

The following rules are for the state contest only. Students/Teams that qualify for the national contest need to adhere to the rules and guidelines for that national contest. The rules can be found in the [Skills USA Championships Technical Standards](#) available from [SkillsUSA Publication Sales](#). For both state and national contests, you should also watch for contest updates sent from the Wisconsin SkillsUSA state office. For national contests, you can find contest [updates](#) at the national [SkillsUSA](#) website.

PRECISION MACHINING

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

Khaki work pants and khaki work shirt or other 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 SkillsUSA 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. 1/8" Grooving tool--5/16" Sq. Tool Bit
 - e. 60° Threading Tool--5/16" Sq. Tool Bit
 - f. 5/16 Sq. high speed tool bit
 - g. 1/4" End Mill and 3/8 End Mill
 - h. 13/32 Counter bore (flat bottom drill OK)
2. Supplied by contestant:
 - a. Pencil
 - b. Safety Glasses
 - c. Scale (6" or 12"), Scriber, Protractor, and Square - Combination Set Can Be Used
 - d. Hacksaw

- e. 10 inch Mill File
- f. 0-1 inch Micrometer
- g. 0-2 inch Micrometer
- h. Vernier Caliper (6 inch or larger) or a 0-1 inch Depth Mic
- i. Hammer
- j. Center Punch
- k. Radius Gage 1/8" and 1/4"
- l. Center Gage
- m. 1/4-20 NC Tap
- n. 13/64 Drill
- o. 23/64 Drill
- p. Tap wrench or T-Handle to Hold 1/4" Tap
- q. .375/.376 Reamer
- r. 60 Degree counter sink tool
- s. Calculator
- t. Trig Table Book
- u. 9/32 (.281) Drill
- v. 1/4" (.250) Drill
- w. Manufacturing student should be prepared for:
 - "Jo" Block Problems
 - Sine Bar Problems
 - Written Test
 - Blue Print Reading Test
 - Write a simple CNC program for a mill part

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 dimensions of keyseats
5. Calculate machine RPM for a given material size
6. Calculate stock utilization
7. Calculate tolerances
8. Convert to metric measurement
9. Determine clearance, relief and rake of cutting tools

b. Designing and Planning Machine Work

1. Read Blueprints
2. Sketch parts
3. Perform layout for precision machine work using layout instruments
4. Use variety of precision measuring tools
5. Measure concentricity with dial test indicator
6. Measure with sine bar

c. Performing Metalwork Operations

1. Clamp work piece
2. Cut metal stock
3. Fabricate special cutting tools
4. Operate hone to apply proper surface in a cylinder
5. Perform bench cross filing
5. Polish metal

d. Performing Bench Work

1. Cut materials with hand hacksaws
2. Cut threads with dies and taps
3. Hand sharpen cutting tools with abrasive stones
4. Ream holes with hand reamers
5. Remove damaged screws and other non-hardened thread hardware
6. Shape metal

e. Operating Drill Presses

1. Center punch hole
2. Drill countersink and counter bore
3. Mount and secure work
4. Adjust drill press for proper feed rate and RPM
5. Spot face work piece
6. Adjust drill press automatic feed

f. 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 external and internal tapered surfaces
6. Cut external and internal threads and rechase
7. Die cut threads
8. Set up lathe and face work piece
9. Perform lathe filing and deburring
10. Rough cut and finish cut
11. Knurl parts

g. Operating Milling Machines

1. Align milling machine fixtures and attachments
2. Inspect and assemble mill work
3. Bore and drill holes
4. Cut keyway
5. Mill an angle, external radius, cylindrical work pieces and internal slots
6. Perform end milling, flycut, reaming, cut-off, and straddle milling operation
7. Set speeds and feeds for milling work
8. Square up metal using table vice

NEW: Precision Machining students should be prepared for the following:

- * "JO" Block Problems
- * NC-CNC Programming Questions
- * Sine Bar Problems
- * Blue Print Reading

WISCONSIN SKILLSUSA CHAMPIONSHIPS
Precision Machining Technology Rating Sheet

Contestant Number: _____

ITEMS EVALUATED	Points Possible	Points Earned	REMARKS
Basic machine operations <ul style="list-style-type: none"> • Lathe • Surface grinder • Mill • Power hacksaw • Bandsaw • Pedestal grinders • Drill press 			
Inspection			
Cad Cam CNC Applications			
Bench work			
Blueprint reading/job planning			
Safety			
Written Test			
Subtotal			
Clothing Penalty (minus 0-5 points)			
Resume Penalty (minus 0 -5)			
Safety Penalty (minus 0-50 points)			

TOTAL			
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