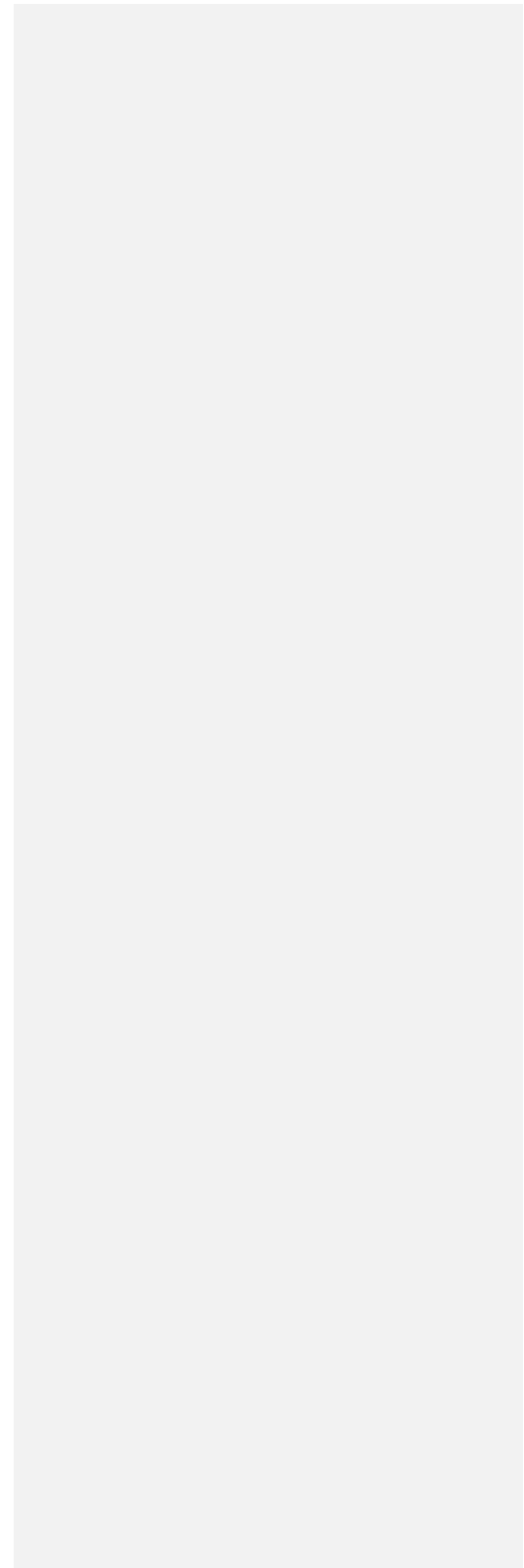


Official Rulebook 2019
Saskatoon Engineering
Competition



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 potential clients (in the form of judges). Competitors must demonstrate resourcefulness while acting in good faith with the spirit of the competition.

TEAM COMPOSITION

The Consulting Engineering team will be comprised of four (4) competitors. All team members must be current undergraduate students in the College of Engineering.

COMPETITION SUBJECT ELIGIBILITY

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 allow room for competitors to evaluate the economic, environmental and social implications of their proposed solutions and address the requirements of the client. The winning solution may not necessarily be the most technically effective solution, but the solution that has the most real-world applicability and forethought.

Therefore, the scenario in given 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.

RESOURCES FACILITIES REQUIRED

- One (1) amphitheater (presentation of problem and team presentations)
- One (1) workroom per team (design of solution)

PERSONNEL REQUIRED JUDGES

There will be a minimum of three (3) judges for the Consulting Competition and when this number is in excess the total number of judges will be an odd number. The judges will also represent a variety of backgrounds in relation to the topic (e.g. Consulting engineering, research and sales backgrounds.)

DIRECTOR

The term Competition Director refers to the person responsible for all Consulting Competition activities and communication. The Competition Director is the primary contact point between competitors, judges, and will also act as a contact between the previous mentioned groups .

The competition director is responsible, along with the SEC Commissioner, for the design and implementation of the Consulting Engineering competition. The director must present the design problem at the beginning of the competition and answer any questions raised by competitors and judges. The director will also be there for all presentation.

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

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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 Timekeeper and the director may be the same person.

EQUIPMENT PROVIDED BY SEC

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

- Wireless internet access
- The outlined problem and relevant background information as decided by the Competition Director

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

- 1 digital projector
- 1 computer containing the team's presentation file.
- Whiteboard(s) or blackboard(s)
- Laser pointer

ALLOWED EXTERNAL RESOURCES

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

- Any background research conducted by team members prior to the competition
- Any textbooks, course notes or other reference material
- Up to four computers

Important: 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. Volunteers will monitor each team during the design process to deter teams from cheating, however, competitors are expected to act in good faith with the spirit of the competition.

PROCEDURE / TIMELINE PRE-COMPETITION AND COMPETITION TIMELINE

At least 48 hours prior to the competition exact specifications of equipment available to teams during the competition (computers, storage devices, available programs, etc.), as well as solution development time length will be announced.

COMPETITION PRESENTATION OF PROBLEM

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

QUESTION PERIOD

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

SOLUTION DEVELOPMENT

Teams will be given 6 hours (at the discretion of the organizers) to develop their solutions, produce all required deliverables, and prepare their presentations. All deliverables shall be submitted to the competition director before the end of the allotted time. Competitors may finish before the end of the allotted time.

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 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 should be stopped during these interruptions.

TIMEKEEPING

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

DURING THE DESIGN PHASE

- Time is started when all the teams have reached their work areas to develop the solution
- 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

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

PRESENTATION ORDER

- Presentation order shall be determined randomly
- Presentation order shall be announced one half hour before the presentations commence.

