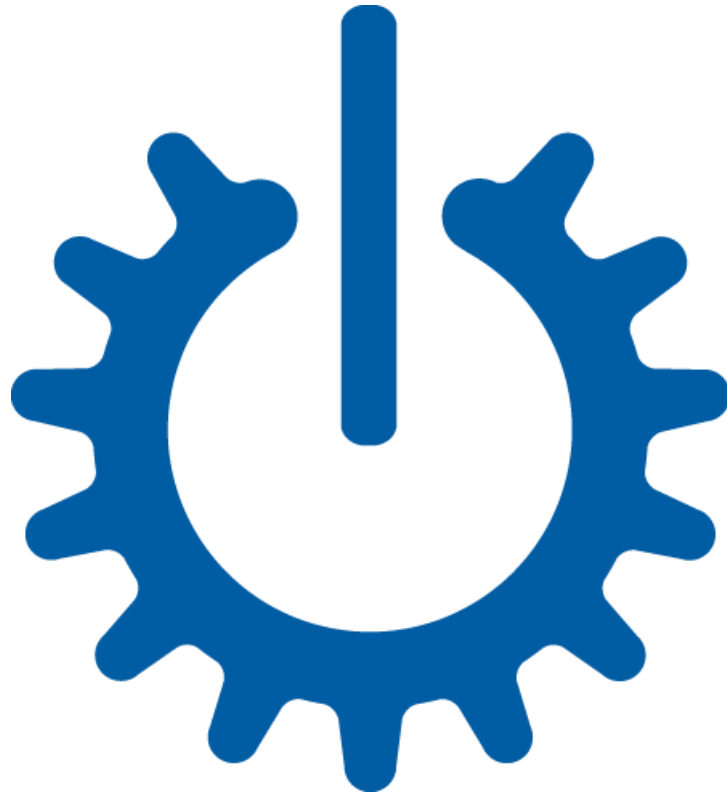


# Official Rules

Canadian Engineering Competition



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# General Rules and Definitions

The term director refers to the director responsible for the competition in which the section is founded. The director is appointed or chosen by the organizing committee and is the primary means of contact for competitors, judges and a liaison between the organizing executive.

## 1.1 Eligibility

The Vice President of Competitions determines the eligibility of all competitors, teams, and projects according to the following guidelines set out in this rulebook.

## 1.2 Qualification

1. The competitors, teams, and projects must have qualified during a regional competition, either the Atlantic Engineering Competition (AEC), the Compétition québécoise d'ingénierie (QEC), the Ontario Engineering Competition (OEC), or the Western Engineering Competition (WEC). A team must qualify by placing first or second in their category. If first or second place teams are unable to attend CEC, the third place team from the same region may be invited to attend CEC at the discretion of the VP Competitions.
2. The teams at any regional competition that are moving on to Canadian Engineering Competition (CEC) must be composed of members representing the same active member school of the Canadian Federation of Engineering Students (CFES) in order to receive an invitation to CEC.

## 1.3 Competitors

3. All competitors must be enrolled in a Canadian undergraduate engineering program and at least half of the competitors making up any one team must be enrolled in an accredited undergraduate engineering program at the time of the competition except in the following cases:
  - 3.1. In the cases of Innovative Design and Engineering Communication, the competitor must have graduated within a year of the competition from an accredited Canadian undergraduate engineering program and the project entered was completed before graduation. A letter will be required from the supervising professor confirming that no changes have been made to the project since the competitor's graduation. This letter must be dated no more than 30 days prior to the competition.



## 1.4 Project

4. Only original projects, which are the work of the competitors, may be entered. An original project is one that has not been entered in the Atlantic Engineering Competition, the Compétition québécoise d'ingénierie, the Ontario Engineering Competition, the Western Engineering Competition, or the Canadian Engineering Competition in previous years. The project must not have a common or obvious approach, solution, or application.
5. Work done during the course of employment related to the engineering degree is also eligible provided that an authorization letter is obtained from the employer allowing the work to be presented at the competition. The work must also meet other eligibility criteria.

## 1.5 Substitutions

6. The team appearing at the Canadian Engineering Competition must be comprised of the whole original team as it competed at its respective regional competition.
7. If a competitor is unable to attend the competition due to medical, personal, or other legitimate reasons, the team may compete in his or her absence as a reduced team, or may find a suitable replacement provided that they meet all of the qualifications as outlined in this document. This may only be done in cases of teams with three or more members and at the discretion of the VP Competitions.
8. If a competition team is unable to send the required teammates to the competition due to medical, personal, or other legitimate reasons (as approved), the next runner-up team from the regional competition shall be eligible to compete.

## 1.6 Regulation Amendments

9. These general regulations shall be considered the official regulations of the Canadian Engineering Competition, an activity run by the Canadian Federation of Engineering Students. These regulations can only be amended with the approval of the current Canadian Engineering Competition Activity Manager for the CFES (current at the time of vote) and with a two-thirds vote of the Advisory Board of the Canadian Engineering Competition.

## 1.7 Violation of competition rules

In the event that a competitor is believed to have violated:

- a) A rule in this rulebook,
- b) A rule included in the problem statement given to competitors explaining their challenge,  
or
- c) A clarification to a rule provided by a competition director during the question period

The following process will ensure that the issue comes to a result that is fair to all parties involved.

### 1.7.1 Procedure

1. The Competition Director only will determine if competitor(s) are in violation of the rules.
  - 1.1. if Competitor(s) are found guilty of a violation during the design phase they will be notified immediately, although they are eligible to continue the competition.
    - 1.1.1. Competitors will be provided in writing the alleged violation of the rules following the design phase.
    - 1.1.2. this communication of a rule violation shall not be an email or text message to ensure the competitor(s) are immediately made aware of the situation.
  - 1.2. Following the competition, competitors have 1 hour to appeal the Competition Director's decision to the Rule Violation Committee (RVC). The appeal must be written and clearly explain why the competitors believe they followed the rules of the competition. Appeals shall be limited to one page with size 12 font.
  - 1.3. If the competitors are not found to be in violation of any rules then the competition will continue as normal.
2. The RVC shall comprise of the Vice President of Competitions and 3 other executive members. (One executive member will act as non-voting chair.)
  - 2.1. It is preferred that the VP of Competitions and the chair(s) are among the voting members of the RVC
  - 2.2. The RVC will have 1 hour to review the appeal and vote to dismiss or hold the Competition Director's decision.
  - 2.3. Competitor(s) will be immediately notified of the RVC decision.
    - 2.3.1. The decision of the RVC is final, and not subject to appeals.
3. In the event of discovery of a rule violation following the competition, competitor(s) will be immediately notified and have 1 hour to appeal and follow the procedure outlined in step 2.

# 1 Consulting Engineering

The purpose of the Consulting Engineering competition is to challenge competitors to design a detailed solution to a large-scale engineering problem. The proposal must be made in a way that promotes the solution to the client (in the form of judges). Competitors must demonstrate resourcefulness while acting in good faith with the spirit of the competition.

## 1.1 Team Composition

The Consulting Engineering team will be comprised of four competitors. At least half of the design team must be representing an accredited engineering program at an active CFES-member school.

## 1.2 Topic

It is recommended that the topic incorporate more than one engineering discipline. However, while the topic should challenge competitors' technical knowledge and skills, it should also require competitors to evaluate the economic, environmental, political and social implications of their proposed solutions and address the requirements of the customer. The winning solution will not necessarily be the most technically effective solution, but the solution that has the most real-world applicability and forethought.

Therefore, the topic should be one that could exist in the real world. Topics drawn from reality must be fully documented. All necessary documentation must be provided to the competitors when the problem is presented.

## 1.3 Resources

### 1.3.1 *Facilities Required*

- 1 amphitheater (presentation of problem and team presentations)
- 1 workroom per team (design of solution)
- Simultaneous translation equipment (if judges are not bilingual)

### **1.3.2 Personnel Required**

#### *1.3.2.1 Judges*

A minimum of three (3) judges (and in any excess, an odd number of judges) are required to assess the problem solving abilities, proposed solution, communication skills and team dynamics of the competitors. Judges in this category should come from a variety of backgrounds including communications, sales and technical or consulting engineering experience related to the topic.

