

# MANUFACTURING PRODUCTION TECHNICIANS

A DEEP DIVE FOR SKILLS-BASED HIRING

REV: 04/04/16

# Occupation Overview: Manufacturing Production Technicians

## Foundational Competencies

- **Operation Monitoring:** Watching gauges, dials, or other indicators to make sure a machine is working properly.
- **Critical Thinking:** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
- **Active Listening:** 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.
- **Monitoring:** Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- **Equipment Maintenance:** Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- **Complex Problem Solving:** Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- **Operation and Control:** Controlling operations of equipment or systems.
- **Repairing:** Repairing machines or systems using the needed tools.
- **Quality Control Analysis:** Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- **Troubleshooting:** Determining causes of operating errors and deciding what to do about it.

## Occupation-Specific Competencies

- **Microsoft Office:** Ability to create and utilize documents using programs such as Microsoft Word, Excel, PowerPoint, and Outlook.
- **Mathematics:** Competency in manipulating numbers, quantities, shapes, and spaces.
- **Machinery:** Ability to safely and appropriately operate, demonstrate, clean, and lubricate machines.
- **Equipment Maintenance/Repair:** Proficiency with equipment assembly, maintenance, efficiency, repair, cleaning, installation, and inspection.
- **Electrical/Mechanical Labor:** Mechanical and/or electrical knowledge of circuit testers, AC/DC drives and motors, cabling, fiber optics, calibration, and components of technical orders.
- **Circuitry:** Experience with CMOS, variable speed drives, continuity testing, PLC Programming, and other aspects of circuit analysis and digital circuitry.
- **Manufacturing Processes:** Understanding Six Sigma processes at a green or black belt levels, Kaizen, and lean manufacturing.
- **Brazing and Soldering:** Ability to use soldering irons for brazing and soldering.
- **Industrial Design:** Ability to create and/or use schematic diagrams, blueprints, and sketching for industrial design.
- **Machine Tools:** Certification and/or proficiency with machine tools such as power grinders, milling cutters, drill presses, lathes, calipers, tool dies, and their dial indicators.

## Job Description (Example)

Set up, test, and adjust manufacturing machinery or equipment, using any combination of electrical, electronic, mechanical, hydraulic, pneumatic, or computer technologies.

- Monitor the productivity or efficiency of industrial operations and activities affecting environmental quality.
- Inspect equipment, systems, and finished products for flaws.
- Test performance of electrical, electronic, mechanical, or integrated systems or equipment.
- Measure physical or chemical properties of materials or objects.
- Determine causes of operational problems or failures.
- Select project materials, create physical models or prototypes, and create detailed work plans.
- Assemble and calibrate scientific or technical equipment.
- Maintain clean work areas.

## Activities (Example List)

- Adhere to all applicable regulations, policies, and procedures for health, safety, and environmental compliance.
- Inspect finished products for quality and adherence to customer specifications.
- Set up and operate production equipment in accordance with current good manufacturing practices and standard operating procedures.
- Calibrate or adjust equipment to ensure quality production, using tools such as calipers, micrometers, height gauges, protractors, or ring gauges.
- Set up and verify the functionality of safety equipment.
- Monitor and adjust production processes or equipment for quality and productivity.
- Troubleshoot problems with equipment, devices, or products.
- Test products or subassemblies for functionality or quality.
- Plan and lay out work to meet production and schedule requirements.
- Start up and shut down processing equipment.

# Prioritized Foundational Competencies: Manufacturing Production Technicians

Most Common Required Competencies	
1	<b>Active Listening:</b> 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; being able to accurately synthesize and share what's been said; taking notes where appropriate.
2	<b>Critical Thinking:</b> Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems; being able to see new ways of doing things, not simply accepting the status quo; understanding how the current system works and being open to making improvements.
3	<b>Monitoring:</b> Monitoring/assessing the performance of yourself, other individuals, your team and the broader organization to make improvements or take corrective action; being able to accept feedback and ideally seek out feedback; being willing to ask for help and find the appropriate people to ask for support.

Most Common Break Point Competencies	
1	<b>Active Listening:</b> <i>See previous.</i>
2	<b>Operation and Control:</b> Controlling operations of equipment or systems; adjusting equipment as needed for the task at hand; maintain machines as needed (e.g., check coolants and oils and add if needed); check tools to make sure they work properly (e.g., sharp blade); following standardized work instructions or company processes.
3	<b>Quality Control Analysis:</b> Analyzing the quality of one's work to meet the necessary quality or performance standards; tracking defects in work; meeting time standard goals (when relevant); checking one's parts to maintain a high quality standard; in general, being mindful of quality and its importance.