- Teams are not allowed to switch places in the presentation order

DELIVERABLES FOR COMPETITORS

Each competitor will be emailed outlining the main themes of the competition 48 hours in advance of the competition. It is the competitors' responsibility to ensure that they have received the email. 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 on the day of the competition.

FROM COMPETITORS

Each team is required to electronically submit a technical report and presentation to the proposed problem at the end of the design phase of the competition to the Competition Director. For the purpose of determining whether or not a submission was made by the deadline, email submissions will be time-stamped against the receipt time reported by the receiving email server.

The produced report is to be a maximum of ten (10) pages not including: Title Page, Table of Contents, and Appendices. All relevant calculations and references are to be included in the Appendices portion of the report. The report must be double spaced, written in Times New Roman, font size twelve (12). The report will be provided to the Judges prior to the presentation component of the competition.

The presentation format can be done in a Microsoft PowerPoint, Prezi, or another method approved by the Competition Director.

Both the technical report and presentation are to include citations of all referenced material. The reference style to be used is APA citation.

RESPONSE TO QUESTIONS

- Only the Competition Director or SEC Commissioner may answer questions during the problem presentation and design phases
- Volunteers and judges may not answer questions regarding rules and procedures at any time
- During the presentation of the problem, the competition director shall answer orally and write down the answers provided
- During the design phase, only questions related to deliverable content shall be answered
- No answers shall be provided in response to questions about the problem that might lead to the development of a new approach or which might invalidate a solution
- During the design phase, answers to questions shall be provided in writing via email to all teams at the same time.
- A certain amount of time (e.g. 30 minutes) may be allowed to elapse or a significant number of questions accumulated before responses are provided A copy of the responses must be provided to the judges prior to presentation

ASSESSMENT AND JUDGING

- The judging panel will consist of an odd number of judges, with a minimum of three (3) in total
- The presentations shall be carried out without an audience

JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Solution 55%

- Addresses problem statement 15%
- Environmental, social and economic analyses 15%
- Real-world applicability 15%
- Technical innovation and creativity 10%

Report 20%

- Report Organization 5%
- Writing Style 5%
- Content 10%

Presentation 25%

- Presentation Organization 5%
- Confidence and Presence 5%
- Communication 5%
- Visual Aides 5%
- Question Responses 5%

Penalties

- Insufficient Citation -50%
- Verbal disclosure of school during presentation -10%
- Disclosure of school in presentation files/documents -10%
- Disclosure of school by other delegates -10%

Total 100%

ENGINEERING COMMUNICATIONS

Engineering communications challenges a team of one or two competitors to describe a complicated technical process or issue in terms that the general public can understand. Evaluation is based on the competitor's public speaking skills and the ability to persuade their audience.

TEAM COMPOSITION

The Consulting Engineering team will be comprised of one (1) or two (2) competitors. All team members must be current undergraduate students in the College of Engineering.

TOPIC ELIGIBILITY

The topic should adhere to the following criteria:

1. The topic must be technical in nature
2. The presentation will assess social, environmental, political and economic ramifications of implementation
3. The work must not be copied or plagiarized from another team or source

RESOURCES FACILITIES REQUIRED

- 1 Amphitheatre for presentation

PERSONNEL REQUIRED JUDGES

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

DIRECTOR

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

OFFICIAL TIMEKEEPER

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

EQUIPMENT PROVIDED BY WEC

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

- 1 Digital projector
- 1 Table
- Blackboard(s) or whiteboards(s)
- Computer

ALLOWED EXTERNAL RESOURCES

Competitors are required to bring any presentation materials which they will use, including computers, pictures or diagrams and models or prototypes. A computer will be made available should competitors be unable to supply their own. Any external sources use in the presentation must be properly cited.

PROCEDURE / TIMELINE PRE-COMPETITION

At least two (2) days prior to the competition, the team must submit a presentation abstract. The abstract will be reviewed by the Competition Director to assess the suitability of the presentation for inclusion in the Engineering Communication competition. It will be given to the judges for information at least 24 hours prior to the competition.

The abstract must describe the presentation topic in no more than two hundred (200) words.

COMPETITION PRESENTATION PERIOD

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

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.

TIMEKEEPING

The following rules will be adhered to during the presentation:

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

PRESENTATION ORDER

- The order of the presentations shall be determined randomly.

DELIVERABLES 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 prepare. The abstract must be a maximum of two hundred (200) words describing the presentation topic.

PRESENTATION SLIDES

Competitors must supply a soft copy (digital) of their presentation to the competition director at least 2 days prior to the day of the competition. The director may assign the due date their discretion to allow time for testing the presentation and printing hard copies. These slides will be used to aid the judges in keeping notes and providing feedback when necessary and desired.

ASSESSMENT AND JUDGING

- Judges should have experience in communications
- Judges do not require any technical knowledge on the subjects being presented
- The panel must have an odd number of judges
- The panel must have at least three (3) judges
- The assessment shall be carried out in the audience's presence
- Feedback forms shall be provided to each team following the announcement of winners

JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Introduction to Topic 20%

- Topic clearly presented 5%
- Appropriate level of language 5%
- Interest elicited by topic 5%
- Accuracy of explanation 5%

Critical Analysis 30%

- Environmental, social and economic analysis 10%
- Further analysis 10%
- Quality of arguments 10%

Presentation 45%

- Presentation Organization 10%
- Confidence and Presence 10%
- Communication 10%
- Visual Aides 10%
- Question Responses 5%

Written Abstract 5%

Total 100%

Impromptu Debate

Competitors will be presented with various topics associated with engineering or general knowledge. For example, “The Legal Drinking Age Should Be Lowered.” One team, the proposition, will present a principle statement or plan case convincing the judges of the merits of this statement. The competing team, the opposition, will explain how the proposition’s points are fallacious, and how the principle or plan is bad in general. No prior research or notes are permitted, and the debates are expected to be understood by the average person.