#### *1.3.2.2 Director*

The competition director is responsible, along with the VP Competitions, for the design and implementation of the Consulting Engineering competition. The director must present the design problem at the beginning of the competition and answer any questions raised by competitors. Only the director may answer questions during the design period. The director will also answer any questions the judges may have during the competition.

#### *1.3.2.3 Official Timekeeper*

The Official Timekeeper must be responsible for enforcing time limits during the question period, solution development and presentations, as stated in the rules.

### **1.3.3 Equipment Provided by CEC**

The following equipment will be made available to all competitors during the design phase:

- A design room with at least one table, four chairs and a whiteboard or blackboard
- Paper and pencils/pens for writing
- a method to submit the team presentation
- Internet Connectivity
- Some information relevant to the design problem, at the discretion of the competition director

The following equipment will be available to teams during the presentation phase:

- 1 Digital projector
- 1 computer containing the team's presentation file
- Simultaneous translation equipment if judges are not bilingual
- Whiteboard(s) or blackboard(s)

### **1.3.4 Allowed External Resources**

The competitors are allowed to bring the following equipment with them:

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
  - Please check with the organizers to make sure the format of your electronic information will be accessible using the computers provided by CEC
- Any textbooks, course notes or other reference material
- Each team member is allowed one computer.

**Note:** Since the use of the Internet and other external resources is permitted in this competition, all information used by competitors must be referenced very carefully. Competitors are not permitted to submit work completed by anyone other than the members of their team. If there is any evidence that competitors are submitting plagiarized work, the entire team will be eliminated from the competition and their home schools will be notified. Volunteers will monitor each team during the design process to deter teams from cheating, however, competitors are expected to act in good faith with the spirit of the competition.

## **1.4 Procedure / Timeline**

### **1.4.1 Pre-Competition**

At least seven days (168 hours) prior to the competition, the main theme(s) of the competition will be announced to the competitors, judges and public. Exact specifications of equipment available to teams during the competition (computers storage devices, available programs, etc.) will also be announced at this time.

### **1.4.2 Competition**

#### **1.4.2.1 Presentation of Problem**

The problem must be presented to all competitors and judges at the beginning of the competition. The competition director must provide detailed explanations of what is expected from the competitors, both orally and in writing.

#### *1.4.2.2 Question Period*

Competitors then have 15 minutes to ask the competition director any questions. Only the time used to ask the questions (not the answers) should be counted in the 15 minutes. Time used by judges to pose questions will not be counted.

#### *1.4.2.3 Solution Development*

Teams will be given 4-8 hours (at the discretion of the organizers, length to be given to competitors at least seven days in advance) to develop their solutions, produce all required deliverables, and prepare their presentations. All deliverables shall be submitted to the competition director before the end of the allotted time. Competitors may finish before the end of the allotted time.

#### *1.4.2.4 Rest Period*

Competitors must be allowed a minimum of one hour to rest before the presentation phase starts.

#### *1.4.2.5 Solution Presentations*

Competitors will have a maximum of 20 minutes to present their solutions. All team members must be present and participate in the presentation or be penalized by the judges. Judges then have a maximum of 10 minutes to ask questions. Judges can ask a question at anytime during the presentation. The clock should be stopped during these interruptions.

### **1.4.3 Timekeeping**

The following rules will be adhered to with respect to timekeeping.

#### *1.4.3.1 During the design phase:*

- Time is started when the teams leave the competition briefing.
- The remaining time must be announced 3 hours, 1 hour, 30 minutes, and 10 minutes before the end of the allotted time.

#### *1.4.3.2 During the presentation:*

- Time is halted when a judge asks a question during the presentation.
- Time is halted when a team member answers a question asked by a judge.
- The remaining time must be indicated to the competitors 10 minutes, 5 minutes and 1 minute before the end of the allotted time for the presentation to the judges.

- A countdown presentation that is visible to both the judges and presenters must be given during the last 30 seconds of the competition.

#### **1.4.4 Presentation Order**

- Presentation order shall be determined randomly.
- Presentation order shall be announced one half-hour before the presentations commence. All teams are required to be present at this announcement.
- Teams are not allowed to switch places in the presentation order.

#### **1.4.5 Deliverables**

##### *1.4.5.1 For Competitors*

Each competitor will electronically be given access to a package outlining the main themes of the competition 7 days in advance of the competition. This theme will also be posted on the official CEC website. It is the competitors responsibility to ensure that they have received the package.

Each team will receive, in hard copy, a package outlining the problem definition, design and presentation requirements, rules, marking scheme and any other information deemed necessary by the competition director on the day of the competition.

##### *1.4.5.2 From Competitors*

Each team is required to submit, electronically, before the end of the design period, a report of less than 10 pages (not including appendices) detailing their proposed solution. The report will be made available to the judges before each team's presentation. The report requirements will be outlined in the problem design package.

Each team is required to submit, electronically, before the end of the design period, a presentation about their proposed solution. The requirements of the presentation will be outlined in the problem design package.

#### **1.4.6 Response to Questions**

- Only the competition director may answer questions during the problem presentation and design phases. Volunteers and judges may not answer questions regarding rules and procedures at any time.
- During the presentation of the problem, the competition director shall answer orally and write down the answers provided.

- During the design phase, only questions related to deliverable content shall be answered. No answers shall be provided in response to questions about the problem that might lead to the development of a new approach or which might invalidate a solution.
- During the design phase, answers to questions shall be provided in writing to all teams at the same time. 15 minutes may be allowed to elapse for a significant number of questions accumulated before responses are provided. A copy of the responses must be provided to the judges prior to the presentations.

## 1.5 Assessment and Judging

- The panel must have an odd number of judges.
- The panel must have at least three (3) judges.
- The judges should be bilingual or the room equipped for simultaneous translation.
- The presentations shall be carried out without an audience.
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC.

### 1.5.1 Judging Matrix

<b>Solution</b>	Addresses problem statement Innovation Environmental, social, and economic analyses Technical feasibility Real-world applicability	<b>60%</b>
<b>Report</b>	Clarity, writing style and professionalism Deliverable compliance with expectations	<b>15%</b>
<b>Presentation</b>	Voice, articulation and timing Visual aids	<b>25%</b>
<b>Plagiarism or Insufficient Resource Citations</b>		<b>-50%</b>
<b>Documents received after deadline</b>		<b>-50%</b>
<b>Total</b>		<b>100%</b>



## 2 Engineering Communications

This competition challenges competitors to describe a complicated technical process or issue in terms that the general public can understand.

### 2.1 Team Composition

The Engineering Communication team will be comprised of one (1) or two (2) competitors. The whole team must be representing an accredited engineering program at an active CFES-member school.

Should the presenting team be a subset of a project team, the remaining members of the project team must sign a letter authorizing presentation of the project in order for it to be eligible for the competition. This letter must be submitted with the competition abstract if applicable.

### 2.2 Topic Eligibility

A topic should adhere to the following criteria:

- The topic must be technical in nature
- The presentation will assess social, environmental, political and economic ramifications of implementation

### 2.3 Resources

#### 2.3.1 Facilities Required

- 1 amphitheatre for presentations
- Simultaneous translation equipment (if judges are not bilingual)

#### 2.3.2 Personnel Required

##### 2.3.2.1 Judges

A minimum of three (3) judges are required to assess the communication skills of the competitors. Judges in this category should have some experience with communications and public speaking. Judges are not required to have any technical engineering experience. If there are more than three (3) judges, they must be odd in number.

### **2.3.2.2 Director**

The competition director is responsible for the implementation of the Engineering Communication competition. The director must be present at all of the presentations and be available to competitors and judges at any time for questions and requests.

### **2.3.2.3 Official Timekeeper**

The Official Timekeeper is responsible for enforcing time limits during the presentations. This role can be run jointly with the director.

