INTRODUCTION TO MANUFACTURING TECHNOLOGY
Activity/Course Code 6045

Introduction to Manufacturing Technology is an entry-level course that provides students an introduction to manufacturing industries and may be used as a prerequisite for any of the manufacturing career majors: Electronics Technology, Machine Technology, Mechatronics Integrated Technologies, Metal Fabrication, and Welding. All standards except those in the careers unit come from the Manufacturing Skill Standards Council's (MSSC) "worker" standards in two* of its identified four critical work functions of production: Safety*, Quality Practices and Measurement*, Manufacturing Processes and Production, and Maintenance Awareness. Worker standards are the basic knowledge and skills required by a mid-level production technician to perform the work. www.msscusa.org

Course Credit: One Carnegie unit

BASIC TECHNICAL KNOWLEDGE AND SKILLS
SAFETY

UNIT A: CAREERS IN MANUFACTURING

1. Describe job opportunities in the area of manufacturing.
2. Describe careers in other areas that support the manufacturing process.
3. Identify manufacturing industries in the local area and job opportunities in these industries.
4. Complete a job application form for a manufacturing position.

UNIT B: SAFE AND PRODUCTIVE WORKPLACE

1. Discuss ways in which manufacturing affects the national economy and standard of living.
2. Describe knowledge of ways in which the global economy affects manufacturers.
3. Discuss common safety practices and systems.
4. Discuss responsibilities of a frontline production worker in a high-performance, safety-conscious work organization.

UNIT C: SAFETY PROCEDURES

1. Locate and use Material Safety Data Sheets (MSDS).
2. Demonstrate knowledge of first aid or first response procedures.

3. Demonstrate knowledge of material handling techniques required to move materials safely.
4. Discuss how to be proactive in responding to a safety concern and how to document occurrences.
5. Discuss emergency exits.
6. Discuss various emergency alarms and procedures.
7. Use clean-up procedures for spills.
8. Describe Lock Out/Tag Out requirements.
9. Inspect work area and report possible safety risks.
10. Demonstrate knowledge of machinery and equipment safety functions to determine whether or not all safeguards are operational.
11. Describe safety procedures to follow in cases of smoke/chemical inhalation.
12. Describe procedures for handling hazardous material.
13. Develop safety checklists.
14. Demonstrate knowledge of equipment shutdown procedures.

UNIT D: PERSONAL SAFETY PRACTICES

1. Identify and report unsafe conditions.
2. Select and use personal protective equipment.
3. Demonstrate knowledge of ergonomic impact of work techniques.
4. Demonstrate knowledge of proper and improper techniques for lifting loads.
5. Demonstrate knowledge of safety requirements for platforms, man lifts, and ladders.
6. Demonstrate knowledge of safety requirements for material handling equipment such as forklifts, cranes, rigging, and pry trucks.
7. Demonstrate knowledge of safety requirements for manual, electrical-powered, and pneumatic tools.
8. Demonstrate knowledge of safety requirements for operation of automated machines/automated processes.

UNIT E: SAFETY POLICIES AND REGULATIONS

1. Demonstrate knowledge of Occupational Safety and Health Administration (OSHA) and other health and safety requirements as applied to the workplace.
2. Demonstrate knowledge of government policies, procedures, and regulations governing the safe use of equipment.
3. Demonstrate knowledge of Hazardous Materials (HAZMAT) procedures information.
4. Demonstrate knowledge of Material Safety Data Sheets (MSDS).
5. Demonstrate knowledge of applicable safety standards.
6. Demonstrate knowledge of which tools and equipment require safety certification.

7. Demonstrate knowledge of what the law requires companies to post or publish in order to keep employees abreast of OSHA and other government regulations.
8. Demonstrate knowledge of Environmental Protection Agency (EPA)-required documentation for (a) disposal of hazardous waste generated during maintenance or (b) transportation of contaminated items.
9. Demonstrate knowledge of accident documentation procedures.

UNIT F: SAFETY TRAINING

Demonstrate knowledge of certifications needed for regulatory compliance (e.g., Cardio Pulmonary Resuscitation [CPR], fire extinguisher, blood-borne pathogens).

