ELECTRO-MECHANICAL TECHNICIAN
(Time-Based)

APPENDIX A
D.O.T. CODE 710.281-018
O*NET CODE 17-3024.00

This training outline represents minimum standards for work processes and related instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom instruction.

WORK PROCESSES

	Approximate Hours
A. Safety and Workplace Orientation	250

1. Demonstrate knowledge of general workplace procedures, policies, safety protocols, etc.
2. Use appropriate Personal Protective Equipment (PPE) when necessary.
3. Learn and adhere to current National Fire Protection Association Standard for Electrical Safety in the Workplace (NFPA 70E).
4. Adhere to regulatory standards for industry, e.g., Food and Drug Administration (FDA) Current Good Manufacturing Processes (CGMP) (where applicable).
5. Learn basics of machine operation.
6. Employ Lockout/Tagout (LO/TO) whenever necessary.
7. Describe production process(es) of workplace.

B. Mechanical Repair	2000

1. Learn basic toolmaker skills using equipment such as: Lathes, Mills, Drill Press, Grinders, etc. (if applicable).
2. Read and interpret mechanical drawings, including Geometric Dimensioning & Tolerancing (GD&T) callouts; demonstrate ability to interpret tolerance stack-up of parts and assemblies.
3. Learn when and how to use and understand precision measuring devices, such as calipers, depth gauges, dial indicators, gauge blocks, etc.

3. Become familiar with all elements of mechanical systems, including drive systems, gearboxes, transmissions, chain drives, belt drives, etc.
4. Learn operation of pneumatic and hydraulic systems; become familiar with valves, pumps, lubricants, coolants, plumbing and piping contained in both systems.
5. Read hydraulic and pneumatic prints.
6. Perform repairs using various handheld tools, including but not limited to: screwdrivers, wrenches, nut drivers, allen wrenches (both SAE and metric), pliers, channel locks, etc.
7. Utilize reference materials to aid repair.
8. Document and submit reports (if applicable).

C. Electrical Repair 950

1. Learn basic electrical properties and vocabulary.
2. Read electrical and electronic drawings.
3. Work with motors:
   a. Direct Current (DC)
   b. Alternating Current (AC), single-phase and three-phase.
4. Work with motor controls, for example: pushbutton, thermostat, switch.
5. Work with motor control circuits: start/stop, forward/reverse, speed, braking.
6. Work with controlled devices, such as: relays, motor starters.
7. Work with transformers, rectifiers, heaters.
8. Perform repairs using various hand tools, including but not limited to: multimeters, oscilloscopes, wire strippers, screwdrivers, wrenches.
9. Utilize reference materials to aid repair.
10. Document and submit reports (if applicable).

D. Electronic Repair 1900

1. Become familiar with basics of industrial electronics and associated equipment and components, such as diodes, transistors, printed circuit boards.
2. Solder electronic components (if applicable).
3. Understand and explain digital logic.
4. Learn and use Programmable Logic Controllers (PLC); describe components and functions; read relay ladder logic; become familiar with multiple Input/Output (I/O) configurations; use PLC knowledge to trouble-shoot, repair, and maintain equipment and machinery.
5. Work with servo motors and encoders.
6. Work with various types of robotics and gantry systems, as well as simple pick-and-place-type systems.
7. Work with machine vision systems, including lighting, focus, exposure timing, Optical Character Recognition (OCR) and pattern recognition.
8. Work with barcode technology, including camera-based and laser-based

readers and code technology, including quiet zones and start/stop symbols on various industrial 1D (1 Dimensional) and 2D (2 Dimensional) barcodes (if applicable).
9. Perform repairs using various hand tools and diagnostic equipment, including but not limited to screwdrivers, allen wrenches (SAE and metric), pliers, flashlights, and multimeters.
10. Utilize reference materials to aid repair.
11. Document and submit reports (if applicable).

E. Preventative Maintenance and Troubleshooting 2750

1. Perform Preventative Maintenance (PM) and troubleshoot machinery and equipment issues using various hand tools and diagnostic equipment.
2. Discern type of PM and/or repair and utilize any/all mechanical, electrical, electronic skillset(s).
3. Utilize reference materials to aid PM and troubleshooting.
4. Document and submit reports (if applicable).

F. Miscellaneous 150

1. Requisition materials.
2. Handle materials and move machinery using rigging techniques, cranes, jacks, etc.

Approximate Total Hours 8000

Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to http://www.labor.state.ny.us/workerprotection/publicwork/PDFs/Article8FAQS.pdf

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APPENDIX B

RELATED INSTRUCTION

Safety, Health, and the Workplace
General Workplace Safety
First Aid & CPR (minimum 6.5 hours every 3 years)
Personal Protective Equipment (PPE)
Right-to-Know/Safety Data Sheets (SDS)
Asbestos Awareness (if present – see Attachment to Appendix B)
Lockout/Tagout (LO/TO)
Sexual Harassment Prevention Training (minimum 3 hours)

Trade Theory and Skills
Trade Math
Fundamentals of Mechanics, Electricity, and Electronics
Print Reading: Dimensional, Schematics, Hydraulic, Pneumatic, Electrical, and Electronic
Geometric Dimensioning & Tolerancing (GD&T)
Metrology
Drives, Gearboxes, Belts, Pumps, Valves
Lubricants and Coolants
Motors and Motor Control Circuits
Transformers, Rectifiers, Relays, Switches
Heaters and Control Circuits
Proportional Integrative Derivative (PID)
Electronic Equipment
Electronic Soldering
Programmable Logic Controllers (PLC)
Robotics
Scanners and Sensors
Rigging and Material Handling/Transport

Additional Courses As Necessary

A Minimum of 144 Hours of Related Instruction are Required for Each Apprentice for Each Year.

ATTACHMENT TO APPENDIX B

Asbestos Awareness

This course must be delivered by one of the following:

1. A provider currently approved by the New York State Department of Health to deliver asbestos safety training.
2. A person holding a current Asbestos Handler certificate from the New York State Department of Labor in the title of: Inspector, Supervisor, Project Monitor, Management Planner, or Project Designer.
3. Anyone otherwise approved by the New York State Education Department.

Minimum course contents must include the following:

1. Definition of asbestos
2. Types and physical characteristics
3. Uses and applications
4. Health effects:
   - Asbestos-related diseases
   - Risks to families
   - Cigarette smoking
   - Lack of safe exposure level
5. Employer-specific procedures to follow in case of potential exposure, including making a supervisor or building owner immediately aware of any suspected incidental asbestos disturbance so that proper containment and abatement procedures can be initiated promptly.

Notwithstanding the above course requirement, employers are advised that they must also be in compliance with New York State Department of Labor Industrial Code Rule 56 at all times.

Employers are further advised, and must advise all apprentices, that completion of the above course requirement does not authorize any person to remove, encapsulate, enclose, repair, disturb, or abate in any manner, any friable or non-friable asbestos, asbestos containing material, presumed asbestos containing material, or suspect miscellaneous asbestos containing material.