## **2.3.3 Equipment Provided by CEC**

The following equipment will be available for use by the competitors during their presentations:

- 1 Digital projector
- Microphone(s) for simultaneous translation if judges are not bilingual
- 1 table
- Blackboard(s) or whiteboard(s)
- computer

## **2.3.4 Allowed External Resources**

Competitors are required to bring any presentation materials which they will use, including computers, pictures or diagrams and models or prototypes. A computer will also be made available should competitors be unable to supply their own.

# **2.4 Procedure / Timeline**

## **2.4.1 Pre-Competition**

At least fourteen (14) days (336 hours) prior to the competition, the team must submit a presentation abstract. The abstract will be reviewed by the Competition Director to assess the suitability of the presentation for inclusion in the Engineering Communication competition. It will be given to the judges for information at least seven (7) days (168 hours) prior to the competition. The abstracts will also be distributed to all CEC competitors upon arrival at the competition.

The abstract must describe the presentation topic in no more than 200 words. It must also state the competitor name(s), school and regional competition attended (OEC, QEC, WEC, AEC).

## **2.4.2 Competition**

### **2.4.2.1 Presentation Period**

Competitors have thirty (30) minutes to present the topic in detail, explained in terms that the public can understand. They must also present the technology's environmental, social, economic and other impacts, and whether these impacts are positive or negative. Lastly, the competitors must give a critical discussion of the technology and associated issues.

### **2.4.2.2 Question Period**

The judges then have a maximum of fifteen (15) minutes to ask questions. If time permits, the audience may also be allowed to ask questions.

## **2.4.3 Timekeeping**

The following rules will be adhered to during the presentation.

- The time must be stopped when a judge asks question during the presentation period.
- The time must be stopped while a team member responds to a question asked by a judge during the presentation period.
- The remaining time must be indicated to the competitor(s): 20 minutes, 10 minutes, 5 minutes, and 1 minute before the end of the presentation.
- A visual countdown must be given during the last 30 seconds of the presentation.
- The timing of the question period after the presentation shall be for information purposes only.

## **2.4.4 Presentation Order**

- The order of the presentations shall be determined randomly.
- Competitors shall be informed of their presentation time at least twelve (12) hours in advance.

## 2.4.5 Deliverables

### 2.4.5.1 Presentation Abstract

Prior to the competition, the team must submit a presentation abstract. The purpose of this abstract is for the judges and organizers to be prepared.

The abstract must be a maximum of two hundred 200 words describing the presentation topic. It must also state the competitor name(s), school and regional competition (OEC, QEC, WEC, AEC).

### 2.4.5.2 Presentation Slides

Competitors must supply a soft copy of their presentation to the Competition Director at least 7 days prior to the day of the competition. The director may assign the due date at their discretion to allow time for testing the presentation and printing hardcopies. These slides will be used to aid the judges in keeping notes and providing feedback when necessary and desired.

## 2.5 Assessment and Judging

- Judges should have experience in communications.
- Judges do not require any technical knowledge on the subjects being presented.
- The panel must have an odd number of judges.
- The panel must have at least three judges.
- Judges should be bilingual or the room equipped for simultaneous translation.
- The assessment shall be carried out in the audience's presence.
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC.

### 2.5.1 Judging Matrix

<b>Introduction to topic</b>	Topic clearly presented Appropriate level of language Interest elicited by topic Accuracy of explanation	25%
<b>Critical analysis</b>	Environmental, social, economic, and other analysis Quality of arguments	30%
<b>Presentation</b>	Voice and articulation Visual aids Timing	40%
<b>Written Abstract</b>		5%
<b>Total</b>		<b>100%</b>

## 3 Extemporaneous Debate

Competitors must use analytical techniques to present, with minimum preparation, a reasoned point of view of a resolution that has not been disclosed beforehand. The goal is to assess the competitors' abilities to convey ideas and develop arguments. The purpose is not to assess competitor knowledge of parliamentary procedure and formal debating rules. Therefore, the rules normally used in debates have been modified and relaxed to enable students with no formal debate experience to take part.

The debate will be conducted in a shortened Canadian National Style debate format.

### 3.1 Team Composition

A debate team must consist of two members. Both team members must be enrolled in an undergraduate engineering program in an active CFES member school.

### 3.2 Resources

#### 3.2.1 Facilities Required

- 2 amphitheaters
- 2 rooms for judges' deliberation
- rooms for debater's preparation

#### 3.2.2 Personnel Required

##### 3.2.2.1 Judges

A minimum of three judges per room are required to assess the problem solving abilities, proposed solution, communication skills and team dynamics of the competitors. If there are more than three judges, an odd number must be maintained. Judges in this category should come from a variety of backgrounds. It is not necessary for judges to have technical experience relating to the topic, but it is suggested that judges have knowledge and/or experience in debating.

### *3.2.2.2 Competition Director*

The Competition Director and VP Competitions are responsible for the entire implementation of the Debate competition. The Director must work with the Mediator in developing the debate topics, schedule and overall competition procedure. It is recommended that the Director have previous experience in debates, preferably at the Canadian Engineering Competition or a regional competition.

### *3.2.2.3 Debate Mediator/Debate Chair*

The Debate Mediator, otherwise known as a Debate Chair, is the expert in debate procedure and interpretation. The Mediator acts as an impartial judge and ensures that the judges understand the rules of the debate.

The Chair of the debate ensures the rules of the debate are upheld. He or she grants the right to speak (introduces the debater) and enforces the time limits. Most importantly, the Chair makes rulings on the “points of procedure” put forward by the debaters. The decisions of the Chair are final.

### *3.2.2.4 Timekeeper*

The timekeeper is responsible for ensuring that competitors stay within their allotted time limits. The timekeeper will inform speakers of specific time intervals.

The Timekeeper will use hand signals to indicate the number of minutes a speaker has left to conclude their argument. The Timekeeper will also give a fifteen (15) second final countdown. If a question is asked in the first or last minute of the speech, the Timekeeper will indicate this to the Chair so that it can be stopped. If a member of the debater team knocks on the table during the final fifteen (15) seconds, the Timekeeper will permit an extra and final fifteen (15) seconds of grace.

## **3.2.3 Equipment Provided by CEC**

- 1 display board, projector, chalkboard or whiteboard is required to display the debate topic during the debate
- 1-3 stopwatches (a stopwatch for each speaking team is optional but encouraged)
- 2 tables
- 1 podium with microphone
- 1 microphone for each team table and 1 for judging table, to total 3 microphones
- Simultaneous translation equipment

The layout of the amphitheatre should place the tables and podium at the front of the room. The first row of the amphitheatre will be reserved for the judges, moderator and timekeeper. This should be completed to allow for a preparation room for the opposition.

### **3.2.4 *Allowed External Resources***

External resources such as stopwatches, writing pads and other tools are allowed at the discretion of the debate mediator and judges. Props and any other external resources except those expressly mentioned previously are prohibited.

## **3.3 Debating Rules and Elements**

### **3.3.1 *Teams***

The debate is between two teams, each with two members. The proposition will be given the task of presenting an initial set of ideas and arguing their validity. The opposition will then proceed to show how these ideas are undesirable. Before the resolution is revealed, a coin toss is held. The team that wins the toss gets to pick the side that they want to represent. Teams are expected to act responsibly at all times. Inappropriate language or offensiveness towards the other team, the officials, or the audience is not acceptable. Teams are expected to direct all of their speeches towards the audience.

### **3.3.2 *Resolutions***

The resolutions will be assigned by the organizing committee and will be validated by the Debate Chairs before the competition begins. They will be related to an issue that the average engineering student should have a defensible opinion on without any preparation. The resolutions will not be truisms. Absolute words such as "all," "everyone," and "always" will also be avoided (eg, "Be it resolved that all engineers are good at math" is not a good resolution, since there are always exceptions). Once both teams are informed of the resolution, they are given ten minutes to prepare for the debate.

### 3.3.3 Time Allotted to Debaters

The speaking order and times will be as follows:

- First speaker of the proposition: 5 minutes
- First speaker of the opposition: 5 minutes
- Second speaker of the proposition: 5 minutes
- Second speaker of the opposition: 5 minutes
- Rebuttal by the first speaker of the opposition: 2 minutes
- Rebuttal by the first speaker of the proposition: 2 minutes

If a debater is over the time limit, the Chair will allow a fifteen (15) second grace period. Upon the exhaustion of speaking time, loud pounding on tables will be deemed appropriate.

