

ELECTROMECHANICAL AND INDUSTRIAL ENGINEERING TECHNICIAN

A DEEP DIVE FOR SKILLS-BASED HIRING

REV: 04/04/16

Occupation Overview: Engineering Technicians, Except Drafters, All Other

Foundational Competencies

- **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.
- **Complex Problem Solving:** Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- **Speaking:** Talking to others to convey information effectively.
- **Monitoring:** Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- **Operation Monitoring:** Watching gauges, dials, or other indicators to make sure a machine is working properly.
- **Quality Control Analysis:** Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- **Judgment and Decision Making:** Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- **Writing:** Communicating effectively in writing as appropriate for the needs of the audience.
- **Systems Analysis:** Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.

Occupation-Specific Competencies

- **Microsoft Office:** Ability to create and utilize documents using programs such as Microsoft Word, Excel, PowerPoint, and Outlook.
- **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.
- **Equipment Maintenance/Repair:** Proficiency with equipment assembly, maintenance, efficiency, repair, cleaning, installation, and inspection.
- **Engineering Activities:** Proficiency in all aspects of being an engineer, including management, support, design, and working on projects.
- **General Data Techniques:** Proficiency with data collection, management, analysis, manipulation, conversion, validation, and other data technique, often for technical writing/editing.
- **Engineering Simulation:** Proficiency with data acquisition and simulation in Labview and other engineering simulation programs.
- **Signal Processing:** Ability to use power supplies, logical analyzers, oscilloscopes, multimeters, and signal generators for signal processing and DSP.
- **Computer Engineering Methods:** Understanding of computational fluid dynamics, CAD, and finite element analysis for computer engineering.
- **Brazing and Soldering:** Ability to use soldering irons for brazing and soldering.
- **Lab Research Methodology:** Experience with laboratory research, procedures, and equipment with sample preparation, aseptic and clean room experience, GMP, and GLP.

Job Description (Example)

- Will perform component level troubleshooting of circuit boards, assemble and align complex laser based opto-mechanical instrumentation, devise test plans and document procedures, as well as prepare wiring schematics and assembly drawings with minimal supervision.
- Perform component level troubleshooting of circuit boards and evaluate noise in detector and optical systems.
 - Assemble and align complex laser-based opto-mechanical instrumentation, devise test plans and document procedures, as well as prepare wiring schematics and assembly drawings with minimal supervision.
 - Assist in preparing formal documentation for the release of R&D projects to the manufacturing floor.
 - Assists in the production of accurate assembly drawings, detail drawings and design layouts based on input from designers and/or engineering.
 - Assists with testing, troubleshooting, assembly of new/existing circuit board designs.

Activities (Example List)

- Recommend corrective or preventive actions to assure or improve product quality or reliability.
- Prepare layouts, drawings, or sketches of machinery or equipment, such as shop tooling, scale layouts, or new equipment design, using drafting equipment or computer-aided design (CAD) software.
- Identify and implement new manufacturing technologies, processes, or equipment.
- Test faulty equipment to diagnose malfunctions, using test equipment or software, and applying knowledge of the functional operation of electronic units and systems.
- Provide complete and accurate design packages and coordinate their distribution for review and design review readiness.
- Review product drawings for accuracy, consistency, and compliance to industrial standards, internal design standards, and project requirements.

Prioritized Foundational Competencies: Engineering Technicians, Except Drafters, All Other

Most Common Required Competencies	
1	Active Listening: Giving full attention to what other people are saying by removing distractions, taking time to capture the details of what is said, consistently asking questions to clarify points as needed, and knowing when to speak.
2	Critical Thinking: Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems by looking at both the micro and macro of every situation. Constantly looking for areas of improvement and bringing forward new ideas to help create more efficient processes.
3	Judgment and Decision Making: Evaluating, considering, and then acting on the best course of action in regards to whether a component can or even should be made, taking into consideration the logistics of production and overall ROI of a process. These types of evaluations should be made at the onset of a new project and be revisited in an ongoing manner.

Most Common Break Point Competencies	
1	Judgment and Decision Making: <i>See previous.</i>
2	Monitoring: Monitoring/assessing performance of yourself, other team members, or the production processes in order to make improvements or take corrective action. Reflecting upon observations in order to hold yourself and others accountable to goals being put in place.
3	Operational Monitoring: Monitoring and, if needed, adjusting multiple components of the manufacturing process, including time, materials, workflow, quality, and operational parameters. Taking advantage of lull periods in the production workflow to stack activities for improved productivity.

Most Preferred Competencies	
1	Critical Thinking: <i>See previous.</i>
2	Complex Problem Solving: Identifying complex, and previously unseen, problems around operational efficiencies and then working with related data to develop innovative solutions (e.g., moving technical designs into efficient production through manufacturing engineering methodologies).
3	Systems Analysis: Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes with the goal of continuous process improvement. Learning the existing structure and limits of a system to identify pathways to greater efficiency and reduced complexity.

