Virginia CTE

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

	5 **Read mechanical drawings.** M1.7.5
Introducing Electrical Systems M1.8	1 **Identify types of motors and/or actuators.** M1.8.1
	2 **Describe the parts of the motor control system.** M1.8.2
	3 **Describe the electromagnetic properties of a motor.** M1.8.3
	4 **Describe the connectors.** M1.8.4
	5 **Interpret line diagrams for a motor-control station.** M1.8.5
	6 **Assemble a motor-control station using normally open (NO) and normally closed (NC) switches.** M1.8.6
	7 **Define Ohm's law.** M1.8.7
	8 **Compute current, resistance, or voltage using Ohm's law.** M1.8.8
	9 **Define Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL).** M1.8.9
	10 **Compute current, voltage, and resistance in a circuit using Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL).** M1.8.10
	11 **Define electric power.** M1.8.11
	12 **Compute electric power.** M1.8.12
	13 **Measure resistance, voltage, and current.** M1.8.13
	14 **Describe the concept of AC.** M1.8.14
Introducing Programmable Control Systems M1.9	1 **Identify the components of a programmable control system.** M1.9.1
	2 **Identify programmable control systems.** M1.9.2