### 3.3.4 Role of the Proposition

The proposition must narrow down the resolution so that the debate will be about one major topic. The resolutions must not be squirreled or converted into truisms. Squirreling is the act of redefining the resolution so that it has a meaning different than the one intended by the resolution. The proposition must also avoid specific knowledge debates where the average engineer has no familiarity with the topic. The proposition can follow one of two different strategies in the debate:

#### 3.3.4.1 The Principle Case

In a principle case, the proposition presents a principle and a contention. The principle is a general statement that is debatable based on facts, experience, or morals. Examples include "engineers need to be well rounded" and "Canadians abuse the free health-care system." The contention is the application of the principle to a particular situation relating to the resolution. The contention must be about one major topic and may be a restatement of the resolution. Example contentions for the above principles would be: "Engineering students should be required to take more complementary studies classes" and "People should be discouraged from going to a doctor unless necessary."

#### 3.3.4.2 The Plan Case

In a plan case, the proposition still identifies a principle and a contention. Once this is done, they present a plan for implementing the contention and changing the status quo. They must identify the need for change and how the plan will induce this change. Example plans for the above contentions would be: "Students should be required to take two years of general studies before



entering an engineering program” and “Individuals should be charged a fee every time they visit a doctor.”

The plan case is the most effective when the principle and contention are almost non-debatable. For example, if the resolution is “Be it resolved that waste management should become more stringent,” the contention is almost unquestionable. However, the proposition can intensify the debate by adding, “Thus, we propose that any household that produces more than a certain quota of waste be severely fined.” In a plan case, it is important that the plan does not become too specific since preparation time is limited and the technical knowledge necessary to develop the plan is non-existent.

### ***3.3.5 The First Speaker***

The first speaker of the proposition must explain the interpretation of the resolution, clearly state the principle and contention, and clarify any definitions. If a plan case is introduced, the entire plan must be outlined in the first speaker's speech. Finally, the first speaker must initiate the argumentation for the contention and plan.

### ***3.3.6 The Second Speaker***

The second speaker of the proposition continues the argumentation of the first speaker and reaffirms concepts that have been attacked by the opposition. New parts of a plan may not be introduced and terms in the resolution may not be defined. New lines of argumentation and new evidence, however, may be introduced.

### ***3.3.7 Role of the Opposition***

The opposition's task is to convince the judges that the proposition's views are fallacious. If the case presented by the proposition is a truism or requires specific knowledge to debate, the opposition can point this out in their first speech and will be rewarded accordingly by the judges. If the point is well taken, then the opposition must redefine the resolution in a debatable manner. If the proposition presents a principle case, the opposition is left with little more to do than attack the principle. If the proposition presents a plan case, the opposition can attack the principle, the contention or the arguments for the plan. The opposition can also show how the plan will not work or identify the undesirable side effects that it will create. Finally, the opposition may propose a counter plan that is more effective than the original plan. The first speaker of the opposition must introduce counter plans.

### **3.3.8 Rebuttals**

In the rebuttals, the most prevalent elements of the debate must be summarized in a concise and convincing manner. Excluding the first rebuttal of the opposition, no new arguments or facts may be presented unless they directly refute what has already been discussed.

### **3.3.9 Questions**

Questions are a secondary means of refuting arguments. They can promptly point out deficiencies in ideas. The debater who currently holds the floor has the authority to take or ignore questions. The opponent who wishes to ask a question indicates their desire by simply standing up. If the debater does not wish to take the question, he or she can so indicate by a wave of the hand or a simple "no, thank you." If this occurs, the inquiring party must sit down. If the current debater wishes to entertain the question, it must be stated by the opponent in less than 15 seconds. Both team members may take part in answering the question. The time used to ask and answer the question comes out of the current debater's allotted time. Each debater must accept one question during his or her speech, if the opponent is making an honest attempt to ask a question. Three attempts at asking a question in one speech constitutes an honest attempt. Questions will not be allowed in the first or last minute of a speech, or during rebuttals.

### **3.3.10 Heckling**

Often, the speaker can contradict himself/herself or make an absurd assumption. Heckling at this time will point out the error and add to the debate. Heckling is acceptable if it is short, to the point and preferably witty. If excess heckling becomes disturbing, the Chair may intervene.

### **3.3.11 Points of Procedure**

If a team believes that one of the rules of the debate have been broken, they must immediately alert the Chair of the violation by standing and saying "Point of Procedure." The Chair will then respond with, "Make your point." The team will then proceed to explain how the debate rules have not been followed. Finally, the Chair will rule on the point by saying, "Point well taken" or "Point not taken." If it is obvious that the Chair is incorrect, the team should not argue with the Chair, but expect the judges to compensate for the Chair's shortcomings. The time it takes to rise and rule on a point is not included in the speaking time of the team currently debating. The following are violations that warrant a point of procedure:

- unprofessional behavior;
- offensive behavior;
- misquotations;
- speaking to the opposition instead of the audience;
- presenting new arguments in the rebuttal;
- introduction of parts of a plan by the second speaker.

(\*If the proposition has presented a truism or specific knowledge case, the opposition must wait until the end of the first debater's speech to point this out.) Moreover, if the officials have failed to follow the rules of debate (incorrect speaking order, too much speaking time allowed, etc.), it may be politely pointed out to them with a Point of Procedure.

Points of procedure are commonly seen to detract from a debate when offered incorrectly. Points of procedure which take away from the flow of a debate unnecessarily will be penalized by the judges.

## **3.4 Procedure / Timeline**

### **3.4.1 Pre-Competition**

These rules are to be made available to all competitors and judges at least 1 month prior to the competition.

A competition briefing will be held before the commencement of the competition and will include the debate moderators/chairs, timekeeper, Competition Director, VP Competitions, judges and competitors. The debate moderators/chairs will run the briefing and review the rules, tips and expectations for the debates. The purpose of the briefing is not to elude to potential debate

topics, but to ensure that all rules and procedures are understood by judges and competitors. There is no timeline for this briefing and questions may be fielded at the discretion of the debate moderators and Competition Director.

### **3.4.2 Presentation Order**

The debate schedule will be prepared at random and presented at the pre-competition briefing (at least thirty (30) minutes prior to the first debate). This schedule will remain visible and updated systematically throughout the Debates competition. The schedule should also illustrate the path which a team will follow depending on wins and losses.

### **3.4.3 Double Elimination**

The debate competition will follow a double elimination format which ensures all teams will get to participate in at least 2 debates. The competition begins with matches between randomly assigned pairs of teams. Once each team has debated once, the losers from the matches will face each other in a second "tree". (Note, in the case of an odd number of teams, all but one team will debate before the second tree commences.) The debates then proceed in the same format with the first tree being those teams that have not lost a match, and the second tree for those that have lost a single match. Once a team has lost 2 matches, they are out of the competition. The final match is between the top teams from each tree, and the third place team is the one with the most wins that didn't make it to the final.

Teams may have to debate two or more times in a row, due to the dynamic nature of the format, however the Debate Director should do their best to ensure teams are given reasonable breaks between debates. Double elimination is used to ensure a minimum level of team participation, therefore if a team proceeds unbeaten until the final round, only to lose to another team, there will not be an additional final debate.

Please see the graphics below for sample breakdowns for 8 and 9 team debate competitions, where the number signifies the match number and Lx denotes the losing team of match number x.



## 3.5 Assessment and Judging

### 3.5.1 Judging

The debate is judged based upon the most convincing argument. Each judge will decide individually and the debate chair will tally the decisions and announce the winner. The winning team will then move to the next round.

### 3.5.2 Feedback

Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC.

## 4 Innovative Design

The innovative design competition is prepared entirely outside the realm of the Canadian Engineering Competition. Competitors choose their own topic, prepare research and develop a design. The designs must be new and innovative and address a void in society.

### 4.1 Team Composition

The innovative design team may be comprised of one to four competitors. At least half of the design team must represent an accredited engineering program at an active CFES-member school. The whole team must be in the Engineering Faculty (or equivalent) at a CFES-member school.

