



Canadian Engineering Competition 2021

Online Rulebook

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Table of Contents

1. General Rules and Definitions	1
1.1 Definitions	1
1.2 Eligibility	2
1.3 Qualification	2
1.4 Competitors	2
1.5 Project.....	2
1.6 Substitutions	3
1.7 Regulation Amendments	3
1.8 Violation of Competition Rules.....	3
1.9 School Anonymity	5
1.10 Online Delivery Format	5
2 Consulting Engineering	6
2.1 Team Composition.....	6
2.2 Topic	6
2.3 Language.....	6
2.4 Resources.....	6
2.4.1 Personnel Required	6
2.4.1.1 Judges	6
2.4.1.2 Director(s)	6
2.4.1.3 Official Timekeeper.....	7
2.4.2 Allowed External Resources	7
2.4.3 Plagiarism	7
2.5 Procedure / Timeline.....	7
2.5.1 Pre-Competition	7
2.5.2 Competition.....	7
2.5.2.1 Presentation of Problem	7
2.5.2.2 Question Period.....	7



2.5.2.3	<i>Solution Development</i>	7
2.5.2.4	<i>Rest Period</i>	8
2.5.2.5	<i>Solution Presentations</i>	8
2.5.3	Timekeeping	8
2.5.3.1	<i>During the design phase</i>	8
2.5.3.2	<i>During the presentation</i>	8
2.5.4	Presentation Order.....	8
2.5.5	Deliverables	9
2.5.5.1	<i>For Competitors</i>	9
2.5.5.2	<i>From Competitors</i>	9
2.5.5.2.1	<i>Report Specifications</i>	9
2.5.6	Response to Questions.....	9
2.6	Assessment and Judging.....	10
2.6.1	Judging Matrix.....	10
2.6.2	Penalty Matrix	10
3	Engineering Communications	11
3.1	Team Composition.....	11
3.2	Topic Eligibility	11
3.3	Language.....	11
3.4	Resources.....	11
3.4.1	Personnel Required	11
3.4.1.1	<i>Judges</i>	11
3.4.1.2	<i>Director(s)</i>	11
3.4.1.3	<i>Official Timekeeper</i>	11
3.4.2	Allowed External Resources.....	11
3.5	Procedure / Timeline.....	12
3.5.1	Pre-Competition	12
3.5.2	Competition.....	12
3.5.2.1	<i>Presentation Period</i>	12
3.5.2.2	<i>Question Period</i>	12
3.5.3	Timekeeping	12
3.5.4	Presentation Order.....	13
3.5.5	Deliverables	13



3.5.5.1	<i>Presentation Abstract</i>	13
3.5.5.1.1	<i>Abstract Specifications</i>	13
3.5.5.2	<i>Presentation Slides</i>	13
3.6	Assessment and Judging	13
3.6.1	Judging Matrix	14
3.6.2	Penalty Matrix	14
4	Extemporaneous Debate	15
4.1	Team Composition	15
4.2	Language	15
4.3	Resources	15
4.3.1	Personnel Required	15
4.3.1.1	<i>Judges</i>	15
4.3.1.2	<i>Director(s)</i>	15
4.3.1.3	<i>Debate Moderator</i>	15
4.3.1.4	<i>Timekeeper</i>	16
4.3.2	Allowed External Resources	16
4.4	Debating Rules and Elements	16
4.4.1	Teams	16
4.4.2	Resolutions	16
4.4.3	Time Allotted to Debaters	16
4.4.4	Role of the Government	17
4.4.4.1	<i>The Principle Case</i>	17
4.4.4.2	<i>The Plan Case</i>	17
4.4.5	The First Speaker of Government	18
4.4.6	The Second Speaker of Government	18
4.4.7	Role of the Opposition	18
4.4.8	The First Speaker of Opposition	18
4.4.9	The Second Speaker of Opposition	18
4.4.10	Rebuttals	19
4.4.11	Questions	19
4.4.12	Heckling	19
4.4.13	Points of Procedure	19
4.5	Procedure / Timeline	20



4.5.1	Pre-Competition	20
4.5.2	Presentation Order	21
4.5.3	Double Elimination	21
4.6	Assessment and Judging	21
4.6.1	Judging	21
4.6.2	Feedback	21
4.7	Judging	22
5	Innovative Design	23
5.1	Team Composition	23
5.2	Topic/Project Eligibility	23
5.3	Language	23
5.4	Resources	23
5.4.1	Personnel Required	23
5.4.1.1	<i>Judges</i>	23
5.4.1.2	<i>Director(s)</i>	23
5.4.1.3	<i>Official Timekeeper</i>	23
5.4.2	Allowed External Resources	24
5.5	Procedure / Timeline	24
5.5.1	Pre-Competition	24
5.5.1.1	<i>Twenty (20) Days Prior to CEC</i>	24
5.5.1.2	<i>Ten (10) Days Prior to CEC</i>	24
5.5.1.3	<i>Thirty (30) Minutes Prior to Presentation Period</i>	24
5.5.2	Competition	24
5.5.2.1	<i>Public Opening</i>	24
5.5.2.2	<i>Judging</i>	24
5.5.3	Timekeeping	24
5.5.4	Presentation Order	25
5.5.5	Deliverables	25
5.5.5.1	<i>Design Summary</i>	25
5.5.5.2	<i>Presentation</i>	25
5.6	Assessment and Judging	25
5.6.1	Judging Matrix	26
5.6.2	Penalty Matrix	26



6	Junior Design	27
6.1	Team Composition.....	27
6.2	Language.....	27
6.3	Resources.....	27
6.3.1	Personnel Required	27
6.3.1.1	<i>Judges</i>	27
6.3.1.2	<i>Director(s)</i>	27
6.3.1.3	<i>Official Timekeeper</i>	27
6.3.2	Equipment Supplied by CEC	27
6.3.3	Plagiarism	28
6.3.4	Allowed External Resources	28
6.4	Procedure / Timeline.....	28
6.4.1	Pre-Competition	28
6.4.2	Competition.....	28
6.4.2.1	<i>Presentation of Problem</i>	28
6.4.2.2	<i>Question Period</i>	28
6.4.2.3	<i>Development of the Solution</i>	28
6.4.2.4	<i>Rest Period</i>	29
6.4.2.5	<i>Presentation and Tests</i>	29
6.4.3	Timekeeping	29
6.4.3.1	<i>During the design phase</i>	29
6.4.3.2	<i>During the presentation</i>	29
6.4.4	Presentation Order.....	29
6.4.5	Deliverables	30
6.4.5.1	<i>From Competitors</i>	30
6.4.6	Response to Questions.....	30
6.5	Assessment and Judging.....	30
6.5.1	Judging Matrix.....	31
6.5.2	Penalty Matrix	31
7	Senior Design	32
7.1	Team Composition.....	32
7.2	Language.....	32
7.3	Resources.....	32



