

Teacher Assessment Blueprint

Precision Machining



Test Code: 5176 / Version: 01

## General Assessment Information

### Blueprint Contents

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**Test Type:** The Precision Machining assessment is included in NOCTI's Teacher assessment battery. Teacher assessments measure an individual's technical knowledge and skills in a proctored proficiency examination format. These assessments are used in a large number of states as part of the teacher licensing and/or certification process, assessing competency in all aspects of a particular industry. NOCTI Teacher tests typically offer both a written and performance component that must be administered at a NOCTI-approved Area Test Center. Teacher assessments can be delivered in an online or paper/pencil format.

**Revision Team:** The assessment content is based on input from subject matter experts representing the following states: Missouri, New York, North Carolina, Oregon, Pennsylvania, and Virginia.



48.0501- Machine Tool  
Technology/Machinist



Career Cluster 13-  
Manufacturing



51-4034.00- Lathe and Turning  
Machine Tool Setters, Operators,  
and Tenders, Metal and Plastic



**NATIONAL COLLEGE CREDIT RECOMMENDATION SERVICE**  
University of the State of New York - Regents Research Fund

In the lower division  
baccalaureate/associate degree  
category, 3 semester hours in  
Introduction to Engineering  
Technology.

## Written Assessment

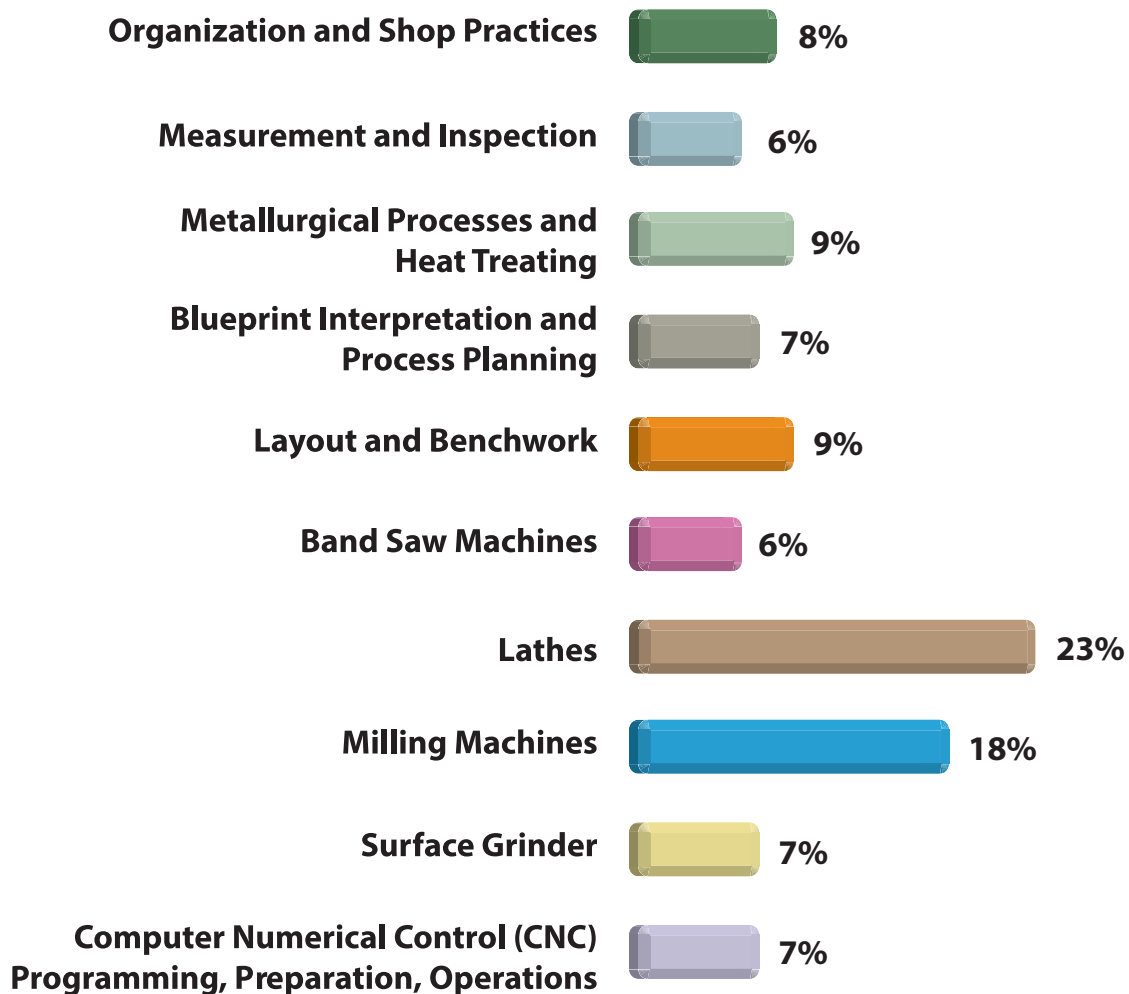
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 3 hours