Should the presenting team be a subset of the project team, the remaining members of the project team must sign a letter authorizing the presentation of the project in order for it to be eligible for the competition.

### 4.2 Topic/Project Eligibility

The topic should adhere to the following criteria:

- The project must be technical in nature
- The project must have a design component
- The project must assess social, environmental and economic ramifications of implementation

While the above list provides a guideline to project selection, no projects will be disallowed due to the topic selection. The judging criteria provide a component which analyses the applicability of the project's topic.

### 4.3 Resources

#### 4.3.1 Facilities Required

An exhibition hall is required to allow competitors to set up displays and perform presentations for the judges. This hall should be in a central location and must be open to the public during the competition.

### 4.3.2 Personnel Required

#### 4.3.2.1 Judges

A minimum of five judges are required to assess the skills, abilities, and topics of the competitors.

#### 4.3.2.2 Director

The competition director is responsible for the logistics and implementation of the Innovative Design competition. The director must be available to competitors and judges at any time for questions and requests.

#### 4.3.2.3 Official Timekeeper

The Official Timekeeper is typically the Director who enforces the time limits and the rules governing the displays.

### 4.3.3 Equipment Provided by CEC

The following equipment will be made available to all competitors during the competition time period:

- A single standard banquet table (8' x 2 1/2' or larger)
- Electrical power supply for each team
- Internet source (LAN or Wireless)

### 4.3.4 Allowed External Resources

There is no restriction on the resources which competitors are allowed to bring to the competition. A list of resources must be provided to the Competition Director in accordance with Section 4.4.1.

## 4.4 Procedure / Timeline

### 4.4.1 Pre-Competition

20 days (480 hours)	<p><b>Competition Brief</b></p> <ul style="list-style-type: none"> <li>▪ A one page competition brief, detailed in Section 4.4.5 (Deliverables).</li> </ul> <p><b>Announcement of Constraints</b></p> <ul style="list-style-type: none"> <li>▪ Space constraints and other logistical constraints must be described to the competitors (maximum display dimensions, maximum display height, use of flammable or dangerous products prohibited, etc.).</li> </ul>
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	<ul style="list-style-type: none"> <li>Location where all display material, models and equipment will be shipped to and stored must be announced.</li> </ul>
<b>10 days (240 hours)</b>	<p><b>Layout and Specific Needs</b></p> <p>Competitors must convey the following information to the Competition Director:</p> <ul style="list-style-type: none"> <li>Any specific needs (layout, electrical, power supply, etc.).</li> <li>A sketch of the anticipated layout, including placement of the display board and any equipment or models.</li> <li>The planned shipping modes of displays or equipment including arrival time.</li> </ul>
<b>12 hours</b>	<p><b>Set-up</b></p> <ul style="list-style-type: none"> <li>Competitors set up their displays the evening before the display. Compliance with the dimension constraints are checked at the same time.</li> </ul> <p><b>Competition Briefing</b></p> <ul style="list-style-type: none"> <li>The Director will host a competition briefing, attended by the competitors and judges, where details of the competition timeline and judging structure are discussed. There will be time allowed for questions.</li> <li>At the briefing, each team will be asked for a copy of their presentation handouts (Section 4.4.5)</li> </ul>

## 4.4.2 Competition

### 4.4.2.1 Public Opening

The exhibitions are open for visits from the general public. Competitors must staff their displays for a minimum of 4 hours a day, including 2 hours during judging periods. Judging periods are to be indicated during the competition briefing.

### 4.4.2.2 Judging

The judges, either individually or in groups of not more than three, will walk among the displays during the judging period. The competitors must give a 20-minute presentation, followed by a 10-minute question period, at their displays. They must use only the resources at their display to illustrate their work. Competitors will be required to give their presentation more than once as each judge must see all displays, but not at the same time.

## 4.4.3 Timekeeping

The following rules govern timekeeping:

- Time is not halted when a judge asks a question during the presentation.

- The remaining time must be indicated to the competitors ten (10) minutes, five (5) minutes, and 1 minute before the end of the allotted time for the presentation.
- A visual countdown must be given during the last 30 seconds of the presentation.
- Time to both ask and answer questions during the question period is counted.

#### **4.4.4 Presentation Order**

Presentation order will be chosen and presented at the competition briefing. The order will be selected at random, adhering to the following criteria:

- The judges may view the presentations either individually or in small groups of up to three people.
- Competitors will be required to give their presentation more than once.
- The order should allow all the judges to visit all the displays.
- The order shall prevent the judges from visiting the displays in the same order.

#### **4.4.5 Deliverables**

##### *4.4.5.1 Design Summary*

Prior to the competition, the team must submit a design summary. The purpose of this summary is for the judges and organizers to be prepared ahead of time with regard to the topics.

This summary will follow conventional formatting characteristics (12 point font, 1.5 line spacing, 1" paper margins) and is limited to one (1) page. The summary must include, but is not limited to:

- Team Name
- Team Members
- School / Regional Competition (AEC, OEC, QEC, WEC)
- Design topic and description

##### *4.4.5.2 Presentation Handouts*

If a slideshow presentation is to be utilized, a hard copy of all slides must be prepared for each judge. The page layout must include 3 slides per page with space for notes.

### **4.5 Assessment and Judging**

- The panel must have an odd number of judges.

- The panel must comprise a minimum of five judges. There is no maximum number of judges.
- The judges must be bilingual or simultaneous translation shall be provided.
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC.

#### 4.5.1 Judging Matrix

<b>Project</b>	Design justification Environmental and social feasibility Economic feasibility Technical feasibility Innovation	<b>70%</b>
<b>Presentation</b>	Visual aids  Voice and articulation  Timing	<b>20%</b>
<b>Written Abstract</b>		<b>10%</b>
<b>Total</b>		<b>100%</b>

## 5 Junior Team Design

This competition challenges junior engineering students to design and build a prototype to address a technical problem. The Team Design category is similar to the Senior Team Design competition, but emphasis is placed on prototype functionality rather than design theory.

### 5.1 Junior Team Composition

The design teams must be comprised of a maximum of four competitors. At least half of the design team must represent an accredited engineering program at an active CFES-member school. The whole team must be enrolled in a program found in the Faculty of Engineering (or equivalent) at a CFES-member school. The team must be entirely comprised of students in their 1<sup>st</sup> or 2<sup>nd</sup> year of an undergraduate, engineering program.

### 5.2 Resources

#### 5.2.1 Facilities Required

- 1 amphitheater (presentation of problem and team presentations)
- 1 large workroom, subdivided with partitions for each team or 1 separate workroom per team
- 1 centralized competition presentation/testing space (location will depend on the constraints of the design problem)
- Simultaneous translation equipment (pending bilingual judges)

#### 5.2.2 Personnel Required

##### 5.2.2.1 Judges

A minimum of five judges are required to assess the problem solving abilities, efficacy of solutions and team dynamics of the competitors. Judges in this category are not required to have a technical background, however, an understanding of effective presentation techniques and other engineering 'soft' skills are an asset.

##### 5.2.2.2 Director

The competition director is responsible, along with the VP Competitions, for the entire design and implementation of the Team Design competition. The director must present the design problem at the beginning of the competition and answer any questions. Only the director may

answer questions during the design period. The director will also answer any questions the judges may have during the competition.

#### *5.2.2.3 Official Timekeeper*

The Official Timekeeper is responsible for enforcing time limits during the solution development period and the presentations.

### **5.2.3 Equipment Supplied by CEC**

1. The following equipment will be made available to all competitors during the design phase:
  - A design area with at least one table, four chairs and at least one of a whiteboard, chart paper or blackboard
  - Paper and pencils/pens for writing
  - Any materials and/or tools specific to the design problem
  - Power source if powered tools supplied
2. The following equipment will be available to teams during the presentation phase:
  - 1 table
  - Microphone(s) for simultaneous translation if judges are not bilingual
  - Whiteboard(s) or blackboard(s)

Each team member is allowed one computer.