7.3.1	Personnel Required	32
7.3.1.1	<i>Judges</i>	32
7.3.1.2	<i>Director(s)</i>	32
7.3.1.3	<i>Official Timekeeper</i>	32
7.3.2	Equipment Provided by CEC	32
7.3.3	Allowed External Resources	32
7.4	Procedure / Timeline	33
7.4.1	Pre-Competition	33
7.4.2	Competition	33
7.4.2.1	<i>Presentation of Problem</i>	33
7.4.2.2	<i>Question Period</i>	33
7.4.2.3	<i>Development of the Solution</i>	33
7.4.2.4	<i>Rest Period</i>	34
7.4.2.5	<i>Presentation and Tests</i>	34
7.4.3	Timekeeping	34
7.4.3.1	<i>During the design phase</i>	34
7.4.3.2	<i>During the presentation</i>	34
7.4.4	Presentation Order	34
7.4.5	Deliverables	35
7.4.5.1	<i>For Competitors</i>	35
7.4.5.2	<i>From Competitors</i>	35
7.4.6	Response to Questions	35
7.5	Assessment and Judging	35
7.5.1	Judging Matrix	36
7.5.2	Penalty Matrix	36
8	Re-Engineering	37
8.1	Team Composition	37
8.2	Topic	37
8.3	Language	37
8.4	Resources	37
8.4.1	Personnel Required	37
8.4.1.1	<i>Judges</i>	37
8.4.1.2	<i>Director(s)</i>	37



8.4.1.3	<i>Official Timekeeper</i>	38
8.4.2	Equipment Provided by CEC	38
8.4.3	Allowed External Resources	38
8.4.4	Plagiarism	38
8.5	Procedure / Timeline.....	38
8.5.1	Case Structure	38
8.5.2	Pre-Competition	38
8.5.3	Competition.....	39
8.5.3.1	<i>Presentation of Problem</i>	39
8.5.3.2	<i>Question Period</i>	39
8.5.3.3	<i>Solution Development</i>	39
8.5.3.4	<i>Rest Period</i>	39
8.5.3.5	<i>Solution Presentations</i>	39
8.5.4	Timekeeping	39
8.5.4.1	<i>During the design phase</i>	40
8.5.4.2	<i>During the presentation</i>	40
8.5.5	Presentation Order.....	40
8.5.6	Deliverables	40
8.5.6.1	<i>For Competitors</i>	40
8.5.6.2	<i>From Competitors</i>	40
8.5.6.2.1	<i>Report Specifications</i>	41
8.5.7	Response to Questions.....	41
8.6	Assessment and Judging.....	41
8.6.1	Judging Matrix.....	42
8.6.2	Penalty Matrix	42
9	Programming.....	43
9.1	Team Composition.....	43
9.2	Language	43
9.3	Topic	43
9.4	Resources.....	43
9.4.1	Personnel Required	43
9.4.1.1	<i>Judges</i>	43
9.4.1.2	<i>Director(s)</i>	43



9.4.1.3	<i>Timekeeper</i>	44
9.4.2	External Resources Allowed.....	44
9.4.3	Software resources.....	44
9.4.4	Plagiarism.....	44
9.5	Procedure/Timeline.....	44
9.5.1	Pre-Competition.....	44
9.5.2	Competition.....	45
9.5.2.1	<i>Problem presentation</i>	45
9.5.2.2	<i>Question period</i>	45
9.5.2.3	<i>Solution development</i>	45
9.5.2.4	<i>Rest period</i>	45
9.5.2.5	<i>Solution Presentations</i>	45
9.5.3	Timekeeping.....	45
9.5.3.1	<i>During the design phase</i>	45
9.5.3.2	<i>During the presentation</i>	45
9.5.4	Presentation order.....	46
9.5.5	Deliverables.....	46
9.5.5.1	<i>For competitors</i>	46
9.5.5.2	<i>From competitors</i>	46
9.5.6	Response to Questions.....	46
9.6	Assessment and Judging.....	47
9.6.1	Judging Matrix.....	47
9.6.2	Penalty Matrix.....	48



1. General Rules and Definitions

1.1 Definitions

- 1.1.1. “Canadian Federation of Engineering Students” henceforth referred to as CFES, refers to the national association of undergraduate engineering student societies in Canada.
- 1.1.2. “Canadian Engineering Competition” henceforth referred to as CEC, is the annual CFES activity comprised of an undergraduate engineering competition outlined in this document.
- 1.1.3. “Regional Competition(s)” refer to the four (4) engineering competitions run annually across Canada which are as follows: the Atlantic Engineering Competition (AEC), the Quebec Engineering Competition (QEC), the Ontario Engineering Competition (OEC), and the Western Engineering Competition (WEC).
- 1.1.4. “Activity Manager” refers to the person in the role of overall coordinator/chair of the CEC.
- 1.1.5. “Organizing Committee” refers to the team who oversees and organizes the competition as a whole.
- 1.1.6. “CEC Advisory Board”, henceforth referred to as the CECAB, refers to the body that provides advice, guidance, and support to the CEC Organizing Committee and is the final ruling authority on issues that will affect more than one CEC.
- 1.1.7. “Vice President of Competitions” henceforth referred to as VP Competitions, or equivalent position refers to the role that oversees all the competition director(s) and all overarching responsibilities related to the competitions.
- 1.1.8. “Director(s)” refers to the role responsible for the specific competition within a competition section of the rulebook. The director(s) is appointed or chosen by a process set forth by the Activity Manager. The director(s) are the primary means of contact for competitors, judges and a liaison between the organizing committee.
- 1.1.9. “Rules Violation Appeals Committee” is a committee to which competitors can appeal a decision regarding (a) rule violation(s) and is defined in Section 1.8 (Violation of Competition Rules).
- 1.1.10. “Appendices” refer to sections at the end of a report containing information that supports the document, including tables, graphs, figures, photos, drawings, etc. An appendix should not include new information or body text. All body text is to be in the report itself.



1.2 Eligibility

- 1.2.1 The VP Competitions determines the eligibility of all competitors, teams, and projects according to the following guidelines set out in this rulebook.
- 1.2.2 The VP Competitions may grant exceptions to the guidelines set out in this rulebook, while honoring the spirit of these guidelines.

1.3 Qualification

- 1.3.1 The competitors must have qualified through one of the four regional competitions (AEC, QEC, OEC, or WEC) or through an alternative qualification method determined by the CEC Organizing Committee. A team must qualify by placing first or second in their category. If the first or second place teams are unable to attend CEC, the third-place team from the same region will be invited to attend CEC.

The teams at any regional competition that are moving on to CEC must be composed of members representing the same active member school of the CFES in order to receive an invitation to CEC.

1.4 Competitors

- 1.4.1 All competitors must have completed or be enrolled in an undergraduate engineering program at a CFES member school. Students who have completed their undergraduate degree are only eligible to compete as long as their graduation was no greater than six (6) months before the commencement of CEC.

1.5 Project

- 1.5.1 Only original projects, which are the work of the competitors, may be entered. An original project is one that has not, in previous years, been entered in the Atlantic Engineering Competition, the Quebec Engineering Competition, the Ontario Engineering Competition, the Western Engineering Competition, or the Canadian Engineering Competition. The project must not have a common or obvious approach, solution, or application.
- 1.5.2 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.



1.6 Substitutions

- 1.6.1 The team appearing at the CEC must be comprised of the whole original team as it competed at its respective regional competition.
- 1.6.2 If a competitor is unable to attend the competition due to medical, personal, or other legitimate reasons, the team may compete in their 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.
- 1.6.3 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.

