

## CNC Milling

TEAM CANADA

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## 1 TECHNOLOGY

In response to the evolving labour market and changing skill needs, the Government of Canada has launched the new Skills for Success (former Essential Skills) model defining nine key skills needed by Canadians to participate in work, in education and training, and in modern society more broadly. SCC is currently working with Employment and Social Development Canada (ESDC) to bring awareness of the importance of these skills that are absolutely crucial for success in Trade and Technology careers. Part of this ongoing initiative requires the integration and identification of the Skills for Success in contest descriptions, projects, and project documents. The next phase and very important aspect of our Skills for Success (SfS) initiative is to provide a Skills Report Card to each competitor at the Skills Canada National Competition. The purpose of the report card is to inform the competitor about their current level of nine identified Skills for Success based on their competition scores. With this knowledge, the competitor will be made aware which skill may require improvement. Full implementation is expected in the next Skills Canada National Competition.

The following 9 skills have been identified and validated as key skills for success for the workplace in the legend below:

<sup>1</sup>Numeracy, <sup>2</sup>Communication, <sup>3</sup>Collaboration, <sup>4</sup>Adaptability, <sup>5</sup>Reading, <sup>6</sup>Writing, <sup>7</sup>Problem Solving, <sup>8</sup>Creativity and Innovation, <sup>9</sup>Digital

These Skills for Success have been identified in section 2.4 and/or 3.2 of your Contest Description and if applicable, in your Project and supporting documents.

## 2 CONTEST INTRODUCTION

### 2.1 Description of the associated work role(s) or occupation(s)

[https://www.skillscompetencescanada.com/en/skill\\_area/cnc-machining/](https://www.skillscompetencescanada.com/en/skill_area/cnc-machining/)

### 2.2 Purpose of the Challenge

The Competition is a demonstration and assessment of the competencies associated with this skill. The Test Projects consists of practical work only. No written exam about theoretical knowledge will be conducted.

The Test Projects covers practical work related to modern manufacturing industry tasks, completed on a CNC mill.

Competitors will be given raw material, (ferrous and/or non-ferrous material) and technical drawings. The desired workpieces shall be machined on all sides. The Competitor carries out tasks that reflect multiple milling operations.

The programming of the CNC mill must be carried out on commercially available CAM systems (MASTERCAM) and the Machine Controls (such as HAAS).

### 2.3 Duration of contest

Maximum 10 hours total time. Combination of Mastercam programming and machining. Time is divided over two separate projects.

### 2.4 Skills and Knowledge to be tested.

The contest involves the manufacturing of precision components using a CNC Vertical Milling centre.

- Reading and Interpreting engineering drawings<sup>8</sup>
- Manually and/or digital programming Computerized Numerical Control tools<sup>9</sup>
- Machining Centre) May include pocketing, profiling, drilling, reaming, tapping, chamfering, thread milling and applied metrology<sup>1</sup>

*Essential Skills - <sup>1</sup>Numeracy, <sup>8</sup>Document Use, <sup>9</sup>Digital*

## 3 CONTEST DESCRIPTION

### 3.1 List of documents produced and timeline for when competitors have access to the documents on the Skills/Compétences Canada website

DOCUMENT	DATE OF DISTRIBUTION
2D finished drawing with a 3D shaded view (paper) or 3D step model (CAD) with 2D finished drawing (paper).	Day of competition

### 3.2 Tasks that may be performed during the contest

- Interpret engineering drawings and follow the specifications ISO A (American) drawing representation<sup>5</sup>
- Import 3D CAD file (step model) and create toolpaths from step file and engineering drawing
- Machining on up to 3 sides of part
- Identify and designate the different machining processes on a CNC machine<sup>7</sup>
- Select and apply appropriate cutting technology according to the cutting parameters, the material, equipment and cutting tools<sup>7</sup>
- Setup and utilize CAD/CAM software (Mastercam)<sup>9</sup>

- Generate G-Code
- Setup a Operate CNC Equipment
- Select appropriate measuring tools or gauging instruments and use them correctly<sup>7</sup>
- Make accurate measurements using precision measuring tools<sup>7</sup>
- Inspect and maintain the accuracy of dimensions within the tolerances<sup>1</sup>

*Skills for Success - <sup>1</sup>Numeracy, <sup>5</sup>Reading, <sup>7</sup>Problem Solving, <sup>9</sup>Digital*

## **4 EQUIPMENT, MATERIAL, CLOTHING**

### **4.1 Equipment and material provided by Skills/Compétences Canada**

- CNC Machining Centre (Haas)
- Cutting Tools and Holders (Sandvik) - [www.sandvik.coromant.com/](http://www.sandvik.coromant.com/)
- Mastercam laptops and software
- All raw material (one part per competitor)
- Gauges, measuring instruments
- Parallels/soft blow hammers/wrenches/vices/deburring files
- Computers and Mastercam software
- Micrometer digital 0-100 mm
- Digital Caliber digital 0-200 mm
- Depth Micrometer digital 0-100 mm
- Thread micrometer digital 25-50 mm
- Test Dial indicator and base
- Edge finder
- Telescoping Gauges
- Thread pitch gage metric

**COMPETITORS WILL BE REQUIRED TO USE THE MATERIAL AND EQUIPMENT PROVIDED BY SCC. ALL OTHER MATERIAL AND EQUIPMENT WILL BE REMOVED FROM THE SKILL AREA.**

### **4.2 Equipment and material provided by the competitor**

- Non programmable calculator/machinist calculator (optional)
- Machinery's Handbook/Machine manual (optional)
- No other tools allowed

#### **4.2.1 Toolboxes Guidelines**

No toolbox is permitted.

