SAENIS TTTMS CASE STUDY CHAMPIONSHIP-2023

Rulebook

1. **Overview**
    1.1. **Introduction:** SAENIS TTTMS Students Case Study Championship is an annual flagship championship, organized by SAE Northern India Section **(SAENIS)** in collaboration with various industries. This is the 2nd session of this championship.

    1.2. **Objective:** The objective of the championship is to bring all the young engineering minds from academia and industry together and provide them the common platform to solve and showcase the approach to some of the thermal engineering challenges that industry confronts today. Our mission is to cultivate, nurture and strengthen the engineering talents in our country and brainstorm together to solve the industrial problems. The championship comprises of three different rounds. The team will be asked
        1.2.1. **Round 1:** Overall outline of the Final solution of the problem statement in terms of mathematical modeling/Simulink Model needs to be submitted;
        1.2.2. **Round 2 (Final Round - Part 1 & Part 2):** Final Presentation of the Solution to be given at 6th SAENIS TTTMS Conference-2023 at Samskara Resorts, Jaipur, Rajasthan, India on 23rd September, 2023.

    1.3. **Championship Summary:** SAENIS TTTMS Case Study Championship is an annual flagship event organized by SAE Northern India Section in collaboration with various industries in the field of future thermal systems for automotive industry. In the championship, an individual team along with the mentor (Faculty Advisor) will be glanced through the disruptive, advanced & sustainable future thermal systems technology for automotive industry. The championship will provide a platform, where the participating students/teams will get the chance to interact with the best industry experts, academia veterans & government authorities responsible for policy making, from various domains in thermal systems for automotive applications. The participating teams will have to go through the detailed problem statement & submit the best possible solutions as per the guidelines. The team will be performing the thermal simulation of the submitted solution to validate the performance using MATLAB Simulink (Student Version License will be Provided or MATLAB License from Respective Colleges will be used). In case, any team is willing to simulate the solution for performance validation using the self-developed analytical tool, they will be allowed to do that. Based on various submissions, the top five submissions will be shortlisted via evaluation processes for the final round and they will get an opportunity to present the same at 6th SAENIS TTTMS Thermal Management Systems Conference-2023, scheduled at Samskara Resorts, Jaipur, Rajasthan, India, where the final winner (Top 3) of the championship will be declared.

2. **The Championship Rules & Organizing Authority**
    2.1. **Authority of the Rules:** The Rules of The Case Study Championship-2023 are the responsibility of the Organizing Committee and are issued under the authority of SAE Norther India Section. Official announcements from the Case Study Championship-2023 shall be considered part of rules and shall have the same validity as rulebook even if these were not initially included in the rulebook but communicated

separately. Ambiguities or questions concerning the meaning or intent of these rules will be resolved by the Organizing Committee only.

2.2. **Rules Validity:** The Case Study Championship 2023 Rules posted on the event website and dated for the calendar year 2023 of the championship are the rules in effect for the championship.

2.3. **Rules Compliance:** By entering The Case Study Championship 2023, the team, members of the teams as individual, faculty advisors and other associated personnel agree to comply with and be bound by these rules, all the rule interpretations or procedures issued or announced by SAE NIS or the Championship Organizing Committee. All team members, faculty advisors and other associated representatives are required to cooperate with and follow all instructions from championship organizers, officials and juries.

2.4. **Understanding of Rules:** Teams are themselves responsible for reading, interpretation and understanding the rules of the championship. To seek the clarifications regarding the rules, teams should contact the organizing committee. Teams must keep the records of all such email communications ready for reference during the evaluation round.

2.5. **Official Communication:** All teams must pay attention to the official announcement made by the Organizers. All official announcements will be posted on website and/or social media channels along with communication through email.

2.6. **General Authority:** SAENIS and the championship organizers reserve the right to revise the schedule of the championship and/or interpret or modify the championship rules at any time and in any manner that is in their sole judgment, required for the efficient and smooth operation of the event.

3. **Eligibility for Participation**

   3.1. Eligibility Limit for Team Members:

      3.1.1. **Student Status:** Team Members willing to take part in the championship must be enrolled in as engineering student from the same campus of a college, institute or university situated in India only. The participating team members must be enrolled in any one the mentioned program i.e. B.Tech., M.Tech. & PhDs in the college.