1.7 Regulation Amendments

- 1.7.1 These general regulations shall be considered the official regulations of the CEC, an activity run by the CFES. These regulations can only be amended with the approval of the current CEC Activity Manager for the CFES (current at the time of the vote) and with a two-thirds vote of the CECAB.

1.8 Violation of Competition Rules

- 1.8.1 If 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(s) during the question period

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

- 1.8.2 Only the Competition Director(s) for a competition will determine if competitor(s) for that competition are in violation of the rules.
- 1.8.3 If Competitor(s) are found guilty of a violation during the design phase, they will be notified immediately but will be eligible to continue in the competition.
- 1.8.4 Competitors will be provided in writing the alleged violation of the rules following the design phase. 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.



- 1.8.5 Following the competition, competitors have one (1) hour to appeal the Competition Director(s)'s decision to the Rule Violation Appeals Committee (RVAC). The appeal must be written and clearly explain why the competitor believes they followed the rules of the competition. Appeals shall be limited to one page in Times New Roman font with 12-point font size, 1" margins and 1.15 line spacing.
- 1.8.6 If the competitor is found to be in violation of any rules, then the competitor will be penalized. The severity of the penalty shall be established rather as outlined in the CEC rulebook or at the discretion of the RVAC.
- 1.8.7 If the competitor is not found to be in violation of any rules, then the competition will continue as normal.
- 1.8.8 The RVAC shall comprise of the current Activity Manager, the VP Competitions or a designate from the current Organizing Committee, the representative from the CFES, and a representative from the Organizing Committee of the following year's CEC.
- 1.8.9 The VP Competitions or a designate from the current Organizing Committee will act as the non-voting chair of the RVAC.
- 1.8.10 If there is more than one Activity Manager, then the Activity Manager(s) only receive one voting seat on the RVAC.
- 1.8.11 The RVAC will have one (1) hour to review the appeal and vote to dismiss or hold the Competition Director(s)'s decision.
- 1.8.12 Competitor(s) will be immediately notified of the RVAC decision.
- 1.8.13 The decision of the RVAC is final, and not subject to further appeals.
- 1.8.14 In the event of discovery of a rule violation following the competition, competitor(s) will be immediately notified and have one (1) hour to appeal and follow the procedure outlined in section 1.8.1.3.



1.9 School Anonymity

School anonymity rules solely apply during presentations of each competition. Delegates can disclose their respective school and wear apparel at any other point during the conference. This includes but is not limited to; design period or competition preparation periods, social events, opening ceremonies and closing banquet.

- 1.9.1 No information in a team's presentation may refer to the team's identity or respective school. If the identity of a team is revealed to the judges at any time through the competitors' presentation, each offense will result in a ten (10)-point penalization and -10% of total points for debate.
- 1.9.2 Presenters and debaters are also forbidden from wearing any apparel bearing the name, crest, colors, or other identifying symbols of their respective schools. Failure to follow this rule will result in a fifty (50)-point penalization, or 50%-point reduction in the case of debate.
- 1.9.3 When submitting deliverable files (such as presentations or reports), the file content and filename must not disclose the name of the team's school. If the identity of a team is disclosed in the presentation slides or filename, the presenting team will be penalized with a loss of ten (10) points. Instead, each team shall name its files using the team name assigned to the team and the case subject as below:

Correct: TEAM_1_CONSULTING.ppt

Incorrect: MANITOBA_ENGINEERING.ppt

1.10 Online Delivery Format

Presentations will be conducted through an online platform that allows for the following functionalities:

- Screen share feature
- Present and answer questions live
- Live translation

All presentations are to be completed live, unless communicated to the competition director(s) that there are problems with the online platform. The competition director(s) of that specific competition, alongside the VP Competitions will deem whether to accept the request. If the request is accepted, an alternative presentation format will be arranged.



2 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.

2.1 Team Composition

The Consulting Engineering team will be comprised of a maximum of four (4) competitors.

2.2 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.

2.3 Language

The presentation and report can be done in either English or French. The presentations and report must be consistent in language.

2.4 Resources

2.4.1 Personnel Required

2.4.1.1 *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.

2.4.1.2 *Director(s)*

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



2.4.1.3 *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. The director(s) may also act as the timekeeper.

2.4.2 Allowed External Resources

The competitors can use the following equipment:

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
- Any textbooks, course notes or other reference material
- Each team member is allowed to use one computer

2.4.3 Plagiarism

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. Competitors are expected to act in good faith with the spirit of the competition.

2.5 Procedure / Timeline

2.5.1 Pre-Competition

At least seven (7) days prior to the competition, the main theme(s) of the competition will be announced to the competitors, judges and public. Assigned Team Names will also be announced at this time.

2.5.2 Competition

2.5.2.1 *Presentation of Problem*

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

2.5.2.2 *Question Period*

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

2.5.2.3 *Solution Development*

Teams will be given four (4) to eight (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(s) before the end of the allotted time. Competitors may finish before the end of the allotted time.

2.5.2.4 *Rest Period*

Competitors must be allowed a minimum of one (1) hour to rest before the presentation phase starts.

2.5.2.5 *Solution Presentations*

Competitors will have a maximum of twenty (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 ten (10) minutes to ask questions. Judges can ask a question at any time during the presentation. The clock must be stopped during these interruptions.

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.

2.5.3 Timekeeping

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

2.5.3.1 *During the design phase*

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

2.5.3.2 *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 ten (10) minutes, five (5) minutes and one (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 thirty (30) seconds of the presentation

2.5.4 Presentation Order

- Presentation order shall be determined randomly
- Presentation order shall be announced thirty (30) minutes 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

Teams may not be in the audience for presentations of their competition until after they have completed their presentation. Any attempts at entering the presentation room before their



allotted time will result in a warning for a first offense, and a ten (10) point penalty for any further offenses

2.5.5 Deliverables

2.5.5.1 *For Competitors*

Each competitor will electronically be given access to a package outlining the main themes of the competition seven (7) days in advance of the competition. This theme will also be posted on the official CEC website. It is the competitor's responsibility to ensure that they have received the package. At the competition briefing, each team will receive a package outlining the problem definition, design and presentation requirements, rules, marking scheme and any other information deemed necessary by the competition director(s).

2.5.5.2 *From Competitors*

Each team is required to submit, electronically, before the end of the design period, a report of less than ten (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.

2.5.5.2.1 *Report Specifications*

The report must be written in Times New Roman font with 12-point font size, 1" margins and 1.15 line spacing. All other report requirements will be outlined in the problem design package.

2.5.6 Response to Questions

- Only the competition director(s) 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(s) 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. Fifteen (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.

2.6 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
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC

2.6.1 Judging Matrix

Consulting Judging Matrix		
Solution	Addresses Problem Statement	/10
	Environmental/Social/Economic/Sustainability Analysis	/25
	Technical Feasibility	/15
	Real-world Applicability	/10
		/60
Report	Writing Style, Professionalism and Clarity	/5
	Content Quality	/10
		/15
Presentation	Voice, Articulation and Timing	/10
	Visual Aids	/10
	Response to Questions	/5
		/25
Deduction Total		
Total		/100

2.6.2 Penalty Matrix

Point Penalties	
Plagiarism	Elimination
Insufficient Citation	-50
Documents Received After Deadline	-50
Absent Team Member	-25
Verbal Disclosure of School During Presentation	-10
Disclosure of School in Presentation Files/Documents	-10
Wearing School Apparel During Presentation	-50
Font Size, Font, Margin Size and Line Spacing Not Followed	-10
Entering presentation room before allotted time (after first offense)	-10
Total	



3 Engineering Communications

The goal of this competition is to describe an engineering topic (i.e. process, product, device, issue) in terms that the general public can understand.

