



## Specific Competencies and Skills Tested in this Assessment:

### Manufacturing Math, Science, and Measurement

- Apply math functions to solve problems
- Create and interpret graphs and charts commonly used in manufacturing
- Match measurement activities to manufacturing processes
- Demonstrate proper general and precision measurement techniques
- Using mechanical formulas, solve problems involving geometric shapes and metric conversions
- Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content



### Workplace Safety, Health and Job Skills

- Complete forms and paperwork as required
- Identify issues involving basic industrial safety
- Maintain and use protective guards on equipment and machinery
- Use electrical devices correctly and safely
- Identify fire exits, fire-fighting equipment, and procedures
- Determine weight/operating limits of equipment
- Perform periodic checks during operation to assure proper function
- Identify, safely handle, and properly dispose of chemical, biological and physical hazards
- Describe ergonomics and its importance to the manufacturing process



## Specific Competencies and Skills continued:

### Quality Assurance

- Identify components of an effective manufacturing system
- Explain the effect of quality assurance on profit
- Demonstrate the ability to apply continuous quality improvement to the manufacturing process
- Define and apply SPC (Statistical Process Control)
- Identify and address customer problems
- Perform inspections

### Blueprint Reading

- Interpret commonly used abbreviations, terminology, and symbols
- Determine tolerances and dimensions associated with a drawing
- Interpret blueprints to determine appropriate tool usage
- Identify types of lines within a drawing
- Extract information from title blocks and legends
- Identify various views

### Manufacturing Fundamentals, Processes, and Materials

- Demonstrate basic mechanical skills
- Perform troubleshooting and maintenance procedures
- Describe the importance of correct fixturing and workholding devices
- Describe the function of specific machine tools
- Locate and retrieve production materials specific to process flow and delivery schedule
- Demonstrate proper use and processes of manufacturing shop tooling
- Enter and edit a program in a Computer Numerical Control (CNC) machine
- Set up and operate a Computer Numerical Control (CNC) machine



## Specific Competencies and Skills continued:

### Material Handling

- Requisition, ship, handle, and store materials
- Apply knowledge of assembly lines
- Apply knowledge of materials and material handling procedures

### Industrial Robotics Systems

- Interpret appropriate industrial robotic functions and applications
- Interpret basic robotic programming, including CADD
- Identify various industrial robotic design features



### Computer Use

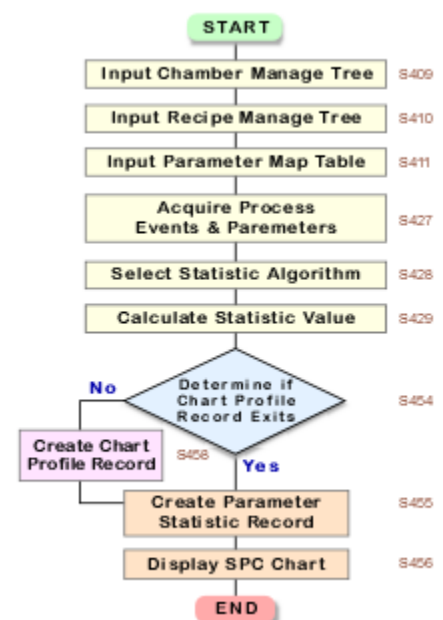
- Apply computer applications in manufacturing processes
- Identify possible effects of introducing automations into manufacturing processes
- Describe various methods of tracking inventory quantities
- Perform measurements using digital or electronic gauges interfaced with a CPU

### Process Control

- Identify a variety of process control applications
- Collect and analyze information to determine and improve work processes
- Explain the advantages and disadvantages of just-in-time inventory
- Interpret project plans
- Apply knowledge of time and motion studies
- Appropriately report job status

### Purchasing and Resource Identification Activities

- Exhibit knowledge of "make or buy" decisions
- Demonstrate knowledge of vendor relationships



