BAKER COLLEGE
STUDENT LEARNING OUTCOMES

MATT1110 Basic Gauges and Measurements
3 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Examine basic gauges and instruments and their safe use practices in manufacturing.
    a. Describe the history of precision measuring devices.
        i. Early and present standards of Linear measurement
        ii. Standard measuring temperatures
        iii. Measurement terms
        iv. Classification of fits
    b. Ensure safe operating practices of measuring devices, equipment and personnel.
    c. Identify what personal protective equipment is required for each task.
        i. Gloves
        ii. Hearing protection
        iii. Foot wear
        iv. Hard hat
        v. Clothing
        vi. Safety glasses
    d. Demonstrate the safe use of precision measuring devices.
        i. Fixed Gages (plug, ring, snap, feeler, wire and drill)
        ii. Screw threads and thread gages (history, application, standards, terminology, classification)
        iii. Dial gages and indicators (Dial indicators, comparators, micrometers, calipers and care of)
        iv. Micrometers and verniers (inside, depth gage, telescope)
        v. Combination square set (uses, accuracy, terminology)
        vi. Plug gages and Gage blocks (Sets, accuracy, care, uses and effect of temperature)
        vii. Surface plates and accessories (parallels, v blocks, squares and straight edges)
    e. Describe applications within specific manufacturing markets of Basic Gauges and Measurement.
    f. Explain surface roughness, hardness testing and nondestructive testing as it applies to CNC activities.
        i. Surface roughness, waviness, lay and profile
        ii. The Profilometer
        iii. Surface roughness comparator blocks

iv. Heat treatment of steel
v. File testing for hardness
vi. Rockwell and Brinell hardness testers
vii. The durometer
viii. Ultrasonic methods of flaw detection

2. Explore basic gauges and precision measuring devices used in CNC.
    a. Explain the purpose of basic gauges and precision measuring devices.
        i. Fixed Gages (plug, ring, snap, feeler, wire and drill)
        ii. Screw threads and thread gages (history, application, standards, terminology, classification)
        iii. Dial gages and indicators (Dial indicators, comparators, micrometers, calipers and care of)
        iv. Micrometers and verniers (inside, depth gage, telescope)
        v. Combination square set (uses, accuracy, terminology)
        vi. Plug gages and Gage blocks (Sets, accuracy, care, uses and effect of temperature)
        vii. Surface plates and accessories (parallels, v blocks, squares and straight edges)
    b. Use optical instruments and measuring machines.
        i. Optical comparators
        ii. Theory and use of optical flats
        iii. Optical comparator charts
        iv. Electro mechanical lead tester
        v. Spring testing
        vi. Care of optical instruments and measuring machines

3. Explain Trigonometric functions and geometry for angular measurement.
    a. Explain sine as the relationship of the opposite side divided by the hypotenuse in a right triangle
    b. Explain Understand cosine as the relationship of the adjacent side divided by the hypotenuse in a right triangle
    c. Explain tangent as the relationship of the opposite side divided by the adjacent side in a right triangle
    d. Explain how to use the above calculations to determine an angle from a Trigonometric function chart.
    e. Explain the relationship of angles when lines are parallel and intersected by other parallel lines.
    f. Explain that alternate interior angles are equal
    g. Explain that adjacent angles have a sum of 180 degrees

Big Ideas and Essential Questions

Big Ideas

- Industrial Safety Foundations of Gauges and Measurements
- Basic Principles of Gauges and Measurements
- Understanding the Mathematics behind measurement
- Proficiency in the use of hand-held gauges and measuring machines
- Fundamental understanding of nondestructive surface and metallurgy testing

Essential Questions

1. Why is safety the first priority?
2. How does proper gauging and measurement insure product conformance?
3. Why is it important to consider measuring efficiencies and accuracies?
4. How do I determine what instruments to utilize when measuring different items?
5. What impact does an incorrect usage have on accuracies of the product?
6. How are the different measuring devices used?
7. How does documentation impact industrial communication between shifts?
8. What is the potential uses in the future?

Not approved for experiential credit

Effective: Spring 2021