3.1 Team Composition

The Communications Design team will be comprised of a maximum of two (2) competitors. 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.

3.2 Topic Eligibility

The topic should fulfill the following criteria:

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

3.3 Language

The presentation and abstract can be done in either English or French. The presentations and abstract must be consistent in language.

3.4 Resources

3.4.1 Personnel Required

3.4.1.1 *Judges*

A minimum of three (3) judges (and in any excess, an odd number of 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.

3.4.1.2 *Director(s)*

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

3.4.1.3 *Official Timekeeper*

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

3.4.2 Allowed External Resources

Competitors are required to display any presentation materials which they will use, including pictures or diagrams and models or prototypes



3.5 Procedure / Timeline

3.5.1 Pre-Competition

At least eighteen (18) days prior to the competition, the Competition Director(s) will contact all teams with their designated Team Name to be used for the rest of the competition.

At least fourteen (14) days prior to the competition, the team must submit a presentation abstract to the Competition Director(s). The abstract will be reviewed by the Competition Director(s) 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 prior to the competition. The abstracts will also be distributed to all CEC competitors prior to the competition.

The abstract must describe the presentation topic in no more than two hundred (200) words. It must also state the competitor name(s) and Team Name.

3.5.2 Competition

3.5.2.1 *Presentation Period*

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

3.5.2.2 *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.

3.5.3 Timekeeping

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

- The time must be stopped when a judge asks questions 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): twenty (20) minutes, ten (10) minutes, five (5) minutes, and one (1) minute before the end of the presentation
- A visual countdown must be given during the last thirty (30) seconds of the presentation
- Teams will be penalized five (5) points/minute for under-use of time greater than three (3) minutes
- Teams whose presentation exceed thirty (30) minutes in length will be given a fifteen (15) second grace period to finish their presentation. If their presentation is not completed after the fifteen (15) second grace period, the presentation will be terminated by the competition director(s)



- The timing of the question period after the presentation shall be for information purposes only

3.5.4 Presentation Order

- The order of the presentations shall be determined randomly
- Presentation order shall be announced thirty (30) minutes 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

3.5.5 Deliverables

3.5.5.1 *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.

3.5.5.1.1 *Abstract Specifications*

The abstract must be a maximum of two hundred (200) words describing the presentation topic. It must be written in Times New Roman font with 12-point font size, 1" margins and 1.15 line spacing. It must also state the competitor name(s), and Team Name.

3.5.5.2 *Presentation Slides*

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

3.6 Assessment and Judging

- Judges should have experience in communications
- Judges do not require any technical knowledge on the topics being presented
- The panel must have an odd number of judges with a minimum of three (3) judges
- Judges should be bilingual, or the room equipped for simultaneous translation
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC

3.6.1 Judging Matrix

Engineering Communications Judging Matrix		
Introduction to Topic	Topic and Background Clearly Presented	/10
	Understandable Language	/5
	Interest Elicited by Topic	/5
	Accuracy of Explanation	/5
		/25
Critical Analysis	Environmental, Social and Economic Analysis	/15
	Quality of Arguments	/15
		/30
Presentation	Voice, Articulation and Timing	/10
	Visual Aids	/10
	Response to Questions	/10
		/30
Written Abstract	Content Quality	/5
	Contains all key presentation information	/10
		/15
Deduction Total		
Total		/100

3.6.2 Penalty Matrix

Point Penalties	
Plagiarism	Elimination
Insufficient Citation	-50
Documents Received After Deadline	-50
Absent Team Member	-25
Verbal Disclosure of School During Presentation	-10
Disclosure of School in Presentation Files/Documents	-10
Wearing School Apparel During Presentation	-50
Under-use of time greater than 3 minutes	-5 /minute
Abstract Specifications not Followed	-10
Total	



4 Extemporaneous Debate

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.

4.1 Team Composition

A debate team must consist of two (2) members.

4.2 Language

A team may choose to debate in either English or French. Both members from the same team must debate in the same language for the entire round.

4.3 Resources

4.3.1 Personnel Required

4.3.1.1 *Judges*

A minimum of three (3) judges (and in any excess, an odd number of judges) per room 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. 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.

4.3.1.2 *Director(s)*

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

4.3.1.3 *Debate Moderator*

The Debate Moderator is the expert in debate procedure and interpretation. The Moderator acts as an impartial judge and ensures that the judges understand the rules of the debate.

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



4.3.1.4 *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 a method at the discretion of the Debate Director 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 Moderator so that it can be stopped. If a member of the debater team requests an extra final fifteen (15) seconds of grace using the method indicated by the Debate Director, during the final fifteen (15) seconds, the Timekeeper will permit an extra and final fifteen (15) seconds of grace. The responsibilities of the timekeeper and the Moderator may be fulfilled by the same person.

4.3.2 Allowed External Resources

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

4.4 Debating Rules and Elements

4.4.1 Teams

The debate is between two teams, each with two members. The government 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, either government or opposition.

Teams are always expected to act responsibly. Inappropriate language or offensiveness towards the other team, the officials, or the audience is not acceptable. Teams are expected to direct all their speeches towards the chair/moderator

4.4.2 Resolutions

The resolutions will be assigned by the organizing committee and will be validated by the moderator 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 (e.g. "Be it resolved that all engineers are good at math" is not an acceptable resolution, since there are always exceptions). Once both teams are informed of the resolution, they are given ten (10) minutes to prepare for the debate.

4.4.3 Time Allotted to Debaters

The speaking order and times will be as follows:

- First speaker of the government: five (5) minutes
- First speaker of the opposition: five (5) minutes



- Second speaker of the government: five (5) minutes
- Second speaker of the opposition: five (5) minutes
- Rebuttal by the first speaker of the opposition: two (2) minutes
- Rebuttal by the first speaker of the government: two (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.

4.4.4 Role of the Government

The government 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 government must also avoid redefining the resolution to include specific knowledge where the average engineer has no familiarity with the topic. It is the government's responsibility to define each word/term in the resolution, should they fail to do so, the first speaker of the opposition may provide their own definition(s) and debate that resolution.

The government can follow one of two different strategies in the debate:

4.4.4.1 *The Principle Case*

In a principle case, the government presents their restatement of the principle into a contention, narrowing down the specific connotations of the broad terms stated in the principle. The principle is the original resolution and is a general statement that is debatable based on facts, experience, or morals. The contention is the application of the principle to a more specific situation relating to the resolution. The contention must be about one major topic and may be a restatement of the resolution. Below is an example of a contention being applied to a resolution.

Resolution (Principle): Be it resolved that caffeine should be regulated by the government

Contention: The amount of caffeine in various products supplied by the food industry should be regulated by the Canadian Federal Government

4.4.4.2 *The Plan Case*

In a plan case, the government still identifies 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. An example plan for the above contention would be: "The federal government should place strict limits to the amount of caffeine present in food items per their mass in grams, fines will be imposed per amount of caffeine over the limit.

