



Entry Level Assessment Blueprint

Precision Machining



Test Code: 4152 / Version: 01

Specific Competencies and Skills Tested in this Assessment:

Organization and Shop Practices

- Demonstrate safe work habits and operating procedures
- Clean and maintain personal work area and equipment
- Select and appropriately use cutting fluids
- Identify and appropriately use personal protective equipment (PPE)
- Identify environmental and safety considerations established by the EPA, OSHA, and listed in MSDS publications



Measurement and Inspection

- Identify, select, and calibrate precision and semi-precision measuring tools
- Measure workpiece to verify compliance with print specifications
- Display knowledge of quality control standards and process improvement

Metallurgical Processes and Heat Treating

- Identify the properties and characteristics of common metals and their effect on machinability
- Identify the AISI/SAE and UNS steel identification systems
- Identify heat treating processes and objectives

Blueprint Interpretation and Process Planning

- Interpret blueprints with geometric dimensioning and tolerancing (G D & T) symbols
- Develop an order of operations (process plan) based on blueprint specifications

Layout and Benchwork

- Identify and use hand tools
- Identify and safely use power hand tools
- Grind and shape tools using a pedestal/bench grinder
- Perform semi-precision layout

Specific Competencies and Skills continued:

Band Saw Machines

- Identify parts and preventive maintenance of a band saw
- Explain safe principles of operation
- Set up and perform band saw machine operations



Lathes

- Identify parts and preventive maintenance of a lathe
- Explain safe principles of operation
- Select and maintain appropriate tools
- Calculate appropriate cutting speed, feed rate, and depth of cut
- Grind and form lathe tools
- Demonstrate knowledge of various workholding methods (e.g., independent and universal chucks, collets, faceplate, between centers, steady and follower rests)
- Set up and perform lathe machine operations (e.g., turning, boring, threading, taper turning, knurling, grooving and cut-off, drilling and tapping, filing, polishing)
- Identify appropriate uses for carbide inserts

Milling Machines

- Identify parts and preventive maintenance of a mill
- Explain safe principles of operation
- Select and maintain appropriate tools
- Calculate appropriate cutting speed, feed rate, and depth of cut
- Explain various workholding methods (e.g., mill vise, table set-ups, angle plates, indexing heads, v-blocks)
- Set up milling machines (e.g., head alignment, vise alignment, tool holder selection, establishing a part zero, set DRO use)
- Perform milling operations (e.g., pocketing, slotting, hole-making, peripheral and face milling)

Surface Grinding

- Identify parts and preventive maintenance of a surface grinder
- Select appropriate grinding wheel
- Explain safe principles of operation (e.g., wheel mounting and dressing, ring testing, workholding, grinding parallel and perpendicular surfaces)

Specific Competencies and Skills continued:**Computer Numerical Control (CNC) Programming, Preparation, Operations**

- Demonstrate knowledge of the axis and coordinate systems
- Read and write basic G and M codes
- Perform basic setup and operation for CNC lathe (e.g., work offset, tool offset, workholding devices, toolholding devices)
- Perform basic setup and operation for CNC mill (e.g., work offset, tool offset, workholding devices, toolholding devices)

Drill Press

- Identify parts and preventive maintenance of a drill press
- Determine appropriate tooling and workholding devices
- Explain safe principles of operation (e.g., drilling, reaming, countersinking, counterboring, tapping)

