



CONTEST DESCRIPTION
CNC Machining
POST-SECONDARY

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1 THE SKILLS FOR SUCCESS FOR CAREERS IN THE SKILLED TRADES AND 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 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:

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

These Skills for Success have been identified in section 2.4 and/or 3.2 (to be completed by SCC) 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/

2.2 Purpose of the Challenge

Assess the contestant's CNC machining operational skills and techniques utilizing CNC equipment and CAD/CAM software.

2.3 Duration of contest

2 days – 3 to 4 hours per day.

2.4 Skills and Knowledge to be tested.

The contest involves manufacturing a precision component using a CNC turning centre and a CNC Vertical Milling centre.

- Reading and Interpreting engineering drawings⁵
- Proficient use of MasterCam to program CNC machines.⁹

- (Turning Centre) May include external and internal turning, taper turning, threading, drilling, boring, face grooving and applied metrology.¹
- (Machining Centre) May include pocketing, profiling, drilling, reaming, tapping, chamfering, thread milling and applied metrology.¹

Skills for Success - ¹Numeracy, ⁵Reading, ⁹Digital

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 |
|-------------------------------------|----------------------|
| 2023 Project Drawings for Reference | December 2023 |
| Generic Cutting Tool List | December 2023 |

3.2 Tasks that may be performed during the contest.

- Interpret engineering drawings and follow the specifications ISO A (American) drawing representation⁵
- Identify and designate the different machining processes on a CNC machine
- Select and apply appropriate cutting technology according to the cutting parameters, the material, equipment and cutting tools⁷
- Utilize MasterCam⁹
- Generate G-Code
- Setup and operate CNC Equipment
- Select appropriate measuring tools or gauging instruments and use them correctly.⁷
- Make accurate measurements using precision measuring tools.¹
- Inspect and maintain the accuracy of dimensions within the tolerances.¹

Skills for Success - ¹Numeracy, ⁵Reading, ⁷Problem Solving, ⁹Digital

4 EQUIPMENT, MATERIAL, CLOTHING

4.1 Equipment and material provided by Skills/Compétences Canada

- CNC Machining Centre (Haas VF-2 or similar) – <http://www.hasscnc.com/>
- CNC Turning Centre (Haas ST-20 or similar)
- CAD/CAM system (MasterCam only) – If a competitor requires MasterCam access for training, contact In-House Solutions. Phone: 1-800-529-5517
- Cutting tools and holders (Sandvik) - www.sandvik.coromant.com/
- All raw material (one part per competitor)
- Gauges, measuring instruments
- Parallels/soft blow hammers/wrenches/vices/deburring files
- Computers and Mastercam software
- Digital micrometers 0-100mm

- Digital caliper (digital) 0-200 mm
- Depth micrometer (digital) 0-100 mm
- Thread micrometer (digital) 25-50 mm
- Dial test 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.

- Nonprogrammable calculator/machinist calculator
- Machinery's Handbook/Machine manual (optional)
 - Haas Mill Operators Manual
 - Haas Lathe Operators Manual
- No other cutting or non-cutting tools allowed
- No personal computers or other CAD/CAM software allowed
- Pen, highlighters, etc. (optional)

4.2.1 Toolboxes Guidelines

- All required tools are supplied by Skills Canada.

4.3 Required clothing provided by the competitor.

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

5 HEALTH AND SAFETY

5.1 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.

5.1.1 Safety manual

As part of our program a safety manual has been created 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.

5.1.2 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.

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

- N/A

5.3 List of required personal protective equipment (PPE) provided by the competitor.

- CSA-approved safety boots
- CSA-approved safety glasses
- Hearing protection (optional, earmuff style protectors and wireless headsets are prohibited)

Note: Competitors who do not have the required protective equipment will not be allowed to participate in the competition.

6 ASSESSMENT

6.1 Point breakdown

Note: This list is subject to change.

| TASKS | /100 |
|--|------|
| Compliance with occupational health and safety regulations | 5 |
| Compliance with dimensions, tolerances, and surface finish specified in plans for Milling | 45.5 |
| Compliance with dimensions, tolerances, and surface finish specified in the plans for Turning | 45.5 |
| No additional part (material) per competitor. One piece per person | 0 |
| If a failure of a tool occurs as a result of a competitor's negligence, a loss of – 2 per tool will be deducted. | (2) |
| Practical set-up procedure for Turning Centre | 2 |
| Practical set-up procedure for Milling Centre | 2 |

7 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 – digital memory devices | <ul style="list-style-type: none"> Competitors are not allowed to bring digital memory devices into the workshop. |
| Use of technology – personal devices | <ul style="list-style-type: none"> Competitors are not allowed to bring personal laptops, tablets or cellphones into the workshop. |
| Drawings - recording information | <ul style="list-style-type: none"> Competitors are not permitted to take drawings or recorded information out of the workshop. Coaches, trainers, and competitor team members are prohibited from photographing projects and drawings during competition. Violation will result in the disqualification of the associated competitor at the discretion of the NTC. |
| Tools/infrastructure | <ul style="list-style-type: none"> Competitors are not allowed to bring their own tools and measuring instruments. Competitors are not allowed to change the machine or computer parameters/settings. Competitors are not allowed to tamper with or bypass safety interlocks. No other software other than Mastercam permitted. No manual programming permitted (see additional information) |
| Equipment failure | <ul style="list-style-type: none"> If equipment or tools supplied by Skills/Compétences Canada fail, extra time will be allowed only if the NTC member, sponsor technician, or equipment supplier determines it is not caused by user error. |
| Food/Drink | <ul style="list-style-type: none"> Competitors are permitted to have water in a closed container, but food and drink are otherwise prohibited while machining or programming. |

8 ADDITIONAL INFORMATION

8.1 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 may not be guaranteed.

8.2 Ties

- **Tiebreaker #1:** In the event of a tie, the competitor with the highest score in the Compliance with dimensions, tolerances, and surface finish specified in plans for Milling criteria will be declared the winner.
- **Tiebreaker #2:** If a tie remains, the competitor with the highest score in the Compliance with dimensions, tolerances, and surface finish specified in the plans for Turning will be declared the winner.
- **Tiebreaker #3:** If a third tie occurs, the competitor with the highest score in the Compliance with surface finish criteria will be declared the winner.

8.3 Competition rules

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

9 NATIONAL TECHNICAL COMMITTEE MEMBERS

| MEMBER ORGANIZATION | NAME |
|----------------------|-----------------------------|
| Prince Edward Island | Andrew Townshend – Co-Chair |
| New Brunswick | Bob Doucet |
| Quebec | Éric Bilodeau - Chair |
| Ontario | Jurgen Hierholzer |
| Manitoba | Rob Ataman |
| Saskatchewan | Jonathan Crane |
| Alberta | Brandon Walker |
| British Columbia | Marte Arreola |
| Nova Scotia | Kimball Edwards |

Contact the Skills/Compétences Canada national secretariat for any questions or concerns: Nathalie Maisonneuve (nathaliem@skillscanada.com).