Machine Metalworking

1 Semester – ½ credit
Open to grade 9-12
Recommended Related Courses: Intro to CAD, ABC ‘s of Engineering, Practical Welding, Metal Fabrication.

Machine Metalworking is a “hands-on”, project based, introduction to the safe and accurate operation of machine tools. Topics covered include: engine lathe, milling machine, bandsaw, drill press, grinders, CNC machining, threading, print reading, lay-out procedures, precision measurement, and career opportunities.

Major Course Objectives

1. To give the students a basic introduction to the field of Machine Tool Metalworking.

2. To give the students “hands-on” experiences in using metal working equipment.

3. To have the students develop safe work habits.

4. To stress to the student the desire to produce precise and high quality work.

5. To give the student insight to the rapidly changing and technical nature of the world of work.

6. To allow the students to explore the many career opportunities in the Machine Tool field.

Required Projects

1. Soft Faced Hammer.

2. Try Square / CNC Program.

3. Scriber.

Text

“Machining Fundamentals” by John R. Walker

All Units Covered Will Include:

1. Lecture / Discussion
2. Related Safety Information
3. Reading Assignments
4. Demonstrations
5. Related Videos
6. Lab Time for required projects

Methods of Evaluation

1. Written Assignments
2. Written exams
3. Instructors Observations
4. Required Projects

Machine Metalworking Outline

1. Introduction
    a. Class
    b. Instructor (s)
    c. Course content / Projects
    d. Administrative Procedures

2. Print Reading
    a. Line Types
    b. Abbreviations
    c. Math review (Fraction, Decimal, Metric)
    d. Orthographic and isometric drawings
    e. Surface Identification
    f. Ruler Reading
    g. Dimensions and Tolerances

3. Measuring Tools
    a. Rulers (scales)
    b. Micrometers
    c. Calipers
    d. Dial indicators
    e. Gauge Blocks
    f. Combination Squares
    g. Verniers
    h. Protractors

4. Layout Tools and Procedures
    a. Layout dyes
    b. Scribers
    c. Punches
    d. Compass / Dividers
    e. Surface Plate and Gauge
    f. Vee Blocks

5. Safety
    a. General / Common Sense
    b. Personal
    c. Tools and Machines (ongoing)
    d. First Aid

6. Files
    a. Types
    b. Classifications
    c. Use

7. Power Saws
    a. Safety
    b. Horizontal Cut-off
    c. Vertical Contour

8. Engine Lathe
    a. Types
    b. Controls
    c. Safety
    d. Tooling
    e. Work Holding Devices
    f. Rpm Formulas
    g. Straight Turning
    h. Taper Turning
    i. Knurling
    j. Drilling and Reaming

9. Drilling Machines
    a. Types
    b. Safety
    c. Rpm Formulas
    d. Work Holding Devices
    e. Operations

10. Grinding Machines
    a. Types
    b. Safety
    c. Wheel Selection
    d. Operations

11. Milling Machines
    a. Types
    b. Controls
    c. Safety
    d. Tooling
    e. Work Holding Devices
    f. Feeds and Speeds
    g. Operations

12. Taps and Dies
    a. Types
    b. Uses
    c. Tap Drill Selection
    d. Procedures

13. Non-Traditional Machining Processes
    a. EDM
    b. Chemical
    c. Laser

14. Introduction to CNC
    a. Theory
    b. Programming
    c. Applications

15. Career Opportunities

Other Notes:

- Safety glasses will be provided by the student. (Clear – No tint or mirrored)

- All tools and measuring instruments will be provided; any that are brought in will be the student's responsibility.

- Quarter and Semester Exams will be administered.