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.

4.4.5 The First Speaker of Government

The first speaker of the government 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.

4.4.6 The Second Speaker of Government

The second speaker of the government 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 however, new lines of argumentation and new evidence may be introduced.

4.4.7 Role of the Opposition

The opposition's task is to convince the judges that the government's views are indefensible by bringing forward counterarguments and refuting the government's arguments. If the case presented by the government is a truism, has been squirreled, has been poorly defined, 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 and both teams must now debate according to the revised contention. If the government presents a principle case, the opposition is left with little more to do than attack the principle. If the government 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.

4.4.8 The First Speaker of Opposition

The first speaker of the opposition must reintroduce the principle and present their own counterarguments for how the proposed contention or plan is undesirable. It is the first speaker's responsibility to redefine the contention if they believe the government has presented a truism, squirreled the proposed principle, presented topics which require specific knowledge, or has poorly defined any terms in their contention. It is also the first speaker of the opposition that must introduce counter plans. Finally, the first speaker may refute arguments that the first speaker of the government has presented in their speech.

4.4.9 The Second Speaker of Opposition

The second speaker of the opposition is responsible for refuting arguments brought up by the second speaker of the government in their speech. They may also refute points of argument in the government's first speech, reinforce the arguments of the first



speaker of the opposition, and introduce new counterarguments opposing the contention and new evidence in favor of the opposition. New points of the counter plan may not be introduced by the second speaker.

4.4.10 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.

4.4.11 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 the method indicated by the Debate director. If the debater does not wish to take the question, they can so indicate by a wave of the hand or a simple "no, thank you." If this occurs, the inquiring party must stop their action. If the current debater wishes to entertain the question, it must be stated by the opponent in less than fifteen (15) seconds during which the speaker must yield the floor.

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 their speech, if the opponent is making an honest attempt to ask a question. The third attempt at asking a question in one speech constitutes an honest attempt. Answers to questions may then be used as a talking point by both sides in their speeches. Questions will not be allowed in the first or last minute of a speech, or during rebuttals.

4.4.12 Heckling

Heckling is not allowed during a debate being held online.

4.4.13 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 the "Point of Procedure Method" indicated by the Debate Director. 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 government 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.

For penalties and further actions to take when a point of procedure is well taken, consult the following matrix:

Violation	First Offence	Repeated Offence
Unprofessional/Offensive behavior	A penalty of -1 to total score for team on each judging matrix	An additional penalty of -1 to total score for each repeated offence
Misquotations	Misquoted point of argument will be struck from record	Misquoted point of argument will be struck from record
Speaking to opposition instead of the audience	A warning from the debate moderator	A penalty of -0.5 to total score for team on each judging matrix for each repeated offence
Presenting new arguments in the rebuttal	New argument will be struck from record and not allowed to be used further	New argument will be struck from record and not allowed to be used further
Introduction of parts of a plan by the second speaker	Part of plan will be struck from record and not allowed to be used further	Part of plan will be struck from record and not allowed to be used further
Identifying school verbally	-10% total point reduction	-10% total point reduction
Wearing school clothing	-50% total point reduction	

4.5 Procedure / Timeline

4.5.1 Pre-Competition

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



At least seven (7) days before the competition, the competition Director(s) will assign each team their designated Team Name for use at the competition.

A competition briefing will be held before the commencement of the competition and will include the debate moderator, timekeeper, Competition Director(s), judges and competitors. The debate moderator will run the briefing and review the rules, tips and expectations for the debates. The purpose of the briefing is not to allude 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 moderator and Competition Director(s).

4.5.2 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.

4.5.3 Double Elimination

The debate competition will follow a double elimination format which ensures all teams will get to participate in at least two (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 two (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 (2) or more times in a row, due to the dynamic nature of the format, however the Debate Director(s) 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.

4.6 Assessment and Judging

4.6.1 Judging

The debate is judged based upon the most convincing argument, communication skills, and ability to follow outlined procedures. Each judge will decide individually, and the moderator will tally the decisions and announce the winner. The winning team will then move to the next round.

4.6.2 Feedback

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



4.7 Judging

Criteria	5 points	4 points	3 points	2 points	1 point	Total Points
Respect for Other Team	All statements, body language, and responses were respectful and used appropriate language (with the exception of minor heckling)	Statements and responses were respectful and used appropriate language, but once or twice body language was not (with the exception of minor heckling)	Most statements and responses were respectful and in appropriate language. There was one inappropriate remark or minor body language issues.	Statements, responses and/or body language were borderline appropriate. Some inappropriate remarks or actions.	Statements, responses and/or body language were consistently not respectful.	
Information	All information presented in this debate was clear, accurate and thorough	Most information presented in this debate was clear, accurate and thorough	Most information presented in the debate was clear and accurate, but was not usually thorough	Some information was accurate, but there were some minor inaccuracies	Information had some major inaccuracies OR was usually not clear	
Rebuttal	All counter-arguments were accurate, relevant and strong	Most counter-arguments were accurate, relevant, and strong	Most counter-arguments were accurate and relevant, but several were weak	Some counter arguments were weak and irrelevant	Counter-arguments were not accurate and/or relevant	
Use of Facts/Logic	Every major point was well supported with several relevant facts and/or logical examples	Every major point was adequately supported with several relevant facts and/or logical examples	Every major point was supported with facts and/or logical examples, but the relevance of some were questionable	Some points were supported well, others were not	All points were not supported	
Organization	All arguments were clearly tied to a common idea (premise) and organized in a tight, logical fashion	Most arguments were clearly tied to a common idea (premise) and organized in a tight, logical fashion	Most arguments were loosely tied to a common idea (premise) and organized in a somewhat logical fashion	Some arguments were loosely tied to a common idea (premise) and organized in a somewhat logical fashion	No arguments were tied to a common idea (premise) and organized in a any fashion	
Understanding of Topic	The team clearly understood the topic in depth and presented their argument forcefully and convincingly	The team clearly understood the topic in depth and presented their argument with ease	The team seemed to understand the main points of the topic and presented those with ease	The team seemed to understand the main points of the topic, but didn't present with ease	The team did not show an adequate understanding of the topic	
Total Points:						
Comments:						



5 Innovative Design

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

5.1 Team Composition

The innovative design team may be comprised of one (1) to six (6) competitors. 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 for it to be eligible for the competition.

5.2 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.

5.3 Language

The design summary and presentation can be done in either English or French but must be consistent in language.

5.4 Resources

5.4.1 Personnel Required

5.4.1.1 *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.

5.4.1.2 *Director(s)*

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

5.4.1.3 *Official Timekeeper*

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



5.4.2 Allowed External Resources

There is no restriction on the resources which competitors are allowed to use during the presentation.

5.5 Procedure / Timeline

5.5.1 Pre-Competition

5.5.1.1 *Twenty (20) Days Prior to CEC*

Competition Design Summary

- A one (1) page competition design summary, detailed in Section 5.5.5 (Deliverables)

5.5.1.2 *Ten (10) Days Prior to CEC*

Presentation Document

- Each team is required to submit a copy of their presentation to the Competition Director(s).