UNIT G: COMMUNICATION SKILLS THAT ENHANCE SAFETY

1. Demonstrate knowledge of ways to improve reading, listening, and writing skills.
2. Demonstrate knowledge of techniques for making effective presentations to internal and external customers, including safety orientations.
3. Demonstrate skill in using different forms of communication, such as e-mail, fax, and phone.
4. Demonstrate skill in providing effective feedback and in making decisions.
5. Demonstrate skill in communicating customer needs effectively to others including shift-to-shift, coworkers, and managers, including needs that impact safety.

UNIT H: TEAMWORK SKILLS THAT ENHANCE SAFETY

1. Demonstrate knowledge of the characteristics of a high-performance team.
2. Demonstrate knowledge of roles and responsibilities of production team members.
3. Demonstrate skill in using teamwork to deal with customer requests.
4. Demonstrate knowledge of ways to align team goals to customer and business production needs.
5. Demonstrate skill in ensuring that team goals are specific, documented, measurable, and achievable.
6. Demonstrate skill in communicating production information to team members.
7. Demonstrate skill in using team problem solving and conflict resolution processes.

BASIC TECHNICAL KNOWLEDGE AND SKILLS
QUALITY PRACTICES AND MEASUREMENT

UNIT I: OVERALL QUALITY PROCESS

1. Demonstrate knowledge of quality standards and how they apply to products in order to make effective decisions about quality problems.
2. Demonstrate knowledge of quality procedures and product specifications to identify nonconformance.
3. Demonstrate skill in identifying product defects and defect patterns.
4. Demonstrate knowledge of how to check and test good products and nonconforming products.
5. Demonstrate knowledge of quality terminology.
6. Demonstrate knowledge of quality assurance procedures.

UNIT J: QUALITY SYSTEMS AND INSPECTION TOOLS

1. Demonstrate knowledge of quality systems such as Statistical Process Control (SPC), Six Sigma, Total Quality Management (TQM), Lean Management, "Plan-Do-Check-Act," and International Standards Organization standards, especially ISO 9001:2000 for manufacturers.
2. Demonstrate skill in determining accuracy and precision when using measuring equipment.
3. Demonstrate knowledge of how to use inspection tools, equipment, and procedures.
4. Demonstrate knowledge of inspection equipment calibration standards and requirements.
5. Demonstrate skill in verifying calibration of inspection equipment.
6. Demonstrate knowledge of appropriate automated inspection system.
7. Demonstrate skill in using hand-held inspection devices to examine materials.
8. Demonstrating skill in maintaining and storing inspection tools.

UNIT K: QUALITY DOCUMENTATION

1. Complete proper forms to document problems and corrective action.
2. Use computer systems to document and track substandard and scrapped parts, materials, and assemblies as required by quality processes.
3. Demonstrate knowledge of documentation process and requirements to ensure verifiable evidence of product quality.
4. Demonstrate knowledge of quality system protocol for performing an audit.
5. Demonstrate knowledge of the procedure for reviewing quality problems with operators to provide feedback.

6. Demonstrate knowledge of correct and incorrect approval procedures to document inspection results.
7. Demonstrate knowledge of procedures for recording and storing product history and maintaining records.
8. Demonstrate knowledge of how to use route sheets and statistical method charts to document process.
9. Demonstrate knowledge of follow-up and reporting documentation procedures to ensure proper communications.

UNIT L: BLUEPRINT READING FUNDAMENTALS

1. Visualize objects from a multi-view drawing.
2. Identify product features from a multi-view drawing.
3. Identify dimensions and tolerances of an object from a multi-view drawing.
4. Interpret geometric dimensioning and assembly tolerances on a drawing.
5. Interpret title blocks.
6. Demonstrate skill in interpreting assembly drawings.

UNIT M: BASIC MEASUREMENT

1. Convert measurements in U.S. measurement and standard international metrics systems.
2. Demonstrate measuring parts using a machinist's rule.
3. Demonstrate measuring parts using a tape measure.
4. Demonstrate measuring parts using dial and digital calipers.
5. Demonstrate measuring parts using a micrometer.
6. Demonstrate measuring parts using a dial indicator.
7. Demonstrate collecting measurement data from a digital gauge using a computer.