Most Preferred Competencies	
1	<b>Active Listening:</b> <i>See previous.</i>
2	<b>Troubleshooting:</b> Determining causes of operating errors and deciding what to do about it; able to identify errors, develop possible explanations for the error and speaks with the appropriate people (e.g., superiors, colleagues) when needed before taking action; making small adjustments independently but seeking help on problems that may more systemic (pattern of problems or serious problem).
3	<b>Critical Thinking:</b> <i>See previous.</i>

Most Hard-to-Find Competencies	
1	<b>Active Listening:</b> <i>See previous.</i>
2	<b>Monitoring:</b> <i>See previous.</i>
3	<b>Complex Problem Solving:</b> Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions; able to come up with new ideas on how to improve the company's operations on a key dimension (cost, quality, speed); able to think about how to improve important processes and the overall system to make things better.

Most Evolving Competencies	
1	<b>Monitoring:</b> Evolution driven by increasingly competitive environment with more emphasis on lower cost, better quality, and faster production combined with more powerful, flexible tools; this change makes it more important to continually seek out new ways to improve both on the individual, team, and company level.
2	<b>Operation and Control:</b> Evolution driven by increasingly sophisticated equipment combined with more challenging, complicated requests from customers; change makes it more valuable to know how to use newer, more powerful equipment or at least have done some research into what newer equipment can do.
3	<b>Quality Control Analysis:</b> Evolution driven by more complicated products and outputs ("nothing's flat any more"), given modern CAD capabilities, that make quality assessment harder combined with higher standards; makes it more valuable to know how to use newer quality tools (CMMs, probes) and to have familiarity assessing the quality of more complicated products.

## Prioritized Occupation-Specific Competencies: Manufacturing Production Technician

Most Common Required Competencies	
1	<b>Machinery:</b> Ability to safely and appropriately operate, demonstrate, clean, and lubricate machines (e.g., hand tools, lathes, mills).
2	<b>Manufacturing Processes:</b> Understanding the basic manufacturing process, preferably from end-to-end; ideally, possess a basic familiarity with one or more quality improvement processes such as Six Sigma Kaizen, and lean.
3	<b>Mathematics:</b> Competency in manipulating numbers, quantities, shapes, and spaces; able to take simple measurements and perform basic mathematical operations (e.g., addition, subtraction, division) particularly when required to translate a blueprint into production; in some instances, need to use formulas to calculate key values.

Most Common Break Point Competencies	
1	<b>Machinery:</b> <i>See previous.</i>
2	<b>Equipment Maintenance/Repair:</b> Proficiency with equipment assembly, maintenance, efficiency, repair, cleaning, installation, and inspection; conduct basic day-to-day maintenance to upkeep machines (e.g., check fluid and gas levels, following start-up and shut-down protocols).
3	<b>Manufacturing Processes:</b> <i>See previous.</i>

Most Preferred Competencies	
1	<b>Machinery:</b> <i>See previous.</i>
2	<b>Machine Tools:</b> Proficiency with machine tools such as power grinders, milling cutters, drill presses, lathes, calipers, tool dies, and their dial indicators.
3	<b>Equipment Maintenance/Repair:</b> <i>See previous.</i>

Most Hard-to-Find Competencies	
1	<b>Equipment Maintenance/Repair:</b> <i>See previous.</i>
2	<b>Manufacturing Processes:</b> <i>See previous.</i>
3	<b>Machine Tools:</b> <i>See previous.</i>

Most Evolving Competencies	
1	<b>Machine Tools:</b> Evolution driven by increasingly powerful and sophisticated machines combined with more challenging orders (lower cost, faster turnaround); change increases the value of having a basic familiarity with commonly used machine tools (e.g., power grinder, milling cutters, drill presses) and ideally some familiarity with using more modern equipment.
2	<b>Manufacturing Processes:</b> Evolution driven by increased competitive pressure to improve (cheaper, faster, better); increases the value of understanding one or more quality improvement processes including Six Sigma, Kaizen, and lean and being able to execute those processes to make improvements on the shop floor.
3	<b>Equipment Maintenance/Repair:</b> Evolution driven by the challenge of maintaining more complicated, sophisticated equipment; the change increases the value of emphasizing maintenance both to make equipment last and work as effectively as possible.

