

MACHINE SHOP

Course Design

2005-2006

Course Information

Organization	Eastern Arizona College
Division	Industrial Technology Education
Course Number	MSP 104
Title	Machine Shop
Credits	4
Developed by	Dryden
Lecture/Lab Ratio	2 Lecture/6 lab
Transfer Status	MET231 to ASU, DEC to NAU, NT to UofA
Activity Course	No
CIP Code	48.0500
Assessment Mode	Pre/Post Test (25 Questions/25 Points)
Semester Taught	Fall
GE Category	None
Separate Lab	Yes
Awareness Course	No
Intensive Writing Course	No

Prerequisites

None

Educational Value

This course will help students develop an understanding and appreciation of the machine tool industry and the processes, which produce things in daily use by all of us. Machine shop majors will learn of the various occupations in metalworking and will increase skills in machining processes. This is an excellent background course for automotive and drafting majors.

Description

This course directs the student in the use of five basic machine tools: drilling machines, lathe, milling machine, shaper, and precision grinders. Students will learn to use precision measuring instruments and layout equipment and to machine projects to print dimensions.

Supplies

Safety Glasses

Competencies and Performance Standards

1. Operate all of the basic machine tools accurately and safely.

Learning objectives

What you will learn as you master the competency:

- a. Identify the causes of accidents in a machine shop environment.
- b. List the safety equipment required in shop operations.
- c. List the safety rules for each machine tool and hand tool.
- d. Identify the conditions in a shop which could be considered hazardous.

Performance Standards

Competence will be demonstrated:

- o By completing assigned projects.
- o By choosing correct tools for each task and using them correctly.

Criteria - Performance will be satisfactory when:

- o learner practices recognized safety procedures and uses the prescribed safety equipment at all times.
- o learner demonstrates an ability and willingness to follow designated procedures.

2. Measure linear dimensions, bores, diameters, thread dimensions, and finish dimensions using modern inspection equipment.

Learning objectives

What you will learn as you master the competency:

- a. Students will identify the precision measuring instruments and describe their applications.
- b. Students will accurately record the true dimensions for assigned projects.
- c. Students will calculate part dimensions and gage block build up for accurate inspection of assigned projects.

Performance Standards

Competence will be demonstrated:

- o by accurate inspection of assigned projects.
- o by completing an inspection sheet for each assigned project.

Criteria - Performance will be satisfactory when:

- o learner identifies each measuring instrument.
- o learner demonstrates proper application of each measuring instrument.
- o learner reads micrometers, vernier scales, bevel protractors and other measuring instruments correctly.

3. Demonstrate ten different lathe set ups and operations.

Learning objectives

What you will learn as you master the competency:

- a. Identify the operations of facing, turning, grooving, trepanning, drilling boring,

- counterboring, countersinking, knurling, reaming, centering, tapering and form cutting.
- b. Demonstrate the different set ups which are required for each of these operations.
- c. Describe the conditions which will require the use of the steady rest and the follower rest.
- d. List the different methods which may be used to turn a taper on a part in a lathe.
- e. Prepare a turning and facing tool for lathe operations.
- f. Set the speed adjustment levers for correct spindle speeds for various operations.
- g. Set the gear box for different turning and threading operations.
- h. Clean, lubricate and maintain the lathe correctly.

Performance Standards

Competence will be demonstrated:

- o in completing the lathe work on assigned projects.
- o by independently making all lathe set ups and operations according to accepted shop practices.

Criteria - Performance will be satisfactory when:

- o learner calculates the correct machine settings for speeds, feeds and compound rest positions.
- o learner sets each of the lathes in the shop to to the correct speeds and feeds for assigned operations.
- o learner uses three types of lathe spindle chucks according to the requirements of the assigned operations,
- o learner sets up the various cutting tools according to the requirements of the operation at hand.
- o

4. Prepare all of the different lathe tools to meet the requirements of assigned projects.

Learning objectives

What you will learn as you master the competency:

- a. Identify the parts of a lathe cutting tool.
- b. point out the wear characteristics of used tools.
- c. Describe how the cutting action and chip flow varies when rake angles are increased.
- d. Correctly grind a lathe cutting tool for the following operations: turning, facing, threading, grooving and radius forming.

Performance Standards

Competence will be demonstrated:

- o By correctly fabricating high speed steel cutting tools.