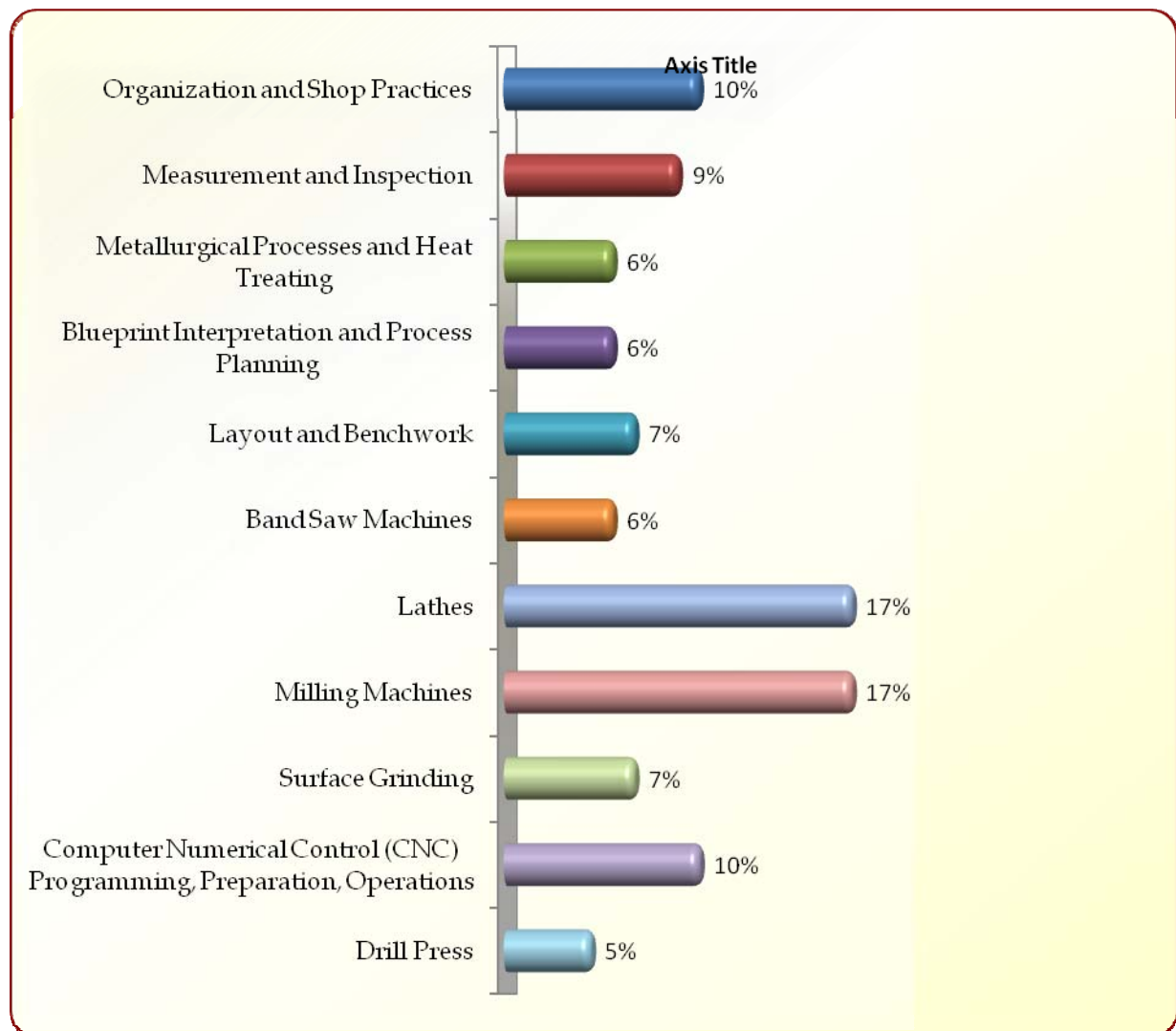


Written Assessment:

Administration Time: 3 hours

Number of Questions: 174

Areas Covered:



Sample Questions:

The purpose of OSHA is to

- A. enforce employee benefits
- B. establish right-to-know programs
- C. publish machining standards
- D. regulate safety in the workplace

The thimble on an inch micrometer has _____ graduations.

- A. 4
- B. 10
- C. 25
- D. 100

Hot-rolled steel has a/an

- A. absence of outer scale
- B. smooth bright finish
- C. gray outer scale
- D. smooth ground finish

Examine the _____ to verify modifications to an original design.

- A. revision block
- B. material requirements plan
- C. material specifications sheet
- D. title block

When tapping a blind hole, use a _____ tap to maximize thread depth.

- A. bottoming
- B. plug
- C. starting
- D. taper

Blade pitch refers to the

- A. width of the blade
- B. thickness of the blade
- C. distance between the teeth
- D. depth of the tooth

Titanium nitride coating on cutting tools

- A. increases tool life
- B. decreases tool life
- C. leaves tool life unchanged
- D. prevents breakage

What is the rpm of a 1/2 inch drill at 90 sfpm?

- A. 207 rpm
- B. 305 rpm
- C. 720 rpm
- D. 815 rpm

The coarsest grain size below is

- A. 36
- B. 46
- C. 60
- D. 80

The two basic axes on a CNC lathe are

- A. X and Y
- B. X and Z
- C. Y and Z
- D. C and Z

Performance Assessment:

Administration Time: 2 hours and 30 minutes

Number of Jobs: 2

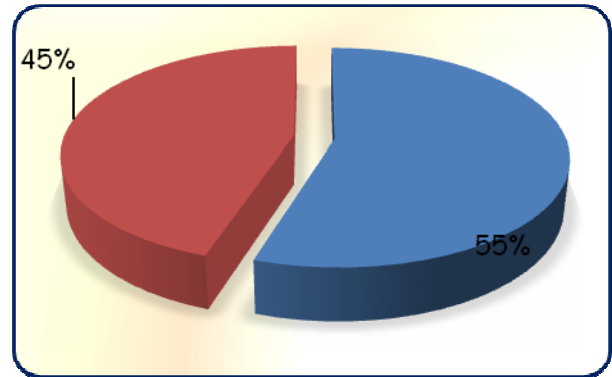
Areas Covered:

55% **Milling Operations**

Participants will receive a piece of cold-rolled steel to perform a milling operation using the provided drawing. Steps will include aligning vise parallel, machining the block on the milling machine according to specifications, and deburring the part.

45% **Lathe Operations**

Participants will perform a lathe operation using the provided drawing and a piece of cold-rolled steel. Steps will include machining the part according to specifications, and deburring the part.



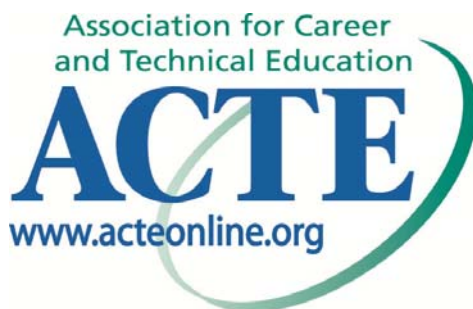
Sample Job: Lathe Operation

Maximum Time: 1 hour and 30 minutes

Participant Activity: The participant will receive a piece of cold-rolled steel, machine the part on the lathe according to the specifications provided on a drawing, deburr the part and break all edges, notify the evaluator to inspect the work is in customer ready condition, and clean up the machines and work area.



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!