      3.1.2. **Team Size:** A group of 3 students (Maximum: 3 & Minimum: 1) members can register as a team. The team may contain students from any engineering discipline. One faculty advisor for the team is recommended.

      3.1.3. **SAE Membership:** There is no mandatory criteria for SAE Membership. Although, the interested student can join SAEINDIA membership group online at https://www.saeindia.org.

   3.2. **Faculty Advisor**

      3.2.1. **Requirements and Eligibility**: Each team is expected to have one faculty advisor from interdisciplinary engineering branches, mutually chosen by the team.

      3.2.2. **Responsibilities**: The faculty Advisor will be considered by the championship officials to be the official university/institute representative. The faculty advisor is supposed to advise his/her team on general engineering and engineering project management theory and act as guide of team. The faculty advisor is

allowed to attend the training programme offered by the organizing committee and is invited to attend the evaluation presentation of their team but will not be allowed to provide answers or justifications for any question on behalf of team.

      3.2.3. **Limitations:** The faculty advisor should neither provide the direct solution of the problem statement nor directly participate in the development of any documentation or presentation. The faculty advisor is restricted to answer on behalf of team during any evaluation. He/She is supposed to encourage the team to explain the answers by themselves. Also, he/she cannot perform any activities in event on behalf of the team members. It is also recommended that all documentation of team should be verified by the faculty advisor.
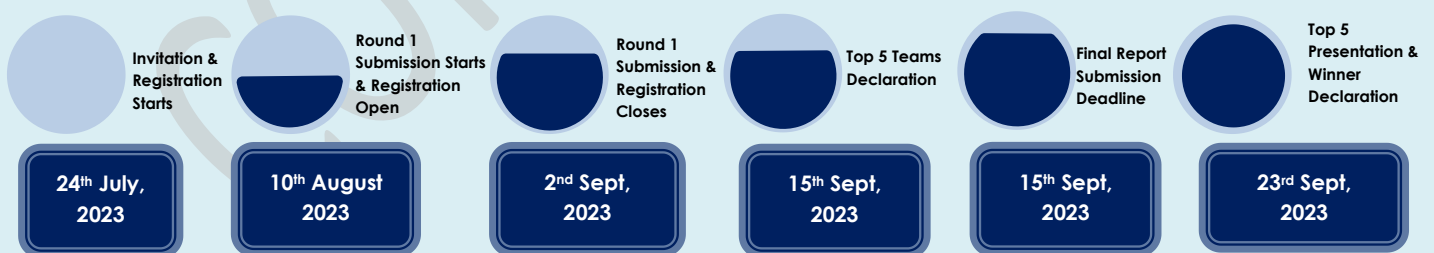
4. Registration Procedure

4.1. Team Registration for Participation: The team registration will be done through online portal with the link (https://bit.ly/44EiJ9m) Each team will have to pay nominal registration fee of **INR 5000 (Excluding GST)**.

4.2. **Change in Team:** Any changes in the team will not be allowed once the final registration is done through portal. However, any critical issues related to team structure, captain or faculty advisor at any stage of the event may be brought in the notice of Organizing Committee with prior approval from institute authorities through an official letter issued by Head of Department or Director of the Institute. These issues will be reviewed by Organizing Committee for further decisions. Please note that this letter is required to only put up the issue in consideration of organizing committee and the Organizing Committee reserves its rights to disregard such requests.

4.3. **Maximum Entries per college:** Multiple teams from any college/university may register for the event. Multiple teams cannot have any team member or faculty advisors in common. A maximum of 10 teams per college is allowed for the championship on first come first basis.

5. Event Timelines

5.1. The invitation for the championship will be sent on 24th July, 2023 to the respective colleges. The subsequent deadlines will be as follows:

Invitation & Registration Starts	Round 1 Submission Starts & Registration Open	Round 1 Submission & Registration Closes	Top 5 Teams Declaration	Final Report Submission Deadline	Top 5 Presentation & Winner Declaration
24th July, 2023	10th August 2023	2nd Sept, 2023	15th Sept, 2023	15th Sept, 2023	23rd Sept, 2023