**Note:** Since the use of the Internet and other external resources is permitted in this competition, all information used by competitors must be referenced very carefully. Competitors are not permitted to submit work completed by anyone other than the members of their team. If there is any evidence that competitors are submitting plagiarized work, the entire team will be eliminated from the competition and their home schools will be notified. Volunteers will monitor each team during the design process to deter teams from cheating, however, competitors are expected to act in good faith with the spirit of the competition.

### **5.2.4 Allowed External Resources**

Teams are allowed to bring their own powerpoint templates for use in the competition, to be checked and approved by competition directors. Templates may contain a theme with background images, school and other logos, as well as a basic slide layout containing titles. Slides are to have no content other than a title and theme. Templates will be collected at

registration time so they can be reviewed before the competition begins. Approved templates will be returned to competitors at the start of competition time.

## 5.3 Procedure / Timeline

### 5.3.1 Pre-Competition

Information about the rules of the competition will be sent to all competitors. A detailed competition timeline will also be provided as well as any background information which may be deemed necessary by the Competition Director.

### 5.3.2 Competition

#### 5.3.2.1 Presentation of Problem

The problem will be presented to all competitors and judges at the beginning of the competition. The Competition Director will provide detailed explanations of what is expected from the competitors, both orally and in writing.

#### 5.3.2.2 Question Period

Competitors then have fifteen (15) minutes to ask the Competition Director any questions they may have. Only the time used to ask the questions (not the answers) should be counted. The answers will be provided orally and recorded in written form.

#### 5.3.2.3 Development of the Solution

The teams will have 4-6 hours (at the discretion of the organizers, length to be given to competitors at least seven days in advance) to develop their solution, produce all required deliverables, and prepare their presentation for the judges. All the deliverables must be submitted to the Competition Director before the allotted time expires. Competitors may finish before the end of the allotted time.

#### 5.3.2.4 Rest Period

Competitors must be allowed a minimum of two (2) hours to rest before the presentation and testing phase starts.

#### 5.3.2.5 Presentation and Tests

Competitors have five (5) minutes to present their designs. All team members must be present and participate in the presentation. The original design, its rationale, a description of the design process, and a critique of the prototype are required presentation components. The judges then

have a maximum of ten (10) minutes to ask questions. The prototype will be available during the presentation.

Each team will then carry out a set number of tests of their design. The number and length of tests must be dictated by Competition Director during the presentation of the problem. The testing may be carried out directly after each team's presentation or after all presentations are complete, at the discretion of the Competition Director.

### **5.3.3 Timekeeping**

- Time is halted when a judge asks or answers a question while the problem is being presented.
- Only the time used to ask questions during the question period is counted, not the time used to answer questions.
- Time for the solution development period is started when all the teams have reached their work areas
- The remaining time for solution development must be announced 2 hours, 1 hour, 30 minutes, and 10 minutes before the end of the allotted time.
- The remaining presentation time must be indicated to the competitors 2 minutes and 1 minute before the end of the allotted time.
- A visual countdown must be given during the last 30 seconds of the presentation to the judges.
- After the 5 minute presentation time, the competitors will have a 15 second grace period to conclude their presentation before they are cut off to begin the question period.

### **5.3.4 Presentation Order**

- Presentation order shall be determined randomly.
- Presentation order shall be announced thirty (30) minutes before the presentations to the judges commence. All teams are required to represent themselves at this announcement.
- Teams are not allowed to switch places in the presentation order.

### 5.3.5 Deliverables

#### 5.3.5.1 From Competitors

Each team is required to submit a prototype of their design before the end of the design period. This design will be used to test the team's solution to the design problem.

No reports or presentation materials are required in the Team Design competition. Teams may use visual aids in their presentations if they so desire, however, emphasis should be placed on a clear explanation of the design and the functionality of the prototype. This is reflected in the judging criteria.

### 5.3.6 Response to Questions

- Only the Competition Director may answer questions during the problem presentation and design phases. Volunteers and judges may not answer questions regarding rules or procedures at any time.
- During the presentation of the problem, the Competition Director shall answer orally and write down the answers provided.
- During the design phase, only questions related to deliverable content shall be answered. No answers shall be provided in response to questions about the problem that might lead to the development of a new approach or that might invalidate a solution.
- During the design phase, answers to questions shall be provided in writing to all teams at the same time. A certain amount of time (e.g. 15 minutes) may be allowed to elapse or a significant number of questions accumulated before responses are provided. A copy of the responses must be provided to the judges prior to the presentations.

## 5.4 Assessment and Judging

- The panel must have an odd number of judges.
- The panel must have at least five judges.
- The judges should be bilingual or the room equipped for simultaneous translation.
- The assessment shall be carried out in the audience's presence.
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC.

### 5.4.1 Judging Matrix

Presentation	Design process	20%
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	Design justification Presentation delivery	
<b>Design Quality</b>	Deliverable compliance with expectations Technical innovation Use of Resources	<b>50%</b>
<b>Testing</b>		<b>30%</b>
<b>Total</b>		<b>100%</b>

## 6 Senior Team Design

This competition challenges competitors to design a solution and build a prototype to address a technical problem.

### 6.1 Team Composition

The Senior Design team will be comprised of a maximum of four competitors. At least half of the design team must be representing an accredited engineering program at an active CFES-member school. The whole team must be enrolled in a program within the Faculty of Engineering at a CFES-member school.

### 6.2 Resources

#### 6.2.1 Facilities Required

- 1 amphitheater (presentation of problem and team presentations)
- 1 workroom per team (design of solution and prototype construction)
- 1 competition/testing space (location will depend on the constraints of the design problem)
- Simultaneous translation equipment (dependant on bilingual judges)

#### 6.2.2 Personnel Required

##### 6.2.2.1 Judges

A minimum of five judges are required to assess the problem solving abilities, efficacy of solutions and team dynamics of the competitors. Judges in this category should have some technical engineering experience.

##### 6.2.2.2 Director

The competition director is responsible, along with the VP Competitions, for the design and implementation of the Senior Team Design competition. The director must present the design

problem at the beginning of the competition and answer any questions. Only the director may answer questions during the design period. The director will also answer any questions the judges may have during the competition.

#### *6.2.2.3 Official Timekeeper*

The Official Timekeeper is responsible for enforcing time limits during the solution development period and the presentations.

#### *6.2.2.4 Volunteers*

A minimum of five volunteers (one volunteer for every two teams plus one extra) are recommended to carry out various support tasks during the design period. A minimum of two volunteers are required during the presentation and testing phases.

### **6.2.3 Equipment Provided by CEC**

The following equipment will be made available to all competitors during the design phase:

- A design room with at least one table, four chairs and a whiteboard or blackboard
- Paper and pencils/pens for writing
- 1 digital storage device to submit the team presentation
- Any materials and/or tools specific to the design problem

The following equipment will be available to teams during the presentation phase:

- 1 Digital projector
- 1 computer to load presentations
- 1 table
- Simultaneous translation equipment
- Whiteboard(s) or blackboard(s)

### **6.2.4 Allowed External Resources**

The competitors are allowed to bring the following equipment with them:

- Any textbooks, course notes or other reference material.
- Digital Camera
- Each team member is allowed one computer.

- Any additional tools, equipment and/or software as deemed fit by the competition director so long as it is reasonable to expect all participants to have access to said tools, equipment and/or software.

Teams are allowed to bring their own powerpoint templates for use in the competition, to be checked and approved by competition directors. Templates may contain a theme with background images, school and other logos, as well as a basic slide layout containing titles. Slides are to have no content other than a title and theme. Templates will be collected at registration time so they can be reviewed before the competition begins. Approved templates will be returned to competitors on a flash drive at the start of competition time.

**Note:** Since the use of the Internet and other external resources is permitted in this competition, all information used by competitors must be referenced very carefully. Competitors are not permitted to submit work completed by anyone other than the members of their team. If there is any evidence that competitors are submitting plagiarized work, the entire team will be eliminated from the competition and their home schools will be notified. Volunteers will monitor each team during the design process to deter teams from cheating, however, competitors are expected to act in good faith with the spirit of the competition.