## **5 Required clothing provided by the competitor**

- Long pants (no shorts allowed)
- Short sleeve shirt
- Shop coat with short sleeves (optional)

## **6 HEALTH AND SAFETY**

### **6.1 Safety program**

SCC has implemented a comprehensive safety program as health and safety is an integral part of our competitions. Our safety program includes guidelines and procedures to make the work environment in each skill area safer.

#### **6.1.1 Safety manual**

As part of our program a safety manual has been created in order to monitor and document health and safety within each skill area. It includes a definite plan of action designed to prevent accidents. The safety manual will be provided for every skill and these instructions must be followed and respected by all participants and officials at the SCNC.

#### **6.1.2 Safety workshop**

During orientation, Competitors will participate in a Safety workshop and they will be expected to work and maintain a safe working area during the competition. Any Competitor breaking any health, safety, and environmental rules, may be required to undertake a second safety workshop, this will not affect the Competitor's competition time.

### **6.2 List of required personal protective equipment (PPE) provided by competitors**

- As per section 7.3

### **6.3 COVID-19 Protocol**

The COVID-19 guidelines will be shared as soon as they are available.

The COVID-19 guidelines will be subject to change based on the BC COVID-19 guidelines in place at the time of the competition.

## **7 SAFETY REQUIREMENTS**

### **7.1 Safety workshop**

Upon arrival at the Skill area, Competitors will participate in a Safety workshop and they will be expected to work and maintain a safe working area during the

competition. Any Competitor breaking any health, safety, and environmental rules, may be required to undertake a second safety workshop, this will not affect the Competitor's competition time.

## 7.2 List of required personal protective equipment (PPE) provided by Skills/Compétences Canada

- N/A

## 7.3 List of required personal protective equipment (PPE) provided by the competitor

- Safety Glasses
- CSA approved safety shoes
- Hearing protection (optional)

**Note:** Contestants who do not have the required protective gear will not be allowed to participate in the contest

# 8 ASSESSMENT

## 8.1 Point breakdown

**Note:** This list is subject to change.

TASKS	/100
Compliance with occupational health and safety regulations	10
Compliance with dimensions, tolerances, and surface finish specified in project drawing part #1	45
Compliance with dimensions, tolerances, and surface finish specified in project drawing part #2	45

# 9 CONTEST SPECIFIC RULES

Contest specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from contest to contest. Any additional contest rules will be reviewed during the competitor orientation.

TOPIC/TASK	CONTEST SPECIFIC RULE
Use of technology - personal laptops, tablets and mobile phones	<ul style="list-style-type: none"> <li>• No personal laptops or PC's are allowed</li> <li>• No cellphones are allowed</li> <li>• No personal USB memory drives</li> </ul>



Drawings, recording information	<ul style="list-style-type: none"> <li>• All drawings need to be handed in with the finished project</li> <li>• Any notes taken need to be handed in</li> </ul>
Tools / Infrastructure and safety	<ul style="list-style-type: none"> <li>• If a competitor is displaying a lack of skills to operate the machine and therefore presents a risk of injury to him/her or persons around or risks the damage of the machinery or tools, the competitor can be removed from the contest.</li> </ul>

## 10 ADDITIONAL INFORMATION

### 10.1 Interpreter

If a competitor requires the help of an interpreter once onsite during the competition, the Skills/Compétences Canada Provincial/Territorial offices must advise Skills/Compétences Canada National Secretariat a minimum of 1 month prior to the competition or this service might not be guaranteed.

### 10.2 Ties

- Tiebreaker #1: In the event of a tie, the competitor with the shorter manufacturing time in the first project will be declared the winner.
- Tiebreaker #2: If a tie still remains, the competitor with the shorter manufacturing time overall will be declared the winner.
- Tiebreaker #3: If a third tie occurs, the competitor with the highest score in the Compliance with occupational health and safety regulations criteria will be declared the winner.

### 10.3 Competition rules

Refer to the competition rules of the Skills Canada National Competition which can be found on our website.

## 11 TEAM CANADA EXPERT

Jurgen Hierholzer
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Contact the Skills/Compétences Canada national secretariat for any questions or concerns: Sophie Courchene at [sophieec@skillscanada.com](mailto:sophieec@skillscanada.com)