# Precision Machining Technology

**PURPOSE**
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of precision machining technology.

**GENERAL REGULATIONS**
People entering this contest must follow all rules listed below as well as the "General Regulations" of the Wisconsin Skills Championships. The "General Regulations" can be found at: http://www.skillsusa-wi.org/wordpress/?page_id=130.
You will be held accountable for knowing and following all rules and guidelines of the Wisconsin Skills Championships.

**CLOTHING REQUIREMENT**
Blue jeans (no holes or torn pants) with a short sleeve shirt that would be appropriate work clothing; leather work shoes; and safety glasses with side shields or goggles (Prescription glasses can be used only if equipped with side shields; otherwise they must be covered with goggles).

**NOTE:** No athletic type shoes or shorts may be worn by contestants in this event.

**ELIGIBILITY**
Open to active Skills USA members enrolled in vocational programs with precision machining technology as the occupational objective.

**EQUIPMENT AND MATERIALS**
1. Supplied by the technical committee:
    a. Stock blanks on which operations are to be performed.
    b. Working drawings with specifications of jobs to be performed.
    c. All necessary information and furnishings for use by judges and technical committee.
    d. 0-1 Micrometer
    e. 1-2 Micrometer
    f. Adjustable Parallels
    g. Depth Micrometers
    h. Counter Sink
    i. 9/16" – ¾" HSS Drills
    j. Layout Die
    k. Parallels
    l. Shop towels
    m. Hex Keys (Inch & MM)
    n. Tool Bit Holders

2. Supplied by contestant:
    a. Pencil
    b. Safety Glasses
    c. Scale (6" or 12"), Scriber, Protractor, and Square - Combination Set Can Be Used
    d. Metal cutting file
    e. 1/2” - 20 Tap
    f. 29/64” HSS Drill
    g. 3/8” HSS Drill
    h. Tap Wrench or T-Handle to hold a ½-20 Tap
    i. 6” Caliper
    j. Edge Finder
    k. #3 60° Center Drill
    l. 3/8” HSS Endmill
    m. 3/8” HSS Lathe Tool for Turning O.D. (pre-ground)
    n. 1/8” HSS Groove Lathe Tool for Turning O.D. (pre-ground)
    o. 45° Chamfer Lathe Tool (pre-ground)
    p. Calculator capable of calculating trigonometry or Trigonometry Table Book

3. Manufacturing student should be prepared for:
    a. Written Test
    b. Trigonometry problems
    c. CNC programming terminology
    d. Blueprint Reading problems

**Note:** This is a sample list. The official list changes from year to year. After registering for the contest, the student's advisor will be notified of what tools are needed.

**SCOPE OF THE CONTEST**

1. Each contestant in the Skills Championships is expected to demonstrate competency in the performance skills and companion knowledge (theory) skills of the workplace including:
    a. Applying fundamental computational skills
    b. Interpreting blueprints, technical data and other graphics
    c. Applying physical science principles
    d. Meeting industrial safety and hygiene requirements
2. Competency assessment involves demonstrating hands-on performance skills in setting up and operating machine tools, producing parts to specifications, and a written examination for measuring complementary knowledge skills.

3. Contestants will demonstrate their ability to perform jobs or skills selected from the following list of competencies determined by the Wisconsin Skills Championships Technical Committee.
    a. Computational Competencies
        1) Measure work piece to nearest .0001
        2) Calculate amount of material to be removed
        3) Calculate conversion of revolutions per minute (RPM) to surface feet per second
        4) Calculate machine RPM for a given material size
        5) Calculate stock utilization
        6) Calculate tolerances
        7) Convert to metric measurement
        8) Determine clearance, relief and rake of cutting tools
    b. Designing and Planning Machine Work
        1) Read Blueprints
        2) Perform layout for precision machine work using layout instruments
        3) Use variety of precision measuring tools
        4) Use a tap drill chart
    c. Performing Metalwork Operations
        1) Clamp work piece
        2) Cut metal stock
        3) Fabricate special cutting tools
    d. Performing Bench Work
        1) Cut threads with dies and taps
        2) Hand sharpen cutting tools with abrasive stones
        3) Shape metal
    e. Operating Lathes
        1) Set up engine and turret lathes
        2) Align lathe centers using approximate method
        3) Align lathe centers using accurate measurement
        4) Bore ream, counter bore and countersink holes
        5) Cut threads using a tap
        6) Set up lathe and face work piece
        7) Perform lathe filing and deburring
        8) Rough cut and finish cut
        9) Knurl parts
    f. Operating Milling Machines
        1) Align milling machine fixtures and attachments
        2) Inspect and assemble mill work
        3) Mill internal slots
        4) Perform end milling
        5) Set speeds and feeds for milling work
        6) Square up metal using table vice