## Specific Competencies and Skills continued:

### Electronics and Hydraulics

- Use various devices to gather electrical measurements (e.g., analog voltmeter, DMM)
- Apply knowledge of basic electronics and basic components
- Exhibit appropriate electrical wiring techniques
- Apply knowledge of hydraulics
- Interpret basic ladder diagrams
- Connect and program digital input and output devices to a robot controller Programmable Logic Controller (PLC)

### Design Processes

- Construct drawings using various commands in a Computer Aided Design (CAD) program
- Create a sketch of a multiview drawing given an isometric drawing
- Use Computer Aided Manufacturing (CAM) software to generate and post a Computer Numerical Control (CNC) program
- Design process procedure
- Exhibit knowledge of research and development (R and D)

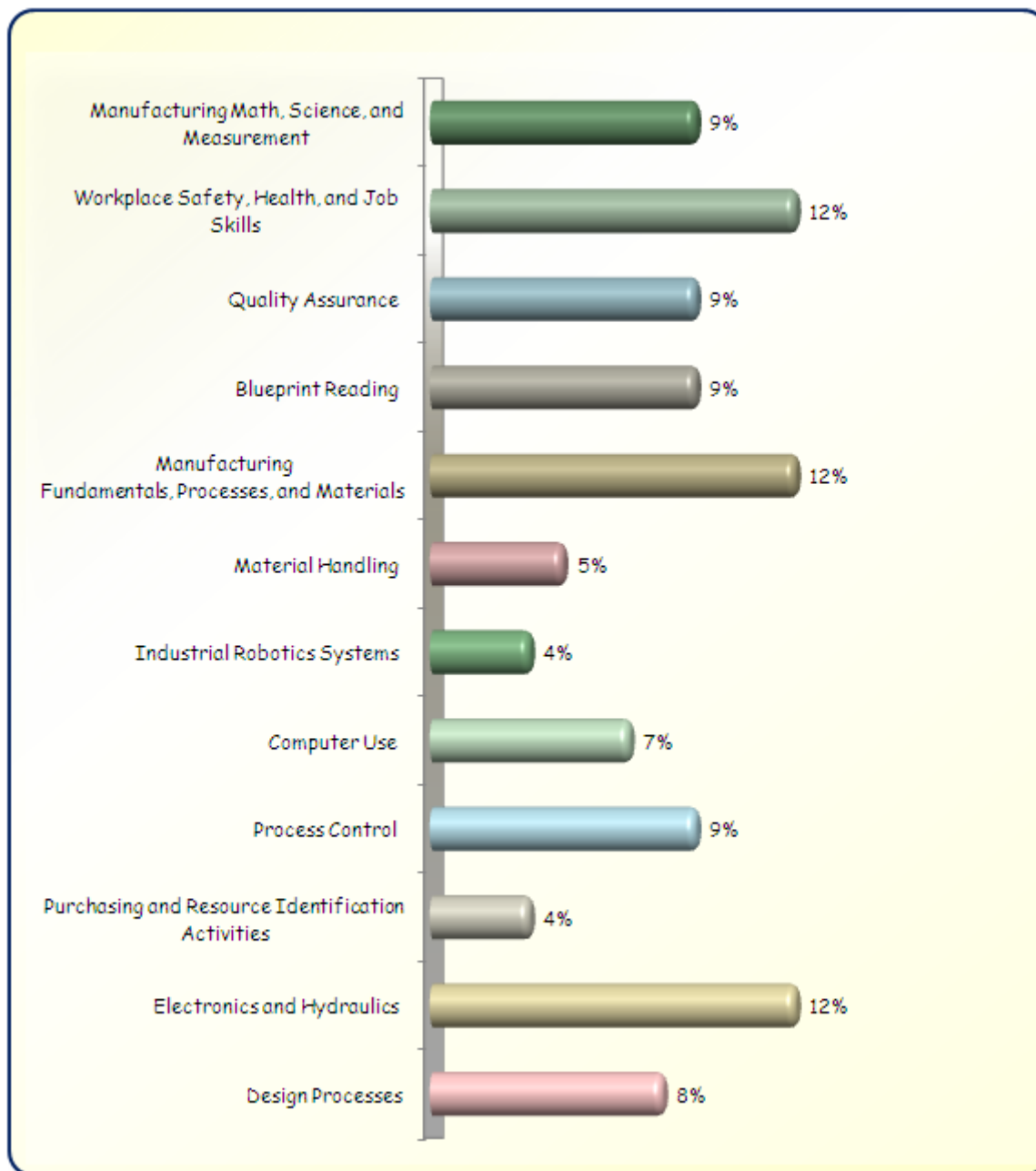


**Written Assessment:**

**Administration Time:** 3 hours

**Number of Questions:** 195

**Areas Covered:**



**Sample Questions:**

With increasing temperature, the density of a liquid

- A. increases substantially
- B. increases slightly
- C. decreases slightly
- D. decreases substantially

The views on a working drawing are set up according to which of the following parameters?

- A. perspective
- B. orthographic
- C. first angle
- D. pictorial

The common unit of measurement of inductance is the

