Skills Compétences Canada

CONTEST DESCRIPTION

Mechanical Engineering CAD

SECONDARY / 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:
[1]Numeracy, [2]Communication, [3]Collaboration, [4]Adaptability, [5]Reading, [6]Writing, [7]Proble m Solving, [8]Creativity and Innovation, [9]Digital

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/mechanical-cadd/

2.2 Purpose of the Challenge

To evaluate each contestant's preparation for employment in the field of Engineering Design and Drafting using CAD and to recognize outstanding students for excellence & professionalism in their field.

2.3 Duration of contest

12 hours

2.4 Skills and Knowledge to be tested.

- Prior to the competition, the competitor shall create metric inch B size templates with title a block containing the information provided in the example that will be posted on the Skills/Compétences Canada website, and bring these items for orientation.[6,9]

- Select fasteners and other assembly components as required (pins, keys, snap rings, etc.).[7]
- Use CAD software to produce drawings that comply with the ASME Y 14.5M-2018 Standard.[9]
- Use CAD software to produce 3D parametric models.[9]
- Use measuring instruments.[1]
- Dimension and tolerance drawings to industry standards including Geometric Dimensioning and Tolerancing (GD&T).[5]
- Create photorealistic rendered images of your final project.[9]
- Create animations of mechanical assemblies using the software and output video files of those animations[9]
- Have knowledge and understanding of designing components for rapid prototype product development (3D printing) using Fused Fillament Fabrication (FFF)
- Have the ability to utilize rapid prototyping (3D printing) to produce a functional prototype using Fused Fillament Fabrication (FFF)[9]
- Knowledge and ability to generate input files for 3D printing (G-Code) using the latest version of CURA 3D printing software as of the date of the competition orientation (https://ultimaker.com/en/products/ultimaker-cura-software)
- Competitors must have the ability to develop new product designs which will function properly within an assembly or on their own[7,8]
- Knowledge of common structural shapes and how to use them to develop frame assemblies
- Ability to use simple formulas and do basic mechanical calculations[1]
- Prior to the competition, competitors should complete the practice project samples which will be posted on the Skills/ Compétences Canada web site.
- Competitors will be required to model parts and assemble parts from physical measurement, drawing files (PDF) and/or model files [5]

Skills for Success – [1]Numeracy, [5]Reading, [6]Writing, [7]Problem Solving, [8]Creativity and Innovation, [9]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
Drawing template example PDF files will be provided ahead of the competition.	February 2024

No project specific documents will be provided prior to competition	

3.2 Tasks that may be performed during the contest.

- Sketching, analyzing measurements and part measuring[1]
- Implement design changes by using problem solving, decision making and critical thinking skills[7,8]
- Detail drawing from assembly and blueprint document interpretation[5,6]
- Assembly from details[9]
- Parametric Modeling – Family of parts and/or assemblies[9]
- Rendering[9]
- Animation[8,9]
- Export a variety of 3D model formats such as; STL files with proper units and resolution for additive manufacturing, STEP files, Cura 3mf files, 3D PDF, multipage PDF files[9]
- Model-based-definition
- Rapid prototyping (3D Printing)
- Exporting drawings as multi-page 2D[9]
- Import a variety of 3D model formats such as; STP (STEP) file[9]
- Weldments
- Sheetmetal
- Surfacing and parametric solid modelling[9]

Skills for Success - [1]Numeracy, [5]Reading, [6]Writing, [7]Problem Solving, [8]Creativity & Innovation, [9]Digital

4 EQUIPMENT, MATERIAL, CLOTHING

4.1 Equipment and material provided by Skills/Compétences Canada

- Table, chair, internet connection (it could be wired or wireless, be prepared for both) and 120VAC power (minimum of two outlets per person)

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.

- Competitors must bring their own computer, monitor (two recommended, three max), and peripherals (3d navigator allowed). Contestant must have administrative rights to the computer and are responsible for the functioning of their own equipment. Your computer setup must have the ability to connect to wired and wireless internet networks.
- A legally licensed 3D parametric CAD modeling software

- Competitors must ensure a legally obtained version of Microsoft Excel is installed on their computer
- If competitors are bringing a computer or laptop from their school (instead of their personal computer), please ensure that the computer is unlocked so documents and possibly software can be saved/installed to the hard drive and technology support can be provided onsite. This may require access to BIOS settings.
- Calculator
- Any reference materials (no photocopies, materials may be PDF documents or published books, journals, etc.)
- Pencils, sketching paper
- Recommended measuring tools can be seen below; however, competitors are welcome to bring additional hand tools if they wish (automated or camera measuring devices are not permitted). Any and/or all tools may be digital and should be capable of measuring in both inch and metric.
- 8” Calipers, digital, dial or vernier
- Ruler(s)
- Radius gauge set (no limit on size)
- Protractor and/or combination set
- Squares
- Thread gauge (or taps/dies or scews/nuts)

4.2.1 Toolboxes Guidelines

One of the objectives of SCC is the sustainability of the Competition. As a result, the toolboxes brought by Competitors will be restricted to the following maximum specifications.
The Competitor toolbox must not exceed 1 m^3 in volume. It can be multiple toolboxes, but the total of all toolboxes must not exceed the maximum volume indicated. There is no exception to this rule. If the Competitor’s toolbox is larger than what is indicated, the Competitor with the guidance of the NTC, will need to remove items from the toolbox and those items will not be used during the competition. All tools must fit inside one or more toolboxes. Tools outside of a toolbox will not be permitted.

4.3 Required clothing provided by the competitor.

- N/A

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.

- N/A

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
Part Design	25
Part Measurement	25
Assembly & Detail Modeling	25
Design change & Parametric Modeling	25

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
Hardware	Internet access will be provided.
Software	Software must be legally obtained.

Malfunction	If your hardware/software malfunctions you will be provided the equivalent downtime to complete the competition up to a maximum of 15 minutes per competition module.
Use of technology - Music - Internet	Competitors are allowed to listen to music through headphones or earbuds but cannot be connected to any network (cellular or wifi). Internet will be provided for competitors; the purpose is for software function and for access to software help documentation. No use of internet for communication with others is permitted.

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:** The competitor with the highest score in the Part Measurement task will be declared the winner.
- **Tiebreaker #2:** The competitor with the highest mark in the Assembly & Detail Modelling will be declared the winner.
- **Tiebreaker #3:** The competitor with the highest mark in Design Change & Parametric Modelling 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
Newfoundland and Labrador	Scott Glasgo
Quebec	Abdelmajid Lajmi
Ontario	Jeremy Braithwaite – Co-Chair
Manitoba	Nino Caldarola
Saskatchewan	Carson Gustafson
British Columbia	Michael Christensen
Yukon	David Lister – Chair

Nova Scotia	Jason Cameron

10 Appendix A – Glossary of terms used in translation.

The names for functions in the software are common terms in English, but the name for the equivalent function in the French depends on the software and can lead confusing and unclear terms. We will provide the English term in quotation marks alongside the French translation. If you plan to use the translated documents, it's your responsibility to know what these mean in your software ahead of the competition.

- Shaded view
- Render
- Bill of Materials (BOM)
- Balloon
- Exploded view

The names of 3D model files will be provided in English, treat them as proper nouns. They will be referred to by their file names.

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