## 6.3 Procedure / Timeline

### 6.3.1 Pre-Competition

At least seven (7) days (168 hours) prior to the competition, the main theme(s) dealt with during the competition will be announced to the competitors via their provided email addresses. Moreover, they will receive a list of all required, optional or prohibited equipment, software, and/or tools.

### 6.3.2 Competition

#### 6.3.2.1 Presentation of Problem

The problem must be presented to all competitors and judges at the beginning of the competition. The competition director must provide detailed explanations of what is expected from the competitors, both orally and in writing.

#### 6.3.2.2 Question Period

Competitors have fifteen (15) minutes to ask the competition director any questions they may have. This takes place during the competition briefing, after the presentation of the problem.

Only the time used to ask the questions should be counted, not the time used to answer the questions.

#### *6.3.2.3 Development of the Solution*

The teams will have eight to ten (8 - 10) hours (at the discretion of the organizers, length to be given to competitors at least seven (7) days in advance) to develop their solution, produce all required deliverables, and prepare their presentation for the judges. All the deliverables must be submitted to the competition director before the allotted time expires. Competitors may finish before the end of the allotted time.

#### *6.3.2.4 Rest Period*

Competitors must be allowed a minimum of six hours to rest before the presentation phase starts.

#### *6.3.2.5 Presentation and Tests*

The presentation schedule will be posted exactly (30) minutes prior to the first presentation. All teams are required to be present at this time. Competitors have fifteen (15) minutes to present their designs. All team members must be present and participate in the presentation or be penalized by the judges. The original design, its rationale, a description of the design process, and a critique of the prototype must be presented. The judges then have a maximum of fifteen (15) minutes to ask questions.

Each team will carry out two tests of their design (or an alternate number of tests specific to the design problem, at the discretion of the competition director). The testing may be carried out directly after each team's presentation or after all presentations are complete, at the discretion of the Competition Director.

### **6.3.3 Timekeeping**

The following rules will be adhered to with respect to timekeeping.

During the problem presentation:

- Time is halted when a judge asks a question during the presentation of the problem.
- During the design phase:
- Time is started when all the teams have reached their work areas during development of the solution.

- The remaining time must be announced five (5) hours, one (1) hour, thirty (30) minutes, and ten (10) minutes before the end of the allotted time.

During the presentation and testing phase:

- Time is halted when a judge asks a question during the presentation.
- The remaining time must be indicated to the competitors five (5) minutes and one minute before the end of the allotted time for the presentation to the judges.
- A visual countdown must be given during the last thirty (30) seconds of the presentation to the judges. Presentations may not exceed the allotted time and will be cut-off promptly at the expiration of the visual countdown. Teams who are cut-off will be penalized.

#### **6.3.4 Presentation Order**

- Presentation order shall be determined randomly.
- Presentation order shall be announced and publicly posted thirty (30) minutes before the presentations to the judges commence. All teams are required to represent themselves at this announcement.
- Teams are not allowed to switch places in the presentation order.

#### **6.3.5 Deliverables**

##### *6.3.5.1 For Competitors*

Each competitor will receive, electronically, seven (7) days in advance of the competition, a package outlining the main themes of the competition and any materials and/or tools that will be provided to competitors during the competition.

At the competition briefing, each team will receive a package outlining the problem definition, background information, design and presentation requirements, rules, marking scheme and any other information deemed necessary by the competition director.

##### *6.3.5.2 From Competitors*

Each team is required to submit, electronically, before the end of the design period, a presentation about their design. The requirements of the presentation will be outlined in the problem design package.

Each team is required to submit a prototype of their design before the end of the design period. This design will be used to test the team's solution to the design problem.

### 6.3.6 Response to Questions

- Only the competition director may answer questions during the problem presentation and design phases. Volunteers and judges may not answer questions regarding rules, competition interpretation or procedures at any time.
- During the presentation of the problem, the competition director shall answer orally and write down the answers provided. The questions and answers will be distributed to all teams or posted conspicuously.
- During the design phase, only questions related to deliverable content shall be answered.

However, teams will be able to ask for clarifications of the rules which may invalidate a solution they are pursuing. Any and all rule clarifications will be recorded and distributed to all teams or posted in a conspicuous location as soon as they are answered. During the design phase, answers to questions shall be provided in writing to all teams at the same time. 15 minutes may be allowed to elapse for a significant number of questions accumulated before responses are provided. A copy of the responses must be provided to the judges prior to the presentations.

## 6.4 Assessment and Judging

- The panel must have an odd number of judges.
- The panel must have at least five judges.
- The judges should be bilingual or the room equipped for simultaneous translation.
- The assessment shall be carried out in the audience's presence.
- Competition directors will develop specific penalties for violations of rules, which will be provided to competitors in the competition briefing.
- Testing will be officially video-recorded to allow for fair resolution of any disputes.
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC.

### 6.4.1 Judging Matrix

<b>Presentation</b>	Design process Design justification Critique of the design Critique of the prototype Presentation delivery	<b>40%</b>
<b>Design Quality</b>	Deliverable compliance with expectations Technical innovation	<b>20%</b>

	Consideration of economic, social and environmental impacts of design Adherence to the spirit of the design problem	
<b>Testing</b>		<b>40%</b>
<b>Total</b>		<b>100%</b>

## 7 Re-Engineering

Re-engineering is the act of taking an existing engineering concept, product, technique, or technology and incrementally improving on its design to suit an alternate situation or application. In this competition, students will be required to apply the re-engineering process to an existing gadget or mechanism in order to add new functionality to it or enhance its original functionality. The intent of these improvements will be to extend the use of the device to an alternative situation or use case.

### 7.1 Team Composition

A team consists of either one or two eligible participants (see 1.5 for eligibility requirements).

### 7.2 Timeline/Procedure

#### 7.2.1 *Problem Presentation*

The first case set will be distributed to the competitors one week in advance of the competition start time. The second case set will be presented to the competitors on the competition start day but in advance of the competition start time. The lead time for this distribution will be sufficient to allow for the reading of case set and to allow for questions to be addressed, but should not exceed one hour. Competitors will not be permitted to start working towards a solution during the lead time period.

#### 7.2.2 *Case Structure*

The competition will consist of two sets of written cases (available in both English and French) that will prompt the competitors to apply the re-engineering process and propose a solution. The first case will be sent to the competitors one week in advance of the competition start time. Competitors will be required to propose a solution for the first case, using as much of the advance time as they feel necessary, by the end of the competition design time. The second case set will be distributed at the beginning of the competition design time and its solution will also be required by the end of the competition design time. The second case set will be related to the first case by requiring a reengineering of the first solution to accommodate new technologies or fit different situational constraints.



### **7.2.3 Question Period**

After the cases have been read by the competitors, the remainder of the lead time will be available for the competitors to ask questions of the judges and competition directors. Both English and French personnel will be available to translate and interpret questions and answers.

### **7.2.4 Design Period**

The competitors will be allowed a total of 8 working hours in order to work towards the solutions to their cases and prepare their required submission materials.

### **7.2.5 Addressing Questions**

During the design period, competitors will be able to ask questions of the competition directors by emailing an identified email account. Answers to all collected questions will be emailed to all competitors, along with the questions which they address, every half hour from the start of the design time. The competition director may elect to answer questions more often at any point in the competition.

### **7.2.6 Materials Provided**

The following materials and resources will be provided to the competition competitors: A design room with at least a table and functioning power outlets; pens and paper; internet access.

### **7.2.7 Materials Allowed**

Other supplementary materials and resources that competitors will be allowed to use include the following: two computers; USB storage; productivity software (i.e. Microsoft Office); an internet browser; any freely available internet sources; textbooks; class notes and materials; reference manuals.

### **7.2.8 Deliverables**

The competitors will be required to write a report for each of the cases they complete as well as prepare one presentation to address both cases in front of the judges. Competitors can also opt to combine both solutions into one report of the combined length if they feel this format better conveys their solutions.

### **7.2.9 Submission**

The two written reports and all presentation materials must be submitted immediately at the end of the design time. Submissions can be accepted either through emailing an identified email account or saving the files on a USB drive and physically handing it to the competition director. For the purposes of determining whether or not a submissions was submitted by the deadline: email submissions will be time-stamped against the receipt time reported by the receiving email server; physical submissions will be time-stamped against a time keeping device synced with the time-nw.nist.gov time reporting service.