TEAM COMPOSITION

Each Impromptu Debate team will be comprised of two (2) competitors. All team members must be current undergraduate students in the College of Engineering.

RESOURCES FACILITIES REQUIRED

Two rooms, each with a whiteboard, tables, and chairs.

PERSONNEL REQUIRED JUDGES

A minimum of three (3) judges are required to assess the arguments of the competitors.

TIMEKEEPER

The Timekeeper is responsible for enforcing time limits during the debate.

EQUIPMENT PROVIDED BY WEC

- A whiteboard for displaying the debate topic
- Two tables laid out in debate fashion
- Additional tables and chairs for judges, timekeeper, and spectators

ALLOWED EXTERNAL RESOURCES

Competitors may bring a pen and paper for writing. They may use a cellphone for the sole use of keeping track of time during their speeches – debaters MAY NOT research the debate topics.

PROCEDURE / TIMELINE COMPETITION FORMAT

Saskatoon Engineering Competition Impromptu Debate will be held in head-to-head round-robin format. In the case multiple teams hold the same amount of wins, the victor of the tying teams from the round-robin will be held as first place.

SPEAKING ORDER AND LENGTHS

1. First speaker of the Proposition:

5 minutes

2. First speaker of the Opposition:

5 minutes

3. Second speaker of the Proposition:

5 minutes

4. Second speaker of the Opposition:

5 minutes

The first and last minute of each speech is “protected” meaning that no questions may be asked by the opposing team. If a debater is over the time limit, the Chair will allow a fifteen (15) second grace period. Upon exhaustion of speaking time, loud pounding on tables will be deemed appropriate.

5. Rebuttal by the first speaker of the Opposition:

2 minutes

6. Rebuttal by the first speaker of the Proposition:

2 minutes

No questions may be asked, by the opposing team, during rebuttal speeches. If a debater is over the time limit, the Timekeeper will allow a fifteen (15) second grace period. Upon exhaustion of speaking time, loud pounding on tables will be deemed appropriate.

TIMEKEEPING

There will be one Timekeeper in each debate. They will hit the table to indicate the end of protected time, after the first minute of each speech. After this they will hold up fingers to indicate the number of minutes left in the speech. They will hit the table once more, to indicate the return of protected time, when there is one minute remaining. Once the full time has been spent, they will move their arm like the hand of a clock counting down the 15 second grace period.

CHOOSING SIDES

The winner of a coin toss will choose which side of the topic to debate - proposition or opposition.

PREPARATION

After sides are chosen, the debate topic will be revealed. Debaters will be given ten minutes to prepare their arguments.

QUESTIONS

Questions are a secondary means of refuting arguments. They can promptly point out deficiencies in ideas. The debater who currently holds the floor has the authority to take or ignore questions. The opponent who wishes to ask a question indicates their desire by simply standing up. If the debater does not wish to take the question, he or she can so indicate by a wave of the hand or a simple "no, thank you." If this occurs, the inquiring party must sit down. If the current debater wishes to entertain the question, it

must be stated by the opponent in less than fifteen (15) seconds. Both team members may take part in answering the question. The time used to ask and answer the question comes out of the current debater's allotted time. Each debater must accept one question during his or her speech, if the opponent is making an honest attempt to ask a question. Three attempts at asking a question constitutes an honest attempt. Questions will not be allowed in the first or last minute of a speech, or during rebuttals.

REBUTTALS

In the rebuttals, the most prevalent elements of the debate must be summarized in a concise and convincing manner. Each side should summarize in a way that shows their arguments in a positive light. No new arguments or facts may be presented unless they directly refute what has already been discussed.

ASSESSMENT AND JUDGING

The debates will be judged based upon the most convincing argument. Each judge will decide individually, and the debate chair will tally the decisions and announce the winner. Judges will be looking for which side presents the highest number of strong arguments that are not refuted by the other side. They will judge as if they have no prior specific knowledge of the topic. Judges will not necessarily give points for organization or speaking ability, but the easier it is for judges to keep up and understand, the easier it is for them to award points.

POINTS OF PROCEDURE

If a team believes that one of the rules of the debate have been broken, they must immediately alert the Timekeeper of the violation by standing and saying, "Point of Procedure." The Timekeeper will then respond with, "Make your point." The team will then proceed to explain how the debate rules have not been followed. Finally, the Timekeeper will rule on the point by saying, "Point well taken" or "Point not taken." The time it takes to rise and rule on a point is not included in the speaking time of the team currently debating. If excessive, Points of Procedure will have a large impact on judges' final decisions. The following are violations that warrant a point of procedure:

- Unprofessional behavior
- Offensive behavior;
- Truism or specific knowledge case*
- Misquotations
- Speaking to the opposing team instead of the audience
- Presenting new arguments in the rebuttal
- Introduction of parts of a plan by the second speaker

* If the proposition has presented a truism or specific knowledge case, the opposition must wait until the end of the first debater's speech to point this out.

