

**I. COURSE INFORMATION:**

A. Division: Technical  
Department: Machine Trades  
Course ID: MACH 061B  
Course Title: Jig and Fixture Making  
Units: 4  
Lecture: 3 hours  
Laboratory: 3 hours  
Prerequisite: MACH 021B and MACH 120B  
Corequisite: None  
Dept. Advisory: None

B. 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).

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

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

**III. EXPECTED OUTCOMES:**

Upon successful completion of the course, the student should 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. COURSE 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
  4. Coordinate Measuring Machine (CMM)
- 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: (Please check all that apply and add any additional not listed.)**

- Lecture
- Class and/or small group discussion
- Critical evaluation of texts, newspapers, journal articles, and other printed research
- Critical evaluation of films, videotapes, audiotapes, or other media forms
- Classroom demonstrations
- Field trips
- Guest speakers
- Other:
- Other:
- Other:

**VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:**

- A. Reading Assignment. Reading assignments are required and may include (but are not limited to) the following: 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 applications into a simple fixture.
- B. Writing Assignment. Writing assignments are required and may include (but are not limited to) the following: Process plan a fixture utilizing a Sequence of Process (SOP) format per ISO 9000 standards.
- C. Critical Thinking Assignment. Critical thinking assignments are required and may include (but are not limited to) the following: Utilizing a manufacturing print, describe a fixturing process to hold the part.

**VII. EVALUATION:**

A student's grade will be based on multiple measures of performance and will reflect the objectives explained above. A final grade of "C" or better should indicate that the student has the ability to successfully apply the principles and techniques taught in this course. These evaluation methods may include, but are not limited to, the following (Please check all that apply, and add additional ones not listed):

- Portfolios
- Projects
- Written papers or reports
- Presentations (oral and visual)
- Work performance (internships or field work)
- Lab work
- Comprehensive examinations (cumulative finals or certifications)
- Peer evaluation
- Self evaluation
- Classroom participation
- Homework
- Other: Field Trip to industry
- Other:
- Other:

**VIII. TYPICAL TEXTS:**

- A. Walker, John, Machining Fundamentals, 8th Edition, Goodheart Wilcox, Illinois, 2004
- B. Weingartner, Charles, Machinists' Ready Reference, Prakken Publications, Ann Arbor, Michigan, 2003
- C. Hoffman, Edward, Basic Jig and Fixture Design, 5th Edition, Thomson Delmar Publishing, Clifton Park, New York, 2004

**IX. OTHER SUPPLIES REQUIRED OF STUDENTS:**

- A. Safety glasses

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- B. Hand held calculator
- C. Geometric Tolerancing Guidelines ANSI Y14-5

**PREREQUISITE/COREQUISITE/ADVISORY  
 COURSE GRID FORM**

**Target Course:** MACH 061B Jig and Fixture Making

**Prerequisite Course:** MACH 021B 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**

Entry Skills in Target Course	Exit Skills Provided by Prerequisite Course (Mark with an X if needed and indicate Prerequisite Course if more than one).	Degree of Importance (Rate 1 – 3)
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1. Apply safety in the machine shop area utilizing OSHA standards.	X	1
2. Utilize machine tools in a safe manner.	X	1
3. Accurately hold tolerances to a given print drawing.	X	1
4. Properly maintain equipment to industry specifications.	X	1

**PREREQUISITE/COREQUISITE/ADVISORY  
 COURSE GRID FORM**

**Target Course:** MACH 061B Jig and Fixture Making

**Prerequisite Course:** MACH 120B Machine Shop Theory

**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**

Entry Skills in Target Course	Exit Skills Provided by Prerequisite Course (Mark with an X if needed and indicate Prerequisite Course if more than one).	Degree of Importance (Rate 1 – 3)
1. Demonstrate their knowledge of safe machine operating practices, CNC Machines, and conventional machine tools.	X	1
2. Explain the formula for calculating feeds and speeds.	X	1
3. Identify the proper use of precision measuring tools when manufacturing.	X	1
4. Select the appropriate layout tools for certifying to NIMS standards.	X	1