### **7.2.10 Translation**

The competitors themselves will not be responsible for the translation of any of the submitted materials. The competition director will ensure the materials are properly translated for presentation to the judges.

## **7.3 Resources**

### **7.3.1 Facilities Required**

- 1 amphitheater (presentation of problem and team presentations)
- 1 workroom per team (design of solution)
- Simultaneous translation equipment (if judges are not bilingual)

### **7.3.2 Personnel Required**

#### **7.3.2.1 Judges**

A minimum of three (3) judges (and in any excess, an odd number of judges) are required to assess the problem solving abilities, proposed solution, communication skills and team dynamics of the competitors. Judges in this category should come from a variety of backgrounds including communications, sales and technical or consulting engineering experience related to the topic.

#### **7.3.2.2 Director**

The competition director is responsible, along with the VP Competitions, for the design and implementation of the Re-engineering competition. The director must present the problem at the beginning of the competition and answer any questions raised by competitors. Only the director

may answer questions during the design period. The director will also answer any questions the judges may have during the competition.

#### *7.3.2.3 Official Timekeeper*

The Official Timekeeper must be responsible for enforcing time limits during the question period, solution development and presentations, as stated in the rules.

### **7.3.3 Equipment Provided by CEC**

The following equipment will be made available to all competitors during the design phase:

- A design room with at least one table, four chairs and a whiteboard or blackboard
- Paper and pencils/pens for writing
- A method to submit the team presentation
- Internet Connectivity
- Some information relevant to the design problem, at the discretion of the competition director

The following equipment will be available to teams during the presentation phase:

- 1 Digital projector
- 1 Computer containing the team's presentation file
- Simultaneous translation equipment if judges are not bilingual
- Whiteboard(s) or blackboard(s)

### **7.3.4 Allowed External Resources**

The competitors are allowed to bring the following equipment with them:

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
  - Please check with the organizers to make sure the format of your electronic information will be accessible using the computers provided by CEC
- Any textbooks, course notes or other reference material
- Each team member is allowed one computer.

**Note:** since the use of the Internet and other external resources is permitted in this competition, all information used by competitors must be referenced very carefully. Competitors are not permitted to submit work completed by anyone other than the members of their team. If there is

any evidence that competitors are submitting plagiarized work, the entire team will be disqualified from the competition and their home schools will be notified. Volunteers will monitor each team during the design process to deter teams from cheating, however, competitors are expected to act in good faith with the spirit of the competition.

## **7.4 Written Report**

### **7.4.1 Content**

Each of the written reports is to include the following information: what the proposed changes are; how the proposed changes meet the requirements laid out in the case description; the technical characteristics of the proposed changes; any calculations which relate to the prior three points.

### **7.4.2 Length**

Each of the reports is not to exceed one side of a single page with a reasonable font size and margin limit; the minimum size for both attributes is 11pt font size and 2cm margins. The competitors may elect to shorten one of the reports and use the remaining space for their other report provided both reports are written end-to-end in a single document and the document does not exceed two single-sided pages. The competitors may also elect to write a single report to address both solutions as long it is clear from the structure of the report where each solution is described and the document itself does not exceed two single sided pages.

### **7.4.3 Appendix and Exhibits:**

Any necessary appendices and exhibits will not count against the above length limitations. Any such included appendices and exhibits however should be clearly referenced in the main text of the report and should not embed an excessive amount of text.

### **7.4.4 Citation**

All competitors are required to cite any outside sources on which the facts and statements in the report are based. Failure to cite all non-original statements will result in a penalty levied against the offending team.

## 7.5 Presentation

### 7.5.1 Content

The presentation should cover both of the completed cases and should present both the material included in the reports and any additional information and explanations required in order to meet the evaluation criteria below.

### 7.5.2 Prohibited Content

In order to ensure that all competitors cease to work on the case solutions once the design time has ended, the competitors cannot include any material in their oral presentation which is not included within their submitted written reports or presentation materials.

### 7.5.3 Equipment Provided

The competitors will be provided with the following materials during their presentation: a computer; a projector; PowerPoint software; a whiteboard or a large pad of paper.

### 7.5.4 Allotted Time

Each team will be allotted 15 minutes for their presentation.

### 7.5.5 Question Period

Following the presentation, each team will be required to answer questions asked by the judges for a period which will not exceed 10 minutes.

### 7.5.6 Presentation Order

The presentation order will be selected randomly and will be announced 30 minutes before the first presentation is to take place. All teams must be present for the announcement of the presentation order. Teams will not be allowed to change their own presentation order.

## 7.6 Evaluation

### 7.6.1 Evaluation Rubric

Teams will be evaluated according to the following grading rubric:

	Case 1	Case 2 or 3
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<b>Solution</b>	<b>65%</b>	
<b>Proposed Changes (functionality, utility)</b>	15%	8%
<b>Technical Characteristics (size, weight, power, fuel usage, materials, physical strength, etc.)</b>	12%	8%
<b>Innovation and Creativity</b>	5%	5%
<b>Commercial Feasibility (cost, production, marketability)</b>	3%	3%
<b>Overall Impact of Changes</b>	3%	3%
<b>Report</b>	<b>15%</b>	
<b>Report Organization</b>	2.5%	2.5%
<b>Writing Style</b>	2.5%	2.5%
<b>Content</b>	2.5%	2.5%
<b>Presentation</b>	<b>20%</b>	
<b>Confidence and Presence</b>	5%	
<b>Presentation Organization</b>	5%	
<b>Communication</b>	5%	
<b>Visual Aides</b>	5%	
<b>Insufficient Citation Penalty</b>	<b>(-25%)</b>	

**Revision Record**

Date	Revisions Made	Name	Position	Email
<b>22/08/07</b>	Full rules revision and update - CEC08 team	Erin Antcliffe	VP Competitions, CEC 2008	eantclif@engmail.uwaterloo.ca
<b>06/09/07</b>	Full revision	Stephanie Robinson	Co-Chair, CEC 2008	Stephanie.robinson@cec2008.ca
<b>4/09/07</b>	Formatting and a bit of content update	Brandon Malleck	Co-Chair, CEC 2008	Brandon.malleck@cec2008.ca
<b>18/09/07</b>	Add Eligibility Rules	Stephanie Robinson	Co-Chair, CEC 2008	Stephanie.robinson@cec2008.ca
<b>25/10/07</b>	Add Jean's and Patrick's comments	Brandon Malleck	Co-Chair, CEC 2008	Brandon.malleck@cec2008.ca
<b>25/10/07</b>	Add Sheena's and Dave's comments	Brandon Malleck	Co-Chair, CEC 2008	Brandon.malleck@cec2008.ca
<b>05/10/07</b>	As per conversation with Erin and Steph	Brandon Malleck	Co-Chair, CEC 2008	Brandon.malleck@cec2008.ca
<b>10/02/08</b>	Revisions based upon feedback from Regional Competitions, observations, and challenges in implementation	Erin Ancliffe, Brandon Malleck	VP Competitions, CEC 2008 Co-Chair, CEC 2008	erin.ancliffe@cec2008.ca brandon.malleck@cec2008.ca
<b>2011</b>	Changes from CEC 2011 committee and regional competitions	Courtney Lessard	Co-Chair, CEC 2011	cochairs@cec2011.ca
<b>24/09/11</b>	Comprehensive review and changes	Andrew Carne	VP Competitions, CEC 2012	competitions@cec2012.ca
<b>23/01/14</b>	Board approved rule changes. Reformat and rebranding for this year's theme. Appended Re-Engineering Rules.	Brandon McRae	VP Competitions, CEC 2014	competitions@cec2014.ca
<b>01/10/14</b>	Comprehensive review and changes	John Constantine	VP Competitions, CEC 2015	competitions@2015cec.ca
<b>13/01/16</b>	Comprehensive review and changes	Jeffrey Kirman	VP Competitions, CEC 2016	competitions@cec2016.com