Team Name Assignment

- The Competition Director(s) will assign each team their designated Team Name for use at the Competition

5.5.1.3 *Thirty (30) Minutes Prior to Presentation Period*

- The Director(s) 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

5.5.2 Competition

5.5.2.1 *Public Opening*

Presentations are to be open to the general public.

5.5.2.2 *Judging*

The competitors must give a twenty (20) minute presentation, followed by a ten (10) minute question period, during their designated presentation time.

5.5.3 Timekeeping

The following rules will be adhered to with respect to 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 one (1) minute before the end of the allotted time for the presentation
- A visual countdown must be given during the last thirty (30) seconds of the presentation
- Presenters will be asked to stop their presentation if they exceed twenty (20) minutes
- Time to both ask and answer questions during the question period is counted



5.5.4 Presentation Order

- Presentation order shall be determined randomly
- Presentation order shall be announced thirty (30) minutes 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

5.5.5 Deliverables

5.5.5.1 *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 regarding the topics.

This summary will follow conventional formatting characteristics (Times New Roman font, 12-point font, 1.15 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
- Design topic and description

5.5.5.2 *Presentation*

A slideshow presentation is to be utilized. It is to be sent to the Competition Director(s) 10 days prior to CEC as stated in section 5.5.1.2.

5.6 Assessment and Judging

- The panel must have an odd number of judges
- The panel must comprise a minimum of three (3) 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



5.6.1 Judging Matrix

Innovative Design Judging Matrix		
Project	Design Justification	/25
	Environmental, Social and Economic Feasibility	/25
	Technical Feasibility/Innovation	/20
		/70
Presentation	Voice, Articulation and Timing	/10
	Response to Questions	/10
		/20
Written Abstract	Content Quality	/5
	Contains all key presentation information	/5
		/10
Deduction Total		
Total		/100

5.6.2 Penalty Matrix

Point Penalties	
Plagiarism	Elimination
Insufficient Citation	-50
Documents Received After Deadline	-50
Absent Team Member	-25
Verbal Disclosure of School During Presentation	-10
Disclosure of School in Presentation Files/Documents	-10
Wearing School Apparel During Presentation	-50
Font Size, Font, Margin Size and Line Spacing Not Followed in Design Summary	-10
Total	



6 Junior Design

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

6.1 Team Composition

The design teams must be comprised of a maximum of four (4) competitors. The team must be entirely comprised of students who, at the time of their regional qualifying competition, have not yet completed 50% or more of the minimum number of credits required to complete their respective accredited engineering programs.

6.2 Language

The presentation and any optional presentation materials can be done in either English or French but must be consistent in language.

6.3 Resources

6.3.1 Personnel Required

6.3.1.1 *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 are not required to have a technical background, however, an understanding of effective presentation techniques and other engineering 'soft' skills are an asset.

6.3.1.2 *Director(s)*

The competition director(s) is responsible, along with the VP Competitions, for the entire design and implementation of the Junior Design competition. The director(s) must present the design problem at the beginning of the competition and answer any questions. Only the director(s) may answer questions during the design period. The director(s) will also answer any questions the judges may have during the competition.

6.3.1.3 *Official Timekeeper*

The Official Timekeeper is responsible for enforcing time limits during the solution development period and the presentations. The director(s) may also act as the timekeeper.

6.3.2 Equipment Supplied by CEC

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

- Any materials and/or tools specific to the design problem



6.3.3 Plagiarism

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. Competitors are expected to act in good faith with the spirit of the competition.

6.3.4 Allowed External Resources

The competitors are allowed to use the following equipment:

- Any textbooks, course notes or other reference material
- Digital Camera
- Each team member is allowed to use one computer
- Any additional tools, equipment and/or software as deemed fit by the competition director(s) so long as it is reasonable to expect all participants to have access to said tools, equipment and/or software

Teams are allowed to use their own PowerPoint templates for use in the competition.

6.4 Procedure / Timeline

6.4.1 Pre-Competition

At least seven (7) days before the competition, information about the rules of the competition will be sent to all competitors. The Competition Director(s) will assign each team their designated Team Name for use at the competition, and a detailed competition timeline will also be provided as well as any background information which may be deemed necessary by the Competition Director(s).

6.4.2 Competition

6.4.2.1 *Presentation of Problem*

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

6.4.2.2 *Question Period*

Competitors then have fifteen (15) minutes to ask the Competition Director(s) 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.

6.4.2.3 *Development of the Solution*

The teams will have four (4) to six (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 deliverables must be submitted to the Competition Director(s) before the allotted time expires. Competitors may finish before the end of the allotted time.

6.4.2.4 *Rest Period*

Competitors must be allowed a minimum of one (1) hour to rest before the presentation phase starts.

6.4.2.5 *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(s) during the presentation of the problem. The testing may be carried out at the discretion of the Competition Director(s).

6.4.3 Timekeeping

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

6.4.3.1 *During the design phase*

- The remaining time for solution development must be announced two (2) hours, one (1) hour, thirty (30) minutes, and ten (10) minutes before the end of the allotted time

6.4.3.2 *During the presentation*

- 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
- The remaining presentation time must be indicated to the competitors two (2) minutes and one (1) minute before the end of the allotted time
- A visual countdown must be given during the last thirty (30) seconds of the presentation to the judges.
- After the five (5) minute presentation time, the competitors will have a fifteen (15) second grace period to conclude their presentation before they are cut off to begin the question period

6.4.4 Presentation Order

- Presentation order shall be determined randomly
- Presentation order shall be announced thirty (30) minutes 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



- Teams may not be in the audience for presentations of their competition until after they have completed their presentation. Any attempts at entering the presentation room before their allotted time will result in a warning for a first offense, and a ten (10) point penalty for any further offenses

6.4.5 Deliverables

6.4.5.1 *From Competitors*

Each team is required to submit, electronically, photos of their prototype design before the end of the design period, based on the criteria provided by the Competition Director(s). This design will be used to test the team's solution to the design problem. 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. Teams may also 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.

6.4.6 Response to Questions

- Only the competition director(s) 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(s) 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. Fifteen (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.

6.5 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
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC

6.5.1 Judging Matrix

Junior Design Judging Matrix		
Design Quality	Deliverable Compliance with Expectations	/15
	Technical Feasibility/Innovation	/15
	Use of Resources	/10
		/40
Presentation	Design Process and Design Justification	/10
	Design Critique	/5
	Voice, Articulation and Timing	/5
	Visual Aids	/5
	Response to Questions	/5
		/30
Testing		/30
Deduction Total		
Total		/100

6.5.2 Penalty Matrix

Point Penalties	
Plagiarism	Elimination
Insufficient Citation	-50
Documents Received After Deadline	-50
Absent Team Member	-25
Verbal Disclosure of School During Presentation	-10
Disclosure of School in Presentation Files/Documents	-10
Wearing School Apparel During Presentation	-50
Entering presentation room before allotted time (after first offense)	-10
Design is based off of an impossible concept	-50
Design makes no attempt to solve the problem within the constraints of the problem statement	-50
Total	



7 Senior Design

A team of four (4) students are given a complex engineering problem and are required to design and build a working prototype. The teams will then present their solution and test their prototypes in front of a panel of judges.

7.1 Team Composition

The Senior Design team will be comprised of a maximum of four (4) competitors.

