

# Mechatronics 1 (8554)

## Applying Basic Safety Standards for Mechanics M1.1

- 1 Comply with federal, state, and local safety requirements. M1.1.1
- 2 Demonstrate lockout-tagout procedures. M1.1.2
- 3 Maintain a safe working environment. M1.1.3
- 4 Explain safe working practices around electrical hazards. M1.1.4
- 5 Identify emergency first-aid procedures. M1.1.5
- 6 Identify the types of fires and the methods used to extinguish them. M1.1.6
- 7 (Optional) Demonstrate the use of a fire extinguisher. M1.1.7
- 8 Identify personal protective equipment (PPE) requirements. M1.1.8
- 9 Inspect hand and power tools to ensure safety and usability. M1.1.9
- 10 Demonstrate workplace ergonomics. M1.1.10
- 11 Report injuries. M1.1.11
- 12 Earn the construction industry OSHA 10-hour card. M1.1.12
- 13 Report personal, environmental, and equipment safety violations to the appropriate authority. M1.1.13
- 14 Pass the safety exam. M1.1.14

## Understanding Manufacturing M1.2

- 1 Define manufacturing. M1.2.1
- 2 Identify the five general steps of manufacturing. M1.2.2
- 3 Distinguish between primary and secondary processes involved in the manufacture of industrial goods into finished products. M1.2.3
- 4 Explain the history of manufacturing. M1.2.4
- 5 Explain manufacturing as a technological system that transforms raw materials into products in a central location (e.g., a factory). M1.2.5
- 6 Explain the onset of advanced manufacturing. M1.2.6

**Understanding Manufacturing Materials** M1.3

- 1 Distinguish among a wide range of materials used in manufacturing. M1.3.1
- 2 Research the major material properties: physical, mechanical, chemical, thermal, electrical/magnetic, acoustical, and optical. M1.3.2

**Introducing Mechatronics** M1.4

- 1 Define the term mechatronics. M1.4.1
- 2 Research the field of mechatronics. M1.4.2
- 3 Explore emerging trends in advanced manufacturing. M1.4.3
- 4 Identify the components of a mechatronic system and how they work together. M1.4.4
- 5 Describe the use of robots as mechatronic systems. M1.4.5

**Understanding Tools Used in Mechatronics** M1.5

- 1 Identify common hand tools. M1.5.1
- 2 Identify electrical measurement devices. M1.5.2
- 3 Demonstrate use of common machine and hand tools. M1.5.3
- 4 Demonstrate how to care for machine and hand tools. M1.5.4
- 5 Compare the use of threaded fasteners and non-threaded fasteners. M1.5.5
- 6 Explain applications for fasteners. M1.5.6
- 7 Demonstrate the use of precision measurement tools (United States customary units and metric). M1.5.7
- 8 Differentiate between U.S. customary units and metric measurement systems. M1.5.8
- 9 Use U.S. customary units and metric units. M1.5.9

**Introducing Mechatronics Documentation** M1.6

- 1 Define the differences in technique among freehand sketching, manual drafting, and computer-aided drafting (CAD). M1.6.1
- 2 Interpret written specifications for manufacturing devices and systems. M1.6.2

**Introducing Mechanical Systems** M1.7

- 1 Identify types of actuators used in mechatronic systems. M1.7.1
- 2 Identify types of sensors used in mechatronic systems. M1.7.2
- 3 Identify mechanical components within a given system or module. M1.7.3
- 4 Identify machine elements. M1.7.4

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**5 Read mechanical drawings.** M1.7.5

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**Introducing Electrical Systems** M1.8

**1 Identify types of motors and/or actuators.** M1.8.1

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**2 Describe the parts of the motor control system.** M1.8.2

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**3 Describe the electromagnetic properties of a motor.** M1.8.3

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**4 Describe the connectors.** M1.8.4

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**5 Interpret line diagrams for a motor-control station.** M1.8.5

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**6 Assemble a motor-control station using normally open (NO) and normally closed (NC) switches.** M1.8.6

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**7 Define Ohm's law.** M1.8.7

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**8 Compute current, resistance, or voltage using Ohm's law.** M1.8.8

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**9 Define Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL).** M1.8.9

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**10 Compute current, voltage, and resistance in a circuit using Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL).** M1.8.10

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**11 Define electric power.** M1.8.11

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**12 Compute electric power.** M1.8.12

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**13 Measure resistance, voltage, and current.** M1.8.13

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**14 Describe the concept of AC.** M1.8.14

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**Introducing Programmable Control Systems** M1.9

**1 Identify the components of a programmable control system.** M1.9.1

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**2 Identify programmable control systems.** M1.9.2