HECKLING

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

PROPOSITION AND OPPOSITION DETAILS PROPOSITION THE PRINCIPLE CASE

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

THE PLAN CASE

In a plan case, the proposition still identifies a principle and a contention. Once this is done, they present a plan for implementing the contention and changing the status quo. They must identify the need for change and how the plan will induce this change. Example plans for the above contentions would be: "Students should be required to take two years of general studies before entering an engineering program" and "Individuals should be charged a fee every time they visit a doctor." The plan case is the most effective when the principle and contention are almost non-debatable. For example, if the resolution is "Be it resolved that waste management should become more stringent," the contention is almost unquestionable. However, the proposition can intensify the debate by adding, "Thus, we propose that any household that produces more than a certain quota of waste be severely fined." In a plan case, it is important that the plan does not become too specific since preparation time is limited and the technical knowledge necessary to develop the plan is non-existent.

FIRST SPEAKER OF THE PROPOSITION

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

THE SECOND SPEAKER OF THE PROPOSITION

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

OPPOSITION

The opposition's task is to convince the judges that the proposition's views are fallacious. The opposition can also show how the plan will not work or identify the undesirable side effects that it will create. Finally, the opposition may propose a counter plan that is more effective than the original plan. The first speaker of the opposition must introduce any counter plans. If the case presented by the proposition is a truism or requires specific knowledge to debate, the opposition can appeal to the judges with a "point of procedure" (see section above) at the beginning of the first speech from the opposition. If the point is well taken, then the opposition must redefine the resolution in a debatable manner. If the proposition presents a principle case, the opposition

is left with little more to do than attack the principle. If the proposition presents a plan case, the opposition can attack the principle, the contention or the arguments for the plan.

INNOVATIVE DESIGN

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

TEAM COMPOSITION

The Innovative Design team will be comprised of one (1) to four (4) competitors.

Should the presenting team be a subset of the project team and plan to use the team project for the competition, 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. However, it is encouraged for all team members to present with equal participation.

TOPIC SELECTION

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 the social, environmental and economic ramifications of product design
- The work must not be copied or plagiarized from another team or source

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 that analyzes the applicability of the project's topic.

RESOURCES FACILITIES REQUIRED

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

PERSONNEL REQUIRED JUDGES

The judging panel will consist of an odd number of judges, with a minimum of three (3) in total.

DIRECTOR

The competition director is responsible for the logistics and implementation of the Innovative Design competition. The director must be available to competitors and judges at any time for questions and requests. Director should also be present at all presentations when possible or have someone equivalent take their place.

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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. This role can be run jointly with the director.

EQUIPMENT PROVIDED BY SEC

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

- A single standard banquet table (8' x 2 1/2' or equivalent)
- Electrical power supply for each team, if necessary
- A chair for each team member

ALLOWED EXTERNAL RESOURCES

There is no restriction on the resources which competitors are allowed to bring to the competition. A list of resources must be provided to the Competition Director in accordance with the "Pre-Competition Procedure/ Timeline."

PROCEDURE / TIMELINE PRE-COMPETITION

All competitors will need to submit a one-page competition brief, detailed in the "Deliverables" section.

They will also receive the location where all display material, models and equipment will be shipped to and stored.

Competitors must convey the following information to the Competition Director:

- Any specific needs (layout, electrical, power supply, etc.)
- The planned shipping methods of displays or equipment, including arrival time

COMPETITION TIMELINE Set-up

Competitors set up their displays the morning of the competition. Compliance with any dimension constraints is checked at this time.

Competition Briefing

The Director will host a competition briefing, attended by the competitors and judges, where details of the competition timeline and judging structure are discussed. There will be time allowed for questions.

If the team wishes the Judges to have physical copies of the presentation slides, they must have them printed and handed in by 9 am.

COMPETITION PUBLIC OPENING

The exhibitions are open for visits from the general public. Competitors must staff their displays for a minimum of two (2) hours, including one (1) hour during judging periods. Judging periods are to be indicated during the competition briefing. The judges, either individually or in groups of two, will walk among the displays during the judging period. The competitors may give up to a twenty (20)-minute presentation, followed by a ten (10)-minute question period, at their displays. They must use only the resources at their display to illustrate their work. Competitors will be required to give their presentation more than once as each judge must see all displays, but not at the same time.

TIMEKEEPING

The following rules govern timekeeping:

- Time is not halted when a judge asks a question during the presentation
- The remaining time must be indicated to the competitors ten (10) minutes, five (5) minutes, and 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
- Time to both ask and answer questions during the question period is counted

PRESENTATION ORDER

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

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

DELIVERABLES

Deliverables are due to the judges by the beginning of the judging period on Competition Day, unless noted otherwise.

DESIGN SUMMARY

Prior to the competition, the team must submit a design summary. The purpose of this summary is for the judges and organizers to be prepared ahead of time with regards to the topics being presented. This summary will follow conventional formatting characteristics (12-point font, 1.5 line spacing, 1" paper margins) and is limited to one (1) page. The summary must include, but is not limited to:

- Team Name
- Team Members
- Design topic and description

PRESENTATION HANDOUTS

If a slideshow presentation is to be utilized, a hard copy of all slides may be prepared for each judge, if the competitors would like to provide such. If so, the competitors must provide their own to give to the

judges.

ASSESSMENT AND JUDGING

- The panel must have an odd number of judges
- The panel must comprise a minimum of three judges. There is no maximum number of judges

JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Solution 60%

- Design Justification 15%
- Environmental, social and economic feasibility 15%
- Technical Feasibility 15%
- Commercial Feasibility (cost, production, marketability, and implementation) 15%

Presentation 30%

- Presentation Organization 10%
- Confidence and Presence 5% Communication 5%
- Visual Aides 5%
- Question Responses 5%

Design Summary 10%

Total 100%

JUNIOR DESIGN

This competition challenges junior (first or second year) engineering students to design and build a prototype to address a technical problem. The Junior Team Design category is similar to that of Senior Team Design. However, with emphasis on prototype functionality rather and design theory.