## Work Scenarios: Computer Manufacturing Production Technician

Scenario: New Work Order	List of Competencies
<p>Stephanie has received an email from her boss informing her that a new work order has come in from an existing client. She logs onto her workstation and opens the shop management software they use to store all work orders and associated documentation, then uses the client's customer number to find the new project. Once she has located the new project, Stephanie uses a computer-aided manufacturing program to open the file that has been uploaded by a project engineer, then reviews the file to verify accuracy and gather the required specs for the machinery necessary to execute the order. As Stephanie examines the plans which show her how she must tool the required machinery, she sees that the newly ordered part will be milled from aluminum blocks on a 5-axis machine using 6 different "tools". Stephanie prints off the setup sheet, takes it out to the floor, and begins collecting, checking, sharpening, and -- finally -- placing the "tools" into the assigned machine, making sure to pay careful attention to the location and order in which they are placed within the machine.</p>	<ul style="list-style-type: none"> <li>• <i>Operation and Control</i></li> <li>• <i>Quality Control Analysis</i></li> <li>• <i>Monitoring</i></li> <li>• <i>Critical Thinking</i></li> <li>• Machine Tools</li> <li>• Manufacturing Processes</li> <li>• Equipment Maintenance / Repair</li> </ul>
Scenario: Setting up New Work Order	List of Competencies
<p>Rudi begins his afternoon shift by meeting with the production technician finishing their shift and learns he needs to finish setup for a new work order. He reviews all of the documentation his coworker gives him and finds the machine is tooled but still needs to be set to the material. Rudi works to program and set dimensions into the machine using one of the raw aluminum blocks that will be milled down to create the final product. As a final step, he performs an initial run of the material and works with a quality technician to make sure that the first article adheres to production quality specifications. Luckily, everything is correct, so he signs off on the setup documentation and moves on to executing the next project that has come into his inbox.</p>	<ul style="list-style-type: none"> <li>• <i>Active Listening</i></li> <li>• <i>Quality Control Analysis</i></li> <li>• <i>Monitoring</i></li> <li>• <i>Critical Thinking</i></li> <li>• Machine Tools</li> <li>• Manufacturing Processes</li> <li>• Equipment Maintenance / Repair</li> </ul>
Scenario: Quality Check	List of Competencies
<p>Carlo has just completed tooling a swiss-type machine and must perform a first run to verify that the rifle barrels being produced will meet quality specifications. After producing a sample, Carlo calls over the quality technician to help measure the barrel and look for anything that does not meet criteria listed on the quality plan. They find that the barrel rifling shows chatter in the metal and that the angle of an end cut is too steep. Carlo knows chatter occurs when the machine is rotating too high a speed, so an alteration to the RPM in the project's CAM file may be in order. Upon investigation he finds the designated RPM input does not match original values communicated by the engineer, the RPM value is adjusted and the file is uploaded back to the machine. Carlo knows the issue with the angle of the cut is the result of a tooling discrepancy. Carefully, Carlo investigates the machine and finds that one of the bits was placed upside down, he reloads the bit into its correct position, and runs the machine again to produce a new sample piece. This time, the barrel passes inspection, and Carlo is able to sign off that the setup is complete. Now, he can begin work on the next project.</p>	<ul style="list-style-type: none"> <li>• <i>Troubleshooting</i></li> <li>• <i>Monitoring</i></li> <li>• <i>Critical Thinking</i></li> <li>• <i>Quality Control Analysis</i></li> <li>• Manufacturing Processes</li> <li>• Machine Tools</li> <li>• Machinery</li> </ul>

# Occupation Deep Dive: Manufacturing Production Technicians

## Job Titles Within This Occupation

- Manufacturing Technician
- Production Technician
- Operator
- Set-up Technician

## Certification and Education Preferences (Example)

- Forklift Operator Certification
- Soldering Certification (e.g., IPC Certification)

## Tools Used (Example List)

- Soldering
- Calibration
- Programmable Logic Controller (PLC) Programming
- Computer Aided Drafting/Design (CAD)
- Lean Manufacturing
- Forklift Operation
- Hand Tools/Torque Wrenches
- Basic Measuring Tools (e.g., dial calipers)

## Other Relevant Foundational Competencies

1	Reading Comprehension
2	Judgment and Decision Making
3	Writing
4	Speaking
5	Coordination
6	Time Management
7	Active Learning
8	Social Perceptiveness
9	Instructing
10	Equipment Selection
11	Learning Strategies
12	Negotiation
13	Service Orientation
14	Systems Analysis
15	Science
16	Persuasion
17	Operations Analysis
18	System Evaluation
19	Management of Personnel Resources
20	Mathematics
21	Technology Design
22	Installation
23	Management of Material Resources
24	Management of Financial Resources
25	Programming

## Other Relevant Occupation-Specific Competencies

1	Employee Training
2	Signal Processing
3	Electrical Construction
4	General Electrical Systems
5	Computer Engineering Methods
6	Operations Analysis
7	Power Tools
8	Material Moving and Transport
9	Product Inspection
10	Hand Tools
11	Packaging
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