7.2 Language

The presentation and any optional presentation materials can be done in either English or French but must be consistent in language.

7.3 Resources

7.3.1 Personnel Required

7.3.1.1 *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 have some technical engineering experience.

7.3.1.2 *Director(s)*

The competition director(s) is responsible, along with the VP Competitions, for the design and implementation of the Senior Design competition. The director(s) must present the design problem at the beginning of the competition and answer any questions. Only the director(s) may answer questions during the design period. The director(s) will also answer any questions the judges may have during the competition.

7.3.1.3 *Official Timekeeper*

The Official Timekeeper is responsible for enforcing time limits during the solution development period and the presentations. The director(s) may also act as the timekeeper.

7.3.2 Equipment Provided by CEC

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

- Any materials and/or tools specific to the design problem

7.3.3 Allowed External Resources

The competitors are allowed to use the following equipment:

- Any textbooks, course notes or other reference material
- Digital Camera



- Each team member is allowed to use one computer
- Any additional tools, equipment and/or software as deemed fit by the competition director(s) so long as it is reasonable to expect all participants to have access to said tools, equipment and/or software

Teams are allowed to use their own PowerPoint templates for use in the competition.

7.3.4 Plagiarism

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. Competitors are expected to act in good faith with the spirit of the competition.

7.4 Procedure / Timeline

7.4.1 Pre-Competition

At least seven (7) days 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. The Competition Director(s) will assign each team their designated Team Name for use at the competition.

7.4.2 Competition

7.4.2.1 *Presentation of Problem*

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

7.4.2.2 *Question Period*

Competitors have fifteen (15) minutes to ask the competition director(s) 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.

7.4.2.3 *Development of the Solution*

The teams will have eight (8) to ten (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 deliverables must be submitted to the competition director(s) before the allotted time expires. Competitors may finish before the end of the allotted time.



7.4.2.4 *Rest Period*

Competitors must be allowed a minimum of one (1) hour to rest before the presentation phase starts.

7.4.2.5 *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(s)). The testing may be carried out at the discretion of the Competition Director(s).

7.4.3 Timekeeping

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

7.4.3.1 *During the design phase*

- The remaining time must be announced three (3) hours, one (1) hour, thirty (30) minutes, and ten (10) minutes before the end of the allotted time

7.4.3.2 *During the presentation*

- 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 (1) 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.

7.4.4 Presentation Order

- Presentation order shall be determined randomly
- Presentation order shall be announced thirty (30) minutes 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
- Teams may not be in the audience for presentations of their competition until after they have completed their presentation. Any attempts at entering the presentation room before their allotted time will result in a warning for a first offense, and a ten (10) point penalty for any further offenses



7.4.5 Deliverables

7.4.5.1 *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. It is the competitor's responsibility to ensure that they have received the package. 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(s).

7.4.5.2 *From Competitors*

Each team is required to submit, electronically, photos of their prototype of the design before the end of the design period, based on the criteria provided by the Competition Director(s). This design will be used to test the team's solution to the design problem. 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.

7.4.6 Response to Questions

- Only the competition director(s) 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(s) 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. Fifteen (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

7.5 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
- Competition director(s) will develop specific penalties for violations of rules, which will be provided to competitors in the competition briefing and also in the CEC Rulebook.
- Testing will be 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

7.5.1 Judging Matrix

Senior Design Judging Matrix		
Design	Innovation	/10
	Environmental and Social Impacts	/10
	Feasibility	/10
	Technical Details	/10
		/40
Presentation	Design Process and Justification	/5
	Design Critique	/5
	Voice, Articulation and Timing	/5
	Visual Aids	/5
	Response to Questions	/5
		/25
Testing		/35
Deduction Total		
Total		/100

7.5.2 Penalty Matrix

Point Penalties	
Plagiarism	Elimination
Insufficient Citation	-50
Documents Received After Deadline	-50
Absent Team Member	-25
Verbal Disclosure of School During Presentation	-10
Disclosure of School in Presentation Files/Documents	-10
Wearing School Apparel During Presentation	-50
Entering presentation room before allotted time (after first offense)	-10
Design is based off of an impossible concept	-50
Design makes no attempt to solve the problem within the constraints of the problem statement	-50
Total	



8 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.

8.1 Team Composition

The Re-Engineering team will be comprised of a maximum of two (2) competitors.

8.2 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.

8.3 Language

The presentation and report can be done in either English or French. The presentations and report must be consistent in language.

8.4 Resources

8.4.1 Personnel Required

8.4.1.1 *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.

8.4.1.2 *Director(s)*

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



8.4.1.3 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. The director(s) may also act as the timekeeper.

8.4.2 Equipment Provided by CEC

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

- Some information relevant to the design problem, at the discretion of the competition director(s)

8.4.3 Allowed External Resources

The competitors are allowed to use the following equipment:

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
- Any textbooks, course notes or other reference material
- Each team member is allowed to use one computer

8.4.4 Plagiarism

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. Competitors are expected to act in good faith with the spirit of the competition.

8.5 Procedure / Timeline

8.5.1 Case Structure

The competition will consist of two (2) 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.

8.5.2 Pre-Competition

At least seven (7) days prior to the competition, the main theme(s) of the competition will be announced to the competitors, judges and public. The first case set will be distributed to the competitors one (1) week in advance of the competition start time and assigned Team Names will also be announced at this time.



8.5.3 Competition

8.5.3.1 *Presentation of Problem*

The first case set will be distributed to the competitors one (1) 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 the case set and to allow for questions to be addressed but should not exceed one (1) hour. Competitors will not be permitted to start working towards a solution during the lead time period.

8.5.3.2 *Question Period*

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

If questions are asked in the seven (7) days leading up to CEC, these questions must be translated and sent out to all competitors when being answered.

8.5.3.3 *Solution Development*

Teams will be given four (4) to eight (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(s) before the end of the allotted time. Competitors may finish before the end of the allotted time.

8.5.3.4 *Rest Period*

Competitors must be allowed a minimum of one (1) hour to rest before the presentation phase starts.

8.5.3.5 *Solution Presentations*

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.

Competitors will have a maximum of twenty (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 ten (10) minutes to ask questions. Judges can ask a question at any time during the presentation. The clock must be stopped during these interruptions.

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.

8.5.4 Timekeeping

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



8.5.4.1 *During the design phase*

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

8.5.4.2 *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 ten (10) minutes, five (5) minutes and one (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 thirty (30) seconds of the presentation

8.5.5 Presentation Order

- Presentation order shall be determined randomly
- Presentation order shall be announced thirty (30) minutes 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
- Teams may not be in the audience for presentations of their competition until after they have completed their presentation. Any attempts at entering the presentation room before their allotted time will result in a warning for a first offense, and a ten (10) point penalty for any further offenses

8.5.6 Deliverables

8.5.6.1 *For Competitors*

Each competitor will electronically be given access to a package outlining the main themes of the competition and the seven (7) days in advance of the competition. This theme will also be posted on the official CEC website. The first case set will be distributed to the competitors one (1) week in advance of the competition start time, along with design requirements and rules. It is the competitor's responsibility to ensure that they have received the package. At the competition briefing, each team will receive a package outlining the second case, design and presentation requirements, rules, marking scheme and any other information deemed necessary by the competition director(s).