TEAM COMPOSITION

The design team must be comprised of a maximum of four competitors. The entire team must be enrolled in the 1st or 2nd year of the undergraduate engineering program at the University of Saskatchewan.

RESOURCES FACILITIES REQUIRED

- One (1) Amphitheatre, including centralized area for prototype testing, presentations, and judges table
- One (1) separated workspace per team
- One (1) separate space for supplies "store"

PERSONNEL REQUIRED JUDGES

A minimum of three (3) to a maximum of five (5) judges are required to assess problem solving abilities, efficacy of solution and team dynamic (work ethic, cooperation, etc.). Judges in this category do not require a technical background in engineering, however an understanding of effective presentation techniques and other engineering 'soft' skills is an asset.

DIRECTOR

The Competition Director is responsible for the entire design and implementation of the Junior Design competition. The Director must present the design challenge at the beginning of the competition and answer applicable questions. Only the director may answer question during the design period. The Director will also answer any questions the judges may have throughout the competition.

OFFICIAL TIMEKEEPER

The Official Timekeeper is responsible for enforcing time limits during the competition and presentations. This role may be run jointly with the Director.

EQUIPMENT PROVIDED BY SEC

1. The following will be made available to all competitors during the design phase:
 - Any materials specific to the design problem
 - Any tools specific to design problem, tool availability may vary, tools may be constrained to a tool work station or on a timed sharing program
2. Materials available to all competitors during the presentation phase may vary based upon quantity.

ALLOWED EXTERNAL RESOURCES

Absolutely no external resources are permitted entry or use during the Junior Design challenge. Competitors are prohibited from using the internet, contacting a third party, or bringing in previously gathered material or information. This includes the use of all laptop computers, cell phones, tablets, or any other communication device in regard to advancing themselves in the competition. Violations may result in disqualification at the discretion of the Competition Director.

PROCEDURE / TIMELINE PRE-COMPETITION AND COMPETITION TIMELINE

Information regarding the rules of the competition will be sent to all competitors at least two (2) days in advance of the competition. A detailed timeline and any relevant background information will also be provided at this time.

COMPETITION PRESENTATION OF CHALLENGE

The problem will be presented to all competitors and judges at the beginning of the competition. The Competition Director will provide a detailed explanation of what is expected from the competitors both orally and written.

QUESTION PERIOD

There will be a fifteen (15) minute question period during which time the competitors may ask any the Competition Director any questions they may have. Only time used to ask questions should be counted.

DEVELOPMENT OF SOLUTION

Teams will be given four (4) to six (6) hours to develop their solution, produce all required deliverables, and prepare their presentation for the judges. All deliverables must be submitted before allotted time expires. Competitors may finish early.

Deliverable must be submitted before a team is permitted to leave the competition area. All submissions are final.

PRESENTATION AND TESTING

Competitors have five (5) minutes to present their design. All teammates must participate in the presentation. The original design, its rationale, design process, and a critique of the prototype are required presentation components. The Judges then have up to five (5) minutes to ask questions.

Each team must then carry out a set number of tests of their prototype. The Competition Director will dictate the number and length of trials. Each team will test directly after their presentation and must clear the test area immediately afterward so that it may be reset for the next team.

TIMEKEEPING

- During presentation of the problem, only time used to ask questions during question period is counted, not time used to answer.
- Development period time will begin when all teams have reached their workstations. Remaining time will be announced at the two (2) hour, one (1) hour, thirty (30) minute, and ten (10) minute marks.
- Remaining presentation time will be signaled at the two (2) minute and one (1) minute marks. As well as a visual countdown from thirty (30) seconds to presentation end.

PRESENTATION ORDER

Presentation order will be determined randomly. This shall be announced at the end of the development time. At least one member of each team must be present at this announcement.

DELIVERABLES

- Each team is required to submit a prototype before the end of the design period. This will be used to test the teams' solution to the design problem.
- No report or presentation material are required for the Junior Design competition. Teams may choose to use visual aids in their presentation, however emphasis is placed on explanation of design and functionality of prototype. This is reflected in judging criteria.

ASSESSMENT AND JUDGING

- The judging panel will consist of an odd number of judges, with a minimum of three (3) in total
- The Assessment shall be carried out in the audience's presence

JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Presentation 30%

- Design Process 5%
- Design Justification 5%
- Presentation 10%
- Delivery 10%
- Questions Answered 5%

Design Quality 30%

- Deliverable compliance with expectations 10%
- Technical innovation and creativity 10%
- Use of resources 10%

Testing 40%

- Testing criteria will be revealed during problem presentation

Total 100%

Programming

The Programming Competition challenges competitors to create a program which solves the presented problem.

TEAM COMPOSITION

The Programming team will be comprised of between two (2) and four (4) competitors. All team members must be current undergraduate students in the College of Engineering.

RESOURCES FACILITIES REQUIRED

- One (1) Amphitheatre (presentation of problem and presentations)
- One (1) workspace for each team (development of program and presentation)

PERSONNEL REQUIRED JUDGES

There will be a minimum of three (3) judges for the Programming Competition and when this number is in excess the total number of judges will be an odd number. The judges are required to assess the problem-solving ability, prototype quality and design skill, and team dynamics of the competitors. Judges in this category should have some technical engineering experience, with experience in coding being an asset.

DIRECTOR

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

OFFICIAL TIMEKEEPER

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

RESOURCES PROVIDED BY WEC DESIGN PERIOD

The following resources will be made available to all teams during the design phase:

- A private workspace with at least one (1) table and four (4) chairs
- Internet access
 - An “example_results.log” file for reference

The following resources will be made available to all teams during the presentation phase:

- One (1) digital projector and screen
- Computer with submitted presentations and program preloaded
- Table
- Whiteboard/Blackboard

RESOURCES NOT PROVIDED BY SEC REQUIRED RESOURCES

Each team must have competitor owned computer(s) or laptop(s) with legal copies of developmental software are required.

