## CNC Turning

### I. Apply basic machining skills per industry standards as set forth by the SkillsUSA technical committee

**Tasks Instructions:**

Each number to the right refers to a single student/candidate (1-10). Place a check (✓) in the respective column for the appropriate student/candidate number (1-10) if the skills listed below are observed as stated. Leave blank if not observed. Student/candidate will only get credit for the skills they have demonstrated.

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- Demonstrate the basic math skills essential to CNC machining
- Identify and use measuring tools that are basic to CNC machining
- Interpret and apply information from prints and drawings
- Measure part to nearest +/-.001”
- Demonstrate safe working practices on machines
- Use various precision measuring tools (i.e., micrometers, calipers, radius gages)
- Use correct filling techniques and appropriate technology
- Define and calculate speed and feed rates (SFPM, CCS, IPM, IPR)
- Demonstrate knowledge of cutting tools, clamping devices and materials
- Perform mathematical calculations that enable the solving of complex trigonometric, geometric and algebraic problems applicable to CNC machining processes

*Safety and infection control are adhered to during all aspects of this task.*

*The student completed task within the time limited.*

**Points earned**

**Total possible points (12)**
II. Demonstrate knowledge of CNC programming per industry standards as set forth by the SkillsUSA technical committee

Tasks Instructions:

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<td></td>
<td>Manually write and verify the CNC program without the use of CAM software according to print specifications, dimensions and tolerances (competitor has the opportunity to edit any program errors on the machine)</td>
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<td>Display complete knowledge of DIN/ISO Programming (G and M codes)</td>
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<td>Apply the correct use of cutter compensation (G41/G41)</td>
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<td>Demonstrate knowledge of incremental and absolute positioning</td>
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<td>Demonstrate knowledge of coordinate system</td>
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<td>Determine proper machining sequences from workpiece drawing</td>
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<td>Adjust speeds and feed as needed</td>
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<td>Safety and infection control are adhered to during all aspects of this task.</td>
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Points earned

Total possible points (9)

III. Set up a CNC machine per industry standards as set forth by the SkillsUSA technical committee

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<td>Set up machine and establish workpiece zero reference point for machining the part</td>
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<td>Select and mount necessary tools from the provided tool list</td>
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<td>Establish tool length offsets and enter them into the CNC machine control</td>
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Enter any necessary tool corrections (i.e., cutter radius compensations) into the CNC machine control

Safety and infection control are adhered to during all aspects of this task.

The student completed task within the time limited.

Points earned
Total possible points (6)

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### IV. Perform mathematical calculations as needed for calculating speeds, feeds, program coordinates, angles, radii and tangent points

Tasks Instructions:

1. Calculate CNC speeds and feeds
2. Calculate programming coordinates from the drawing
3. Calculate angles, radii and tangent points

Safety and infection control are adhered to during all aspects of this task.

The student completed task within the time limited.

Points earned
Total possible points (5)

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### V. Communicate and demonstrate an understanding of all symbols on a blueprint

Tasks Instructions:

1. Read and interpret technical blueprints
2. Understand all symbols on technical blueprints, such as geometric tolerances,
surface-finish symbols, corner-break symbols, etc.

Safety and infection control are adhered to during all aspects of this task.

The student completed task within the time limited.

Points earned

Total possible points (4)

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
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VI. Inspect work per industry standards as set forth by the SkillsUSA technical committee

Tasks Instructions:

- Inspect for conformity to print (shape and features of part to drawing)
- Inspect broken edges
- Inspect for damage to part (clamp marks, scratches)

Safety and infection control are adhered to during all aspects of this task.

The student completed task within the time limited.

Points earned

Total possible points (5)

|   | 1 | 2 | 3 | 4 | 5 |
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Total points earned for all sections (A)

Total possible points for all sections (B) 41

Student/candidate score (divide A/B)