8.5.6.2 *From Competitors*

Each team is required to submit, electronically, before the end of the design period, a report of no greater than one (1) page per case (not including appendices) detailing their proposed solution. 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. Competitors may also opt to combine both solutions into one report of the combined length if they feel this format better conveys their solutions. 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(s). The requirements of the presentation will be outlined in the problem design package.

8.5.6.2.1 *Report Specifications*

The report must be written in Times New Roman font with 12-point font size, 1" margins and 1.15 line spacing. All other report requirements will be outlined in the problem design package.

8.5.7 Response to Questions

- Only the competition director(s) 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(s) 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
- During the week prior to the competition start time, all questions regarding the first case must be answered within forty-eight (48) hours

8.6 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
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of CEC



8.6.1 Judging Matrix

Re-engineering Judging Matrix		Case 1	Case 2
Solution	Functionality of Proposed Changes	/5	/10
	Environmental, Social and Economic Feasibility	/5	/10
	Technical Feasibility	/5	/10
	Real-world Applicability	/5	/10
		/60	
Report	Clarity	/5	
	Writing Style and Professionalism	/5	
	Content Quality	/5	
		/15	
Presentation	Voice, Articulation and Timing	/10	
	Visual Aids	/10	
	Response to Questions	/5	
		/25	
Deduction Total			
Total		/100	

8.6.2 Penalty Matrix

Point Penalties	
Plagiarism	Elimination
Insufficient Citation	-50
Documents Received After Deadline	-50
Absent Team Member	-25
Verbal Disclosure of School During Presentation	-10
Disclosure of School in Presentation Files/Documents	-10
Wearing School Apparel During Presentation	-50
Entering presentation room before allotted time (after first offense)	-10
Report Specifications are not followed (-10 per case)	-10
Total	



9 Programming

The goal of the programming category is to encourage engineering students to produce a piece of readable software. The teams will use their software development skills, their technical writing abilities, and their project management skills to design a solution to a posed problem. This solution will then be presented to company executives (judging panel) for approval. The winning solution will not necessarily be the most technically correct but the one that has the most real-world application and is most thoroughly thought out.

9.1 Team Composition

The Programming team will be comprised of a maximum of four (4) competitors.

9.2 Language

The presentation and any presentation materials can be done in either English or French but must be consistent in language.

9.3 Topic

The topic will be a real-life problem found in any professional industry which can be solved through the application of programming. The type of industries can include, but are not limited to, finance, health, transportation, manufacturing and construction. Although not completely needed, a team that is formed of students from more than one engineering discipline is advised, as it would help to develop a complete solution.

9.4 Resources

9.4.1 Personnel Required

9.4.1.1 *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 may come from a variety of backgrounds including communications, sales and technical or software engineering experience, however they must have programming experience.

9.4.1.2 *Director(s)*

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



9.4.1.3 *Timekeeper*

The Official Timekeeper must be responsible for enforcing time limits during the question period, solution development and presentations, as stated in the rules. The director(s) may also act as the timekeeper.

9.4.2 External Resources Allowed

The competitors are allowed to use the following equipment:

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
- Any textbooks, course notes or other reference material
- Each team member is allowed to use one computer

9.4.3 Software resources

It is expected that the teams participating in this competition have adequate knowledge in choosing the best tools to solve the given problem. It is up to regional and provincial competition to restrict the tools allowed if they so desire. However, CEC will not place restrictions on what languages are to be used for the competition.

9.4.4 Plagiarism

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 they decide to recycle their own or someone else's code it must be clearly cited in the presentation. In addition, the competitors also need to clearly explain why and where the recycled code was used in their software. The judges hold the right to ask any team member to describe what a particular section of the code does at any given point during the presentation. 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. Competitors are expected to act in good faith with the spirit of the competition.

9.5 Procedure/Timeline

9.5.1 Pre-Competition

At least seven (7) days prior to the competition, the main theme(s) of the competition will be announced to the competitors, judges and public. The Competition Director(s) will assign each team their designated Team Name for use at the competition. Competitors are expected to supply their own computer or laptop.



9.5.2 Competition

9.5.2.1 *Problem presentation*

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

9.5.2.2 *Question period*

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

9.5.2.3 *Solution development*

Teams will be given six (6) to eight (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 prior to the end of the provided time.

9.5.2.4 *Rest period*

Competitors must be allowed a minimum of one (1) hour to rest before the presentation phase starts.

9.5.2.5 *Solution Presentations*

Competitors will have a maximum of twenty (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 ten (10) minutes to ask questions. Judges can ask a question at any time during the presentation. The clock must be stopped during these interruptions.

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.

9.5.3 Timekeeping

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

9.5.3.1 *During the design phase*

- The time remaining in the competition must be announced three (3) hours, one (1) hour, thirty (30) minutes and ten (10) minutes before the deadline

9.5.3.2 *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 presentation

9.5.4 Presentation order

- Presentation order shall be determined randomly
- Presentation order shall be announced thirty (30) minutes 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
- Teams may not be in the audience for presentations of their competition until after they have completed their presentation. Any attempts at entering the presentation room before their allotted time will result in a warning for a first offense, and a ten (10) point penalty for any further offense

9.5.5 Deliverables

9.5.5.1 *For competitors*

Each team member will electronically be given access to a package outlining the main themes of the competition seven (7) days in advance of the competition. This theme will also be posted on the official CEC website. It is the competitor's responsibility to ensure that they have received the package. At the competition briefing, each team will receive: a link to an online repository (e.g. hosted on Github, Bitbucket, or Gitlab) that will contain a package describing the problem definition, the design and presentation requirements, the rules, marking scheme and any other information deemed necessary by the competition director(s). Team members only have the right to download/clone the repository on their personal laptop; they are not allowed to add a branch to the repository. At the competition briefing, each team will also receive a package outlining the problem definition, design and presentation requirements, rules, marking scheme and any other information deemed necessary by the competition director(s).

9.5.5.2 *From competitors*

Each team is required to submit, electronically, before the end of the design period all deliverables outlined by the problem. This must include the code which will be used to evaluate the team's solution and their presentation. Only the code provided to the Programming Director(s) will be used for evaluation.

9.5.6 Response to Questions

- Only the competition director(s) 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(s) 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. Fifteen (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

9.6 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

9.6.1 Judging Matrix

Programming Judging Matrix		
Strategy/Algorithm	Simplicity	/10
	Ingenuity	/10
	Ability to Achieve Desired Outcome	/15
		/35
Code	Structure	/10
	Consistency	/5
	Readability	/10
	Efficiency	/10
		/35
Resource Management	Memory Usage Efficiency	/5
	Program's CPU Usage	/5
		/10
Presentation	Design Process and Justification	/7
	Design Critique	/4
	Voice, Articulation and Timing	/4
	Visual Aids	/2
	Response to Questions	/3
		/20
Deduction Total		
Total		/100



9.6.2 Penalty Matrix

Point Penalties	
Plagiarism	Elimination
Insufficient Citation	-50
Documents Received After Deadline	-50
Absent Team Member	-25
Verbal Disclosure of School During Presentation	-10
Disclosure of School in Presentation Files/Documents	-10
Wearing School Apparel During Presentation	-50
Entering presentation room before allotted time (after first offense)	-10
Total	