



CONTEST DESCRIPTION

## **Mechanical Engineering CAD**

SECONDARY / POST-SECONDARY

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## **1 THE ESSENTIAL SKILLS FOR CAREERS IN THE SKILLED TRADES AND TECHNOLOGY**

SCC is currently working with Employment and Social Development Canada (ESDC) in order to bring awareness to the importance of Essential Skills that are absolutely crucial for success in the workforce. Part of this ongoing initiative requires the integration and identification of Essential Skills in contest descriptions, projects, and project documents. The next phase and very important aspect of our Essential Skills (ES) initiative is to provide an ES report card to each competitor at the Skills Canada National Competition. The purpose of the ES report card is to inform the competitor about their current level of essential skills based on their competition scores. With this knowledge, the competitor will be made aware which essential 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 essential skills for the workplace in the legend below:

<sup>1</sup>Numeracy, <sup>2</sup>Oral Communication, <sup>3</sup>Working with Others, <sup>4</sup>Continuous Learning, <sup>5</sup>Reading Text, <sup>6</sup>Writing, <sup>7</sup>Thinking, <sup>8</sup>Document Use, <sup>9</sup>Digital

These essential skills have been identified in section 2.4 and/or 3.2 of your Contest Description and if applicable, in your Project and all other supporting project documents.

## **2 CONTEST INTRODUCTION**

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

<http://skillscompetencescanada.com/en/skills/information-technology/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 A3 and inch B size templates with title block containing the information provided in the example that will be posted on the Skills/Compétences Canada web site, and bring these items for orientation.<sup>8,9</sup>
- Select fasteners and other assembly components as required (pins, keys, snap rings, etc.).<sup>7</sup>
- Use CAD software to produce drawings that comply with the ASME Y 14.5M-1994 Standard.<sup>9</sup>
- Use CAD software to produce 3D parametric models.<sup>9</sup>
- Use measuring instruments.<sup>1</sup>
- Dimension and tolerance drawings to industry standards including Geometric Dimensioning and Tolerancing (GD&T).<sup>8</sup>
- Create a rendered image of your final project.<sup>8</sup>
- Create animations of mechanical assemblies and render video files of those animations
- Have knowledge and understanding of designing components for rapid prototype product development (3D printing)
- Have the ability to utilize rapid prototyping (3D printing) to produce a functional prototype
- Knowledge and ability to generate input files for 3D printing (G-Code) using the latest version of CURA 3D printing software (<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
- 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 <sup>8, 9</sup>

*Essential Skills - <sup>1</sup>Numeracy <sup>7</sup>Thinking (Problem Solving), <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.

DOCUMENT	DATE OF DISTRIBUTION VIA WEBSITE
Tool List	November 2020
Metric A3 and inch B size template with title block	November 2020

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

- Sketching, analyzing measurements and part measuring<sup>1</sup>
- Implement design changes by using problem solving, decision making and critical thinking skills<sup>7</sup>
- Detail Drawing from Assembly and Blueprint document Interpretation<sup>8</sup>
- Assembly from Details.<sup>9</sup>
- Parametric Modeling – Family of parts and/ or assemblies<sup>9</sup>
- Rendering<sup>9</sup>
- Animation
- Export .STL files with proper units and resolution for additive manufacturing
- Rapid prototyping (3D Printing)
- Exporting drawings as 2D and 3D PDF files<sup>9</sup>
- Import a STP (STEP) file<sup>9</sup>
- Weldments
- Sheetmetal
- Surface Modelling<sup>9</sup>

*Essential Skills - <sup>1</sup>Numeracy <sup>7</sup>Thinking (Problem Solving, Decision Making, Critical Thinking)  
<sup>8</sup>Document Use <sup>9</sup>Digital*

## 4 EQUIPMENT, MATERIAL, CLOTHING

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

- Table, chair and 120VAC power

### 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.
- A legally licensed 3D parametric CAD modeling and surfacing software (including the applicable help files) must be installed on the competitor's computer and brought to the competition.
- 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 CMOS 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 screws/nuts)

**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.**

## **5 SAFETY REQUIREMENTS**

### **5.1 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.

### **5.2 Personal protective equipment (PPE) provided by competitors**

- N/A

### **5.3 Personal protective equipment (PPE) provided by the Skills/Compétences Canada**

- N/A

## 6 ASSESSMENT

### 6.1 Point breakdown

POINT BREAKDOWN	/100
<b>SECONDARY</b>	
Design change & Parametric Modeling	25
Assembly & Detail Modeling	25
Part Design	25
Part Measurement	25
<b>POST-SECONDARY</b>	
Design change & Parametric Modeling	25
Assembly & Detail Modeling	25
Part Design	25
Part Measurement	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 competitor orientation.

TOPIC/TASK	CONTEST SPECIFIC RULE
Hardware	<ul style="list-style-type: none"> <li>Computers must remain onsite from orientation to conclusion.</li> </ul>
Software	<ul style="list-style-type: none"> <li>Software must be legally obtained and not require an internet connection.</li> </ul>
Malfunction	<ul style="list-style-type: none"> <li>If your hardware/software malfunctions you will be provided the equivalent down time to complete the competition up to a maximum of 30 minutes per competition subject.</li> </ul>
Use of technology - Music	<ul style="list-style-type: none"> <li>Competitors are allowed to listen to music through headphones or earbuds but must be provided by a non-cellular network.</li> </ul>



## 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 might 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.

## 8 NATIONAL TECHNICAL COMMITTEE MEMBERS

Member Organization	Name
Ontario – Chair	Jeremy Braithwaite
British Columbia	Michael Christensen
Alberta	Roland Wade Hansma
Manitoba	Nino Caldarola
Yukon	David Lister
Newfoundland – Co-chair	Scott Glasgo
Saskatchewan	Regan MacMurchy
Quebec	Abdelmajid Lajmi

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