Most Hard-to-Find Competencies	
1	Critical Thinking: <i>See previous.</i>
2	Speaking: Talking to others to convey and gather information effectively in a technical environment; conversing with team members to translate vital details and directions from one group to another.
3	Writing: Communicating effectively in writing to clearly convey a message, whether it is detailed specifications like finishing measurements or ongoing communications like production reports. This includes being able to communicate the entire picture, address complex problems in a succinct manner that identifies the issue and then propose possible pathways to a solution.

Most Evolving Competencies	
1	Critical Thinking: Evolution driven by software and automated hardware replacing many positions on the floor previously filled by front-line workers; changes make it more important to identify solutions that utilize technology to its greatest effect.
2	Speaking: Evolution driven by more frequent usage of remote collaboration (e.g., telecommuting, online collaborative documents) to solve complex issues; changes make it more important to clearly articulate the key issues and important data points so all parties can undertake independent action to drive a solution forward.
3	Systems Analysis: Evolution driven by the digital thread of production; changes make it more important to rapidly integrate new software and technical components in order to create more robust systems which can undertake new tasks within the manufacturing process.

Prioritized Occupation-Specific Competencies: Engineering Technicians, Except Drafters, All Other

Most Common Required Competencies	
1	Microsoft Office: Ability to effectively work in programs such as Microsoft Word, Excel, PowerPoint, and Outlook to perform tasks like data analysis and report writing.
2	General Data Techniques: Proficiency with data collection, management, analysis, manipulation, conversion, validation, and other data techniques, often for technical writing/editing.
3	Engineering Activities: Proficiency in some aspects of being an engineer, including the support, design, workflow, and team-based work-related projects with an awareness of real-world implications tied to project components (e.g., cost, time, effort).

Most Common Break Point Competencies	
1	Electrical/Mechanical Labor: Awareness of what circuit testers, AC/DC drives and motors, cabling, fiber optics, calibration, and components of technical orders are along with how they work.
2	Engineering Activities: <i>See previous.</i>
3	General Data Techniques: <i>See previous.</i>

Most Preferred Competencies	
1	Engineering Simulation: Proficiency with data acquisition and simulation of virtual flow of work in Labview, Dassault 3DS, and other engineering simulation programs.
2	Computer Engineering Methods: Understanding of computational fluid dynamics, CAD, and finite element analysis for computer engineering as it ties to modern digital manufacturing.
3	Engineering Activities: <i>See previous.</i>

Most Hard-to-Find Competencies	
1	Equipment Maintenance/Repair: Proficiency with basics of equipment assembly, maintenance, efficiency, repair, cleaning, installation, and inspection.
2	Signal Processing: Ability to use power supplies, logical analyzers, oscilloscopes, multimeters, and signal generators for signal processing and DSP.
3	Brazing/Soldering: Ability to use soldering irons for brazing and soldering.

Most Evolving Competencies	
1	Engineering Simulation: Evolution driven by growing breadth of available data points that can be used to more accurately model manufacturing processes in simulation software suites; changes make it more important to learn the basics of simulation software by participating in more thorough and ongoing trainings.
2	Computer Engineering Methods: Evolution driven by engineering software moving to open-source platforms which allow for deep customization; changes make it more important to fully understand production needs and how computer engineering technology can support and augment existing processes.
3	Engineering Activities: Evolution driven by expansion and development of the engineering field; changes make it more important to stay current with new methodologies, materials, processes, and tools available in the engineering space.

Occupation Deep Dive: Engineering Technicians, Except Drafters, All Others

Job Titles Within This Occupation

<ul style="list-style-type: none"> • Engineering Technician • Quality Engineer • Maintenance Engineer • Electromechanical and Industrial Engineering Technician • Non-Destructive Testing Specialist • Electrical Engineering Technologist • Electromechanical Engineering Technologist • Electronics Engineering Technologist • Industrial Engineering Technologist • Manufacturing Engineering Technologist 	<ul style="list-style-type: none"> • Mechanical Engineering Technologist • Photonics Technician • Fuel Cell Technician • Nanotechnology Engineering Technologist • Nanotechnology Engineering Technician 	
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Certification and Education Preferences (Example)

<ul style="list-style-type: none"> • American Society of Certified Engineering Technicians (ASCET)

Tools Used (Example List)

<ul style="list-style-type: none"> • Computer Aided Drafting/Design (CAD) • Cabling • Soldering • Schematic Diagrams
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Other Relevant Foundational Competencies

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

Other Relevant Occupation-Specific Competencies

1	Employee Training
2	General Engineering
3	Industrial Design
4	Data Entry
5	Machine Tools
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