

Course Number: MACH 061A

Course Description: The study of jig and fixtures applications for conventional and computerized numerical machining processes. Skills and standards apply to the National Metal Working Standards (NIMS).

Prerequisites: MACH 021A and MACH 120A

Rationale:

Course Number: Course number will be from A-Z due to manufacturing technology standards changing, the National Metal Working Standards (NIMS) recommend that upgrade training be implemented on a three-year basis.

Course Description: Rewriting the course description to reflect the latest changes in technology.

Prerequisites: Since jig and fixture require basic machining skills, students must have a basic understanding of machine theory and machine operations.

Curriculum Approved: 2/00

San Bernardino Valley College

Course Outline for MACH 061A
JIG AND FIXTURE MAKING

I. CATALOG DESCRIPTION:

Department: Machine Trades
MACH 061A: Jig and Fixture Making
3 hours lecture, 3 hours laboratory = 4 units

Catalog Description: The study of jig and fixtures applications for conventional and computerized numerical machining processes. Skills and standards apply to the National Metal Working Standards (NIMS).

Schedule Description: Study of jig and fixtures applications for conventional and computerized numerical machining process.

Prerequisites: MACH 021A and MACH 120A

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of the course, the student will be able to:

- A. Define and explain the functions of jigs and fixtures related to manufacturing industry;
- B. Identify and explain the various types of closed and box jig type fixtures;
- C. Design and manufacture various tooling fixtures for drilling holes in part locations, related to Datum references;
- D. Describe factors affecting part clearances, design features, and applied fixture design;
- E. Machine a fixture using hinge and bushing components to stack drill multiple parts;
- F. Manufacture a mill fixture utilizing the three-point pin concept.

IV. CONTENT:

- A. Safety Overview
 1. General safety
 2. Identify shop hazards
 3. OSHA (Occupational Safety Health Act)
- B. Functions of Jigs and Fixtures
 1. Styles and shapes
 2. Aircraft and commercial industry usage
 3. Open and closed type jig fixtures
 4. Miscellaneous fixtures
- C. Design Processes and Gaging Type Fixtures
 1. Milling fixtures
 2. Turning fixtures
 3. Inspection fixtures

- D. Tooling materials and components
 - 1. Bushings materials
 - 2. Basic standard parts
 - 3. Locating devices
 - 4. Clamping devices and their classifications
 - 5. Ejectors and their applications to fixture design

V. METHODS OF INSTRUCTION:

Methods of instruction may vary from instructor to instructor but may include:

- A. Lecture
- B. Demonstrations
- C. Guided practice utilizing models and handouts

VI. TYPICAL ASSIGNMENTS:

- A. Text Reading Assignments:
Read assignments from basic fixture making for metalworking trainees:
 - 1. Read elements of a typical nest gage and define its application.
 - 2. Identify various types of drill jig bushings and incorporate their application into a simple fixture.
- B. Laboratory Assignments:
 - 1. Manufacture a drilling and milling fixture for simple multiple hole drilling.
 - 2. Manufacture a multiple box fixture design for drilling parts.
 - 3. Utilize a computerized numerical control fixture for milling a production type part.

VII. EVALUATION(S):

- A. Methods of evaluation may vary from instructor to instructor but may include:
 - 1. Three tests at the end of major content area: fixtures, components, and application of fixtures
Typical Questions:
 - a. Identify three clamping devices that can be used on a nest gage fixture.
 - b. Identify three main planes on a locating device.
 - 2. Mid-term exam
 - 3. Final exam
 - 4. Three completed jig and fixture projects that meet 70% of the blueprint specifications.
- B. Frequency of evaluation may vary from instructor to instructor but may include:
 - 1. Three major jig and fixture tooling assignments
 - 2. Three tests
 - 3. One mid-term
 - 4. One final exam

VIII. TYPICAL TEXT(S):

Herbert, Harig. Basic Jig and Fixture Making for Metalworking Trainees. National Tooling and Machining Association (NTMA), 1991.

Reserve Supplementary Reading:

Walker, John. Machining Fundamentals. Goodheart Wilcox, 1998.

Weingartner, Charles. Machinists' Ready Reference. Ann Arbor, Michigan: Prakken Publications, 1998.

IX. OTHER SUPPLIES REQUIRED OF STUDENT:

Safety glasses, hand held calculator, Geometric Tolerancing Guidelines ANSI Y14-5

**Content Review Form
PREREQUISITE COURSE**

Target Course: MACH 061A Jig and Fixture Making

Prerequisite Course: MACH 021A Machine Shop I

Instructions:

1. List exit competencies (skills) from Prerequisite Course. These skills are listed in the “Student Outcomes” section of the Course Outline (“upon completion of the course, the student should be able to...”)
2. Indicate which of the listed exit competencies (skills) are necessary entry skills needed for success in the target course. Mark with an “X” each needed skill.
3. Indicate the degree of importance of each needed entry skill for course success, using the following rating scale:
 1=Critical 2=Very Helpful 3=Desirable

Skills Analysis

Exit Skills in Prerequisite Course	Entry Skills Needed for Success in Target Course (Mark with an X if needed.)	Degree of Importance (Rate 1 – 3)
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1. Apply safety in the machine shop area.	X	1
2. Utilize machine tools in a safe manner.	X	
3. Accurately hold tolerances to blueprint specifications.	X	1
4. Properly maintain equipment to industry specifications.		

	1
X	1

**Content Review Form
PREREQUISITE COURSE**

Target Course: MACH 061A Jig and Fixture Making

Prerequisite Course: MACH 120A Machine Shop Theory

Instructions:

4. List exit competencies (skills) from Prerequisite Course. These skills are listed in the “Student Outcomes” section of the Course Outline (“upon completion of the course, the student should be able to...”)
5. Indicate which of the listed exit competencies (skills) are necessary entry skills needed for success in the target course. Mark with an “X” each needed skill.
6. Indicate the degree of importance of each needed entry skill for course success, using the following rating scale:
 1=Critical 2=Very Helpful 3=Desirable

Skills Analysis

Exit Skills in Prerequisite Course	Entry Skills Needed for Success in Target Course (Mark with an X if needed.)	Degree of Importance (Rate 1 – 3)
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1. Demonstrate their knowledge of safe machine operating practices, saws, mills, drills, and precision grinders.	X	1
2. Demonstrate their uses of speed and feed tables.	X	1
3. Demonstrate their uses of precision measuring tools.	X	1
4. Demonstrate their knowledge of manufacturing materials and processes.		