Programming languages are restricted to the following: Assembly, C, C++, Objective-C, C#, Java, JavaScript, Python, Ruby, Perl, VB, VHDL, Lisp, MatLab, Haskell, SQL, PHP, HTML.

There are no restrictions on compilers.

OPTIONAL RESOURCES

Teams may bring the following resources to the competition:

- Three (3) additional workstations (for a total of four (4))
- Textbooks, course notes, or other reference material

PROCEDURE / TIMELINE PRE-COMPETITION AND COMPETITION TIMELINE

At least two (2) days prior to the start of the competition, the competition director will send an email to competitors containing the general theme of the competition, any required or optional equipment, and a brief timeline of the competition.

COMPETITION PRESENTATION OF PROBLEM

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

QUESTION PERIOD

Upon hearing the problem description, fifteen (15) minutes will be allotted for competitors to ask questions pertaining to the competition. The competition director will do his/her best to answer these questions. Any questions posed during this period will later be made publicly available, along with their answers, to all competitors.

SOLUTION DEVELOPMENT

Teams will have six (6) hours to develop their solution, prepare their presentation, and produce all required deliverables. Teams must submit their deliverables to the competition director any time before the end of the solution development period, or they may be disqualified.

PRESENTATION AND PROTOTYPE DEMONSTRATION

Each team will have up to fifteen (15) minutes to present, which includes showcasing completed deliverables to the judges. The presentations submitted at the end of the Solution Development phase will be used during the Presentation phase. No modifications to the presentation will be permitted. All team members must participate in the presentation, or they will be penalized by the judges. After presentations, the judges will have up to ten (10) minutes to ask the team questions pertaining to their presentation and design. The total presentation and demonstration time allotted to each team is thirty (30) minutes starting promptly at each team's scheduled time.

RESPONSE TO QUESTIONS

Only the competition director may answer questions during the problem presentation and solution development phases. Volunteers and judges may not answer questions regarding rules, competition interpretation, or procedures.

During the solution development phase, only questions related to deliverable content shall be answered. No answers shall be provided in response to questions about the problem that might lead to the development of a new approach or that might invalidate a solution.

All questions answered by the competition director shall be recorded and made publicly available to all competitors.

TIMEKEEPING SOLUTION DEVELOPMENT

The solution development time shall be started when all teams have reached their workspace after the question period has concluded. The remaining time will be announced when three (3) hours, one (1) hour, thirty (30) minutes, and ten (10) minutes are remaining.

PRESENTATION AND TESTING PHASE

The total presentation and demonstration time allotted to each team is thirty (30) minutes starting promptly at each team's scheduled time. If thirty minutes has elapsed, the scheduled team must end their presentation or prototype demonstration immediately.

The fifteen (15) minute presentation and demonstration time will start when teams initiate their presentation. The remaining time will be indicated to presenters when (5) minutes and one (1) minute are left in the presentation time. A visual countdown will be made available to competitors when thirty (30) seconds are remaining. Teams are allowed five (5) minutes to set up.

The ten (10) minute question time will start as soon as the fifteen (15) minute presentation time has elapsed, or when presenting teams are finished their presentations, whichever occurs first. Judges will not be permitted to ask questions once the question time has elapsed.

PRESENTATION ORDER

The presentation schedule shall be determined randomly. Teams may not switch their presentation times. The presentation schedule will be made available to all teams the day before the first presentation begins.

DELIVERABLES

Deliverables are due to the competition director six (6) hours after the Solution Development phase begins. These deliverables consist a digital copy of the team's presentation and the team's project, including all user documents, any error reports, a copy of the program, and all source code used to

construct the solution. Any additional deliverables required will be outlined in the handout given to competitors during the solution development phase.

ASSESSMENT AND JUDGING

The judging panel will consist of an odd number of judges, with a minimum of three (3) present.

JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Design Quality 70%

- Program Design 20%
- Solution Performance 15%
- Technical innovation and creativity 15%
- Appropriate user documents 10%

Presentation 30%

- Presentation Organization 10%
- Confidence and Presence 5%
- Communication 5%
- Visual Aides 5%
- Question Responses 5%

Penalties

Reported bugs/issues

- 5% per bug/issue

Non-reported bugs/issues

- 25% per bug/issue

Total 100%

Re-Engineering

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 changes will be to improve the original device and/or extend the use of the device to an alternate situation or use case.

TEAM COMPOSITION

The Re-engineering team will be comprised of one (1) or two (2) competitors. All team members must be current undergraduate students in the College of Engineering.

RESOURCES FACILITIES REQUIRED

- Amphitheatre for the presentation phase
- One (1) workroom per team for the design phase

PERSONNEL REQUIRED JUDGES

An odd number and minimum of three (3) judges will assess the problem-solving abilities, proposed solution(s), creativity, communication skills and team dynamics of the competitors. Judges in this category should have some experience with communication and public speaking, as well as some technical engineering experience.

DIRECTOR

The Competition Director is responsible for the implementation of the Re-engineering competition. The director must be present at all of the presentations and be available to competitors and judges at any time during the competition for questions and requests.

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. This role can be run jointly with the director.