**Number of Questions:** 140

**Number of Sessions:** This assessment may be administered in one, two, or three sessions.

### Areas Covered



## Specific Standards and Competencies Included 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 protection 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
- Identify the steel identification system (ANSI)
- Identify properties that affect machinability
- Identify heat treating processes and objectives

### Blueprint Interpretation and Process Planning

- Interpret blueprints with geometric dimensioning and tolerancing (G D & T) symbols
- Develop a production plan based on blueprint specifications



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## Specific Standards and Competencies (continued)

### Layout and Benchwork

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

### 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 (independent, universal, collet, faceplate, between centers, steady and follower rests)
- Set up and perform lathe machine operations (turning, boring, threading, taper turning, knurling, grooving and cut-off, drilling and tapping, filing, polishing)
- Explain and perform threading procedures
- Identify appropriate uses for carbide inserts



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## Specific Standards and Competencies (continued)

### **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
- Demonstrate knowledge of various workholding methods (mill vise, table set-ups, angle plates, rotary table/index, v-blocks)
- Set up and operate milling machines (head alignment, indicate the vise, select tool holder, establish a part zero, set DRO)

### **Surface Grinder**

- Identify parts and preventive maintenance of a surface grinder
- Select appropriate grinding wheel
- Explain safe principles of operation

### **Computer Numerical Control (CNC) Programming, Preparation, Operations**

- Demonstrate knowledge of the axis and coordinate systems
- Read and write basic machine code
- Manually program, setup, and operate a CNC machine



## Sample Questions

**What combination of precision blocks from the standard 81-block set should be used to stack a combination of gage blocks that total 0.7777 inch?**

- A. 0.1007, 0.127, and 0.550
- B. 0.1007, 0.120, and 0.550
- C. 0.1257, 0.150, and 0.500
- D. 0.1877 and 0.600

**The rapid cooling of a heated metal for the purpose of hardening the metal is called**

- A. carburizing
- B. spheroidizing
- C. annealing
- D. quenching

**What is the most common grinding wheel material used on a bench or pedestal grinder for grinding mild steel?**

- A. aluminum oxide
- B. silicon carbide
- C. cubic boron nitride
- D. diamond

**A cut-off parting operation is hazardous when work is turned**

- A. in an independent chuck
- B. in a universal chuck
- C. in a collet
- D. between centers

**Find the feed rate of a 4-tooth cutter, using a 0.005 chip load, at a speed of 200 rpm.**

- A. 2 inches per minute
- B. 4 inches per minute
- C. 6 inches per minute
- D. 8 inches per minute

## Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

**Administration Time:** 3 hours

**Number of Jobs:** 2

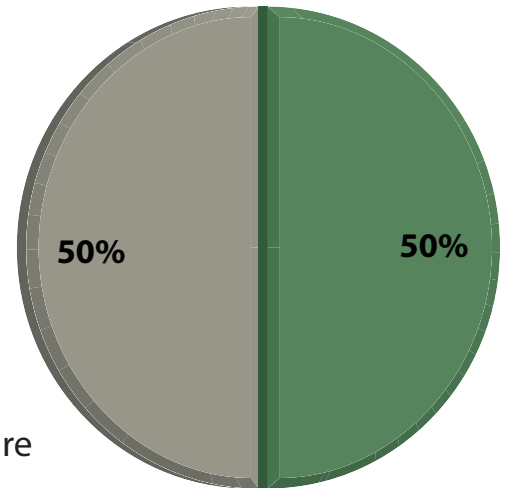
### Areas Covered:

#### 50% Milling Operations

Participants will safely operate the mill with correct measurements for quality work, and clean up and take care of the tools and equipment.

#### 50% Lathe Operations

Participants will safely operate the lathe with correct measurements for quality work, and clean up and take care of the tools and equipment.





## Sample Job

### Lathe Operation

**Maximum Time:** 2 hours

**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.