Criteria - Performance will be satisfactory when:

- o learner will demonstrate the proper use of clearance angles on five different styles of lathe cutting tools.
- o learner will demonstrate two different kinds of rake angle configurations.

- o learner will prepare two different styles of form tools.

5. Demonstrate seven specified milling machine set ups and operations.

Learning objectives

What you will learn as you master the competency:

- a. Identify the following milling operations: face milling, step milling, groove cutting, slab milling, fly cutting, side milling, and boring.
- b. Demonstrate the set ups and operation for each of these operations.
- c. Identify climb milling and conventional milling for each of these operations.
- d. Recognize the configuration of a tool which is properly ground.
- e. Recognize the form of a milling cutter when it is dull.
- f. Describe the correct use of the moving surface locks on a milling machine.

Performance Standards

Competence will be demonstrated:

- o Using the milling machines in the EAC machine shop.
- o Using the precision measuring instruments in the EAC machine shop.

Criteria - Performance will be satisfactory when:

- o learner sets up each milling operation and produces the specified configuration required by the specifications of assigned projects.
- o learner describes the advantages and limitations of each type of milling machine.
- o learner identifies the types of cutters use in milling operations and describes the proper use of each one.
- o learner demonstrates the set up and operation of the digital read out on milling and jig bore operations.

6. Set up and operate the shaper to produce parts to specifications.

Learning objectives

What you will learn as you master the competency:

- a. Know the parts of a metal working shaper.
- b. Define the different types of shapers which are commonly used.
- c. Adjust shaper settings correctly.
- d. Prepare cutting tools for the shaper.

Performance Standards

Competence will be demonstrated:

- o using the tools, measuring instruments and planing machine tools in the EAC machine shop.

Criteria - Performance will be satisfactory when:

- o learner identifies the parts of a shaper.
- o learner demonstrates the correct way to adjust the stroke, feed, stroke rate, clapper box and table on the shaper.

- o learner adjusts the shaper to produce the cuts required by the assigned projects.
- o learner operates the shaper correctly.
- o learner fabricates assigned project using the shaper.

7. Set up and operate the surface grinder to complete the specified close tolerance dimensions on assigned projects.

Learning objectives

What you will learn as you master the competency:

- a. describe the properties and limitations of the surface grinder, cylindrical grinder, ID. grinder and centerless grinder.
- b. Match up the grinding operations with the grinding machine which would best be used to accomplish these operations.
- c. Demonstrate the correct set ups and adjustments for precision grinding.
- d. Describe the proper method for dressing a grinding wheel.

Performance Standards

Competence will be demonstrated:

- o Using the surface grinders in the EAC machine shop to produce close tolerance finishes on assigned projects.

Criteria - Performance will be satisfactory when:

- o learner identifies the different types of precision grinding machine tools.
- o learner identifies the major components of the horizontal spindle, reciprocating table, surface grinder.
- o learner demonstrates the correct procedures for dressing a grinding wheel on a surface grinder.
- o learner produces ground dimensions on a part holding tolerances within .0002 in.

8. Set up and operate the drill press, turret drill, and radial drill to produce specified hole dimensions in assigned projects.

Learning objectives

What you will learn as you master the competency:

- a. Identify the different types of drilling machines and describe their use.
- b. Identify the different tools which are commonly used in drill press operations.
- c. Demonstrate the correct method for installing and removing cutting tools in different drilling machines.
- d. List the parts of a drill.

Performance Standards

Competence will be demonstrated:

- o using the drilling equipment in the EAC machine shop.

- o Using the drill press cutting tools in the EAc machine shop.
- o by producing assigned projects to print specifications.

Criteria - Performance will be satisfactory when:

- o learner identifies the following drilling equipment and describes the advantages and limitations of each: Drill press, gang drill, turret drill, radial drill, hand drill.
- o learner identifies the different types of tooling used in machine shop drilling machines.
- o learner chooses the correct drilling tools for various projects.
- o learner correctly sets up spindle speeds, and work clamping devices for each job.

Types of Instruction

Lecture

Lab

Grading Information

Grading Scale

- A 90% or better average on total points of all tests and projects.
- B 80% to 89% average on total points.
- C 70% to 79% average on total points.
- D 59% to 69% average on total points.
- F Less than 59% average on total points.