EQUIPMENT PROVIDED BY SEC

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

- A design room with at least one (1) table and two (2) chairs per team
- Internet connection

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

- One (1) projector
- One (1) computer containing the team's presentation file
- Whiteboard(s) or blackboard(s) and appropriate writing tools
- Laser pointer

ALLOWED EXTERNAL RESOURCES

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

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
- Any textbooks, course notes or other reference materials
- One (1) computer (laptop or tablet) per team member

Note: Since the use of the internet and other external resources is permitted, all information used by competitors must be referenced carefully using the IEEE citation style and a final list of references. Competitors are not permitted to submit work completed by anyone other than the members of their team present at competition.

PROCEDURE / TIMELINE PRE-COMPETITION

The first of the competition cases will be distributed via email to competitors one (1) week in advance of the competition.

COMPETITION PROBLEM PRESENTATION

Two (2) additional cases will be presented to the competitors on the first day of competition, prior to the design start time. Of these two (2) new cases, teams will choose one (1) to develop a solution for, in addition to the single case distributed before the competition. 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 are allowed to use a computer during the lead time to take notes, but internet access will be restricted, and competitors will not be permitted to start working towards a solution during this time.

CASE STRUCTURE

Competitors will propose two (2) solutions which address the case distributed prior to the competition and one (1) of the cases presented to competitors on the start day. Teams may alternatively submit a single solution which addresses both the case distributed prior to the competition and one (1) of the cases presented to competitors on the start day.

DESIGN DEVELOPMENT

The competitors will be allowed a total of six (6) hours at competition to develop their solution(s) to the cases and prepare their required submission materials.

ADDRESSING QUESTIONS

During the design period, competitors will be able to direct questions to the Competition Director by emailing an identified email account. All received questions and their respective answers will be emailed to all competitors every half hour from the start of the design time. The Competition Director may elect to answer questions more often at any point in the competition.

CONSULTATION PHONE CALLS AND EMAIL

Competitors are not allowed to place phone calls during the competition time related to the competition cases. Teams will be allowed to utilize email at their own discretion throughout the competition period. However, all original ideas for design and innovation must come from the team members themselves and any communications which contribute significantly to the design must be referenced in the report.

DESIGN PRESENTATIONS

Competitors will have a maximum of fifteen (15) minutes to present their solution(s). 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 may also ask questions at any time during the presentation. Presentations will be open to the public with the exception of Re-Engineering competition teams who have not yet delivered their own presentation.

TIMEKEEPING

Presentations will be timed from the moment that the team starts speaking. Competitors will be warned twice as their time expires: two (2) minutes before their fifteen (15) minutes are up, and thirty (30) seconds before their fifteen (15) minutes are up. The clock will be stopped anytime that judges ask questions during a presentation and judges will not be permitted to ask questions during the last (30) seconds of a presentation. Following a presentation, the timer will be started again for up to ten (10) minutes of judges' questions or until a total of twenty-five (25) minutes has passed, whichever occurs first. The Official Timekeeper will then stop judges from asking more questions. However, competitors will be allowed to finish answering the last question posed to them.

PRESENTATION ORDER

Presentations order will be announced the morning of the presentations at least one (1) hour before the first presentation. The order will be random and cannot be modified.

DELIVERABLES SUBMISSION

The written report(s) and all presentation materials must be submitted immediately at the end of the design time. Submissions can be accepted either through emailing an identified email account or saving the files on a USB drive and physically handing it to the Competition Director. For the purposes of determining whether a submission was made by the deadline, email submissions will be time-stamped against the receipt time reported by the receiving email server. If submitting by USB drive, the participant must have their submission ready in hand to give to the Competition Director at the end of the design development time. Late submissions will not be accepted.

PRESENTATION

One presentation should cover both completed cases and should present both the material included in the reports and explanations required to meet the evaluation criteria below.

PROHIBITED CONTENT

To ensure that all competitors cease 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.

REPORT

The competitors may elect to write either one (1) or two (2) reports. In both instances, they must include the following information and adhere to the following rules:

- The proposed changes to each case
- How the proposed changes meet the requirements laid out in the case description
- Technical and financial characteristics of the proposed changes
- Any calculations which relate to the prior three points.
- All submitted material must be contained on two (2), single sided, letter sized (8.5"x11") pieces of paper
- The minimum values for font and margins are 11pt and 1/2", respectively.

Any necessary appendices and exhibits will not count against the above length limitations. Any such included appendices and exhibits, however, must be clearly referenced in the main text of the report and should not embed an excessive amount of text. Appendices and exhibits should be considered bonus pages, and the report(s) must make sense without them.

CITATION

All competitors are required to cite any outside sources on which the facts and statements in the report are based. IEEE citation format will be used for consistency between all teams. Failure to cite all non-original statements will result in a penalty levied against the offending team.

ASSESSMENT AND JUDGING

The judging panel will consist of an odd number of judges with a minimum of three (3).

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JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

	Case 1	Case 2
Solution 60%		
• Proposed Changes (ability to address the problem and fulfill requirements)	10%	10%
• Technical Feasibility (is the design technically proficient?)	10%	10%
• Innovation and Creativity	5%	5%
• Commercial Feasibility (cost, production, marketability, and implementation)	5%	5%
Report 15%		
• Report Organization	5%	
• Writing Style	5%	
• Content	5%	
Presentation 25%		
• Presentation Organization	5%	
• Confidence and Presence	5%	Communication 5%
• Visual Aides	5%	
• Question Responses	5%	
Penalties		
• Insufficient Citation	-50%	
Total 100%		

Senior Design

The Senior Design Competition challenges competitors to design a solution and build a prototype to address a technical problem.

TEAM COMPOSITION

The Senior Design team will be comprised of between two (2) and four (4) competitors. All team members must be current undergraduate students in the College of Engineering.

