
<th>Course Description</th>
<th>Credit/Non-Credit</th>
<th>Hours Spent on Competency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ergonomics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preventative maintenance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubricants/lubrication systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Troubleshooting and analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robotics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspection Criteria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Controls and PLCs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blueprint reading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power systems</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*On-The-Job Training is the work experience and instruction. Training experience need not be in the exact order as listed below.*

<table>
<thead>
<tr>
<th>Trainer/Instructor</th>
<th>Name of person responsible for verifying competency mastery</th>
<th>Hours spent on competency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical power transmissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic/Pneumatic systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical Alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CNC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser Shaft Alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Belting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boring Mills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grinders</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Supplemental Skills</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal Fabrication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxy-Acetyl Cutting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scaffold use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>