- A. henry
- B. farad
- C. mho
- D. ohm

CAD/CAM software allows the user to

- A. generate artistic sketches
- B. schedule conveyors
- C. replace the architect
- D. select tool diameters

Time and motion studies

- A. determine the facility capacity
- B. focus on product line
- C. focus on entire work group output
- D. determine the workload at a specific location



## Performance Assessment:

**Administration Time:** 3 hours

**Number of Jobs:** 3

### Areas Covered:

#### 47% Milling Operations

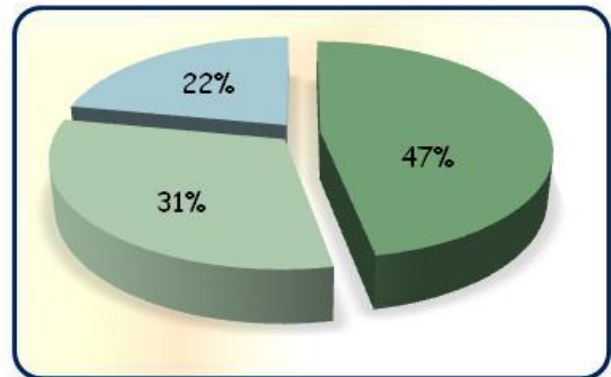
Safety, indicate the vise, length, width square to length, width of groove, centerline of groove, length of groove, depth of groove, angle, length of angle, overall finish, quality of work, clean up, and care of tools/equipment.

#### 31% Assemble a Multiple Shaft Gear Drive System

Safety, electric gear motor, install gears, prony brake, and product evaluation.

#### 22% Determining Gage Block Combinations

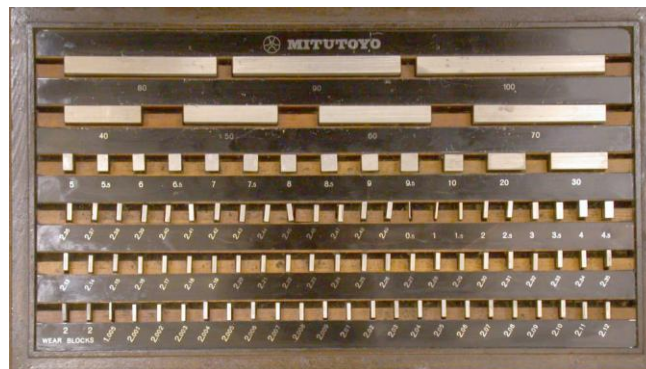
Wiring together gage blocks, verify and record combined height using a height gage.



**Sample Job:** Determining Gage Block Combinations

**Maximum Time:** 40 minutes

**Participant Activity:** The participant is to wring gage blocks together, verify and record combined height of the blocks using a height gage.



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!