RESOURCES FACILITIES REQUIRED

- One (1) Amphitheatre (presentation of problem and presentations)
- One (1) workspace for each team (development of prototype and presentation)
- One (1) testing space (testing of prototypes)

PERSONNEL REQUIRED JUDGES

A minimum of three (3) to a maximum of five (5) judges are required to assess the problem-solving ability, prototype quality and design skill, and team dynamics of the competitors. Judges in this category should have some technical engineering experience, with experience in mechanical design being an asset.

DIRECTOR

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

OFFICIAL TIMEKEEPER

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

VOLUNTEERS

A minimum of two (2) volunteers are required for various support tasks during the design period. These tasks include operation of the store and running the test area. A minimum of two (2) volunteers are required for the presentation period.

RESOURCES PROVIDED BY SEC DESIGN PERIOD

The following resources will be made available to all teams during the design phase:

- A private workspace with at least one (1) table and four (4) chairs
- A digital storage device for submission of presentation
- Any required competition-specific materials.

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PRESENTATION PERIOD

The following resources will be made available to all teams during the presentation phase:

- One (1) digital projector and screen
- Computer with submitted presentations preloaded
- Table
- Whiteboard/Blackboard
- Team's design prototype
- Testing area

RESOURCES NOT PROVIDED BY SEC REQUIRED RESOURCES

Each team must have one (1) laptop with a working trial copy of the Arduino IDE and the firmware downloader on it. It is recommended that this software is installed a few days before competition.

OPTIONAL RESOURCES

Teams may bring the following resources to the competition:

- Three (3) additional laptops (for a total of four (4))
- Textbooks, course notes, or other reference material

PROCEDURE / TIMELINE PRE-COMPETITION AND COMPETITION TIMELINE

At least two (2) days prior to the start of the competition, the competition director will send an email to competitors containing the general theme of the competition, any required or optional equipment, and a brief timeline of the competition.

COMPETITION PRESENTATION OF PROBLEM

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

QUESTION PERIOD

Upon hearing the problem description, fifteen (15) minutes will be allotted for competitors to ask questions pertaining to the competition. The competition director will do his/her best to answer these questions. Any questions posed during this period will later be made publicly available, along with their answers, to all competitors.

SOLUTION DEVELOPMENT

Teams will have six (6) hours to develop their solution, prepare their presentation, and produce all required deliverables. Teams must submit their deliverables to the competition director any time before the end of the solution development period, or they may be disqualified.

PRESENTATION AND PROTOTYPE DEMONSTRATION

Each team will have up to fifteen (15) minutes to present their designs to the judges. The presentations submitted at the end of the Solution Development phase will be used during the Presentation phase. No modifications to the presentation will be permitted. All team members must participate in the presentation, or they will be penalized by the judges. After presentations, the judges will have up to ten (10) minutes to ask the team questions pertaining to their presentation and design. Finally, each team will be allotted ten (10) minutes for prototype testing, where they may perform up to two (2) tests of their prototype, each up to two (2) minutes in length. The total presentation and demonstration time allotted to each team is forty (40) minutes starting promptly at each team's scheduled time.

RESPONSE TO QUESTIONS

Only the competition director may answer questions during the problem presentation and solution development phases. Volunteers and judges may not answer questions regarding rules, competition interpretation, or procedures.

During the solution development phase, only questions related to deliverable content shall be answered. No answers shall be provided in response to questions about the problem that might lead to the development of a new approach or that might invalidate a solution.

All questions answered by the competition director shall be recorded and made publicly available to all competitors.

TIMEKEEPING SOLUTION DEVELOPMENT

The solution development time shall be started when all teams have reached their workspace after the question period has concluded. The remaining time will be announced when four (4) hours, one (1) hour, thirty (30) minutes, and ten (10) minutes are remaining.

PRESENTATION AND TESTING PHASE

The total presentation and demonstration time allotted to each team is forty (40) minutes starting promptly at each team's scheduled time. If forty minutes has elapsed, the scheduled team must end their presentation or prototype demonstration immediately.

The fifteen (15) minute presentation time will start when teams initiate their presentation. The remaining time will be indicated to presenters when (5) minutes and one (1) minute are left in the presentation time. A visual countdown will be made available to competitors when thirty (30) seconds are remaining.

The ten (10) minute question time will start as soon as the fifteen (15) minute presentation time has elapsed, or when presenting teams are finished their presentations, whichever occurs first. Judges will not be permitted to ask questions once the question time has elapsed.

The ten (10) minute prototype demonstration time will start as soon as the ten (10) minute question time has elapsed, or when judges no longer have questions for the teams. Teams may perform up to two (2) prototype tests of two (2) minutes in length within the prototype demonstration time. Once the ten (10) minutes have elapsed, teams may not initiate any prototype tests, and any currently running prototype tests must stop immediately.

PRESENTATION ORDER

The presentation schedule shall be determined randomly. Teams may not switch their presentation times. The presentation schedule will be made available to all teams the day before the first presentation begins.

DELIVERABLES

Deliverables are due to the competition director six (6) hours after the Solution Development phase begins. These deliverables consist of at least the prototype and a digital copy of the team's presentation. Any additional deliverables required will be outlined in the handout given to competitors during the solution development phase.

ASSESSMENT AND JUDGING

The judging panel will consist of an odd number of judges, with a minimum of three (3) present.

JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Presentation 25%

- Team Strategy 5%
- Teams' use of Design Process 5%
- Alternatives Considered 5%
- Presentation delivery and style 5%
- Question Responses 5%

Design Quality 35%

- Abides to the spirit of the competition 5%
- Design compliance with expectations 10%
- Technical innovation and creativity 10%
- Consideration of economic, social and environmental impacts of design 10%

Testing 40%

- Quantified score as outlined in the problem description

Total 100%