6. Event Outline – The championship is divided into 2 rounds

6.1. **Round 1 (Solution Outline):** Each team has to analyze the problem statement thoroughly to provide the best possible solution of the problem statement titled as "Battery Cooling System Strategy & Modeling in Simulink (MATLAB) with Closed Loop Feedback Controller". Each team will be provided with problem statement and relevant battery cooling system model. Each team is supposed to work out the solution. The teams are supposed to submit the overall layout of the solution along

with the strategy. The team with the best solution outline/strategy will be selected for the final round. The first-round evaluation will be done based on the following parameters:

6.1.1. Concept Clarity

6.1.2. Best Solution Layout/strategy (Problem approach strategy)

6.1.3. Flow chart for the solution to be submitted

6.1.4. Boundary Conditions Clarity

6.1.5. Feedback Controller Parameters & Parametric Optimization of the Cooling System

Top 5 teams will be selected for final round based on round 1 evaluation.

6.2. **Round 2 (Final Round):** The evaluation of final round will be in two-parts (Part 1 & Part 2) as mentioned below. Each part will have separate weightage.

Part 1: Final Report (50% Weightage): The team with the best strategy with the detailed mathematical & analytical calculations will be selected for this round. The criteria for the final round part 1 evaluation will be as follows:

6.2.1. Overall Understanding & Formulation

6.2.2. Detailed Thermal Engineering Analysis

6.2.3. Detailed Mathematical Calculation & Modeling

6.2.4. Logical explanation with the real-life solution, which can be implemented directly on the actual vehicle

6.2.5. Proper documentation of the work done with the strict adherence to the rule

6.2.6. Solution with zero plagiarism

6.2.7. Only solution, which can be implemented on the vehicle directly, without any deviation from the boundary conditions.

Part 2: Presentation at SAENIS TTTMS Conference 2023 (50% Weightage): Each team (Top 5 Teams Only) will get an opportunity to present their case study at 6th SAENIS TTTMS Conference-2023, Samskara Resorts at Jaipur, Rajasthan, India on 23rd September, 2023. The presentation will be given in front of the evaluation committee & Jury at the conference. Total of 25 minutes (20 Minutes Presentation + 5 min Q&A) will be given for presentation during the conference.

Based on the overall score received in the final round (Both Part 1 & Part 2), top 3 teams will be selected for the cash prize & felicitation during the conference. There is **NO WEIGHTAGE** of **Round 1 Score** as this round is for qualification purpose only. All the qualified teams (Top 5) will be eligible for "Certificate of Appreciation" and rest of the teams will get the "Certificate of Participation".

6.3. **Important Note**

6.3.1. The detailed problem statement with relevant description will be provided by the organizing committee **(Refer Annexure A).**

6.3.2. The detailed rulebook will be provided by the organizing committee **(Refer Annexure B).**

6.4. Awards

6.5. Round 1: Solution Outline (Elimination Round)

6.5.1. All the teams, qualifying the round 1 evaluation criteria will be considered for round 2 (Final Round). There will no winner declaration in this round.

6.5.2. Out of the all the team, top 5 team will be selected for presentation at the SAENIS TTTMS Conference-2023.

6.6. Round 2 (Final Round) Part 1: Report Submission (50% Weightage)

6.6.1. All the teams, qualifying the round 2-part 1 evaluation criteria will be will be given score as per the criteria. There will no winner declaration in this round.

6.7. **Round 2 (Final Round) Part 2 (50% Weightage): Final Presentation at SAENIS TTTMS Conference 2023 | Winner Declaration**

6.7.1. The Top 5 team will be presenting their solution in front of the "Jury" at SAENIS TTTMS Conference-2023 at Samskara Resorts, Jaipur, Rajasthan, India. The final winner will be declared at the conference along with the first & second runner up.

6.8. Prize Details

6.8.1. **Winner: INR 70,000** with the Winner Trophy & Certificates

6.8.2. **1st Runner Up: INR 35,000** with the 1st Runner Up Trophy & Certificates

6.8.3. **2nd Runner Up: INR 20,000** with the 2nd Runner Up Trophy & Certificates

7. Team Accommodation

7.1. The accommodation (without dinner) for the final selected top 5 teams along with the faculty advisors will be provided at Jaipur, Rajasthan on 22nd September, 2023. The lunch will be provided on 22nd September to all the top 5 teams along with the faculty advisors.

7.2. The ticket or any other expenses will be borne by the selected teams & advisors. The organizing committee is not responsible of any other expenses apart from, what has been declared in section 7.1.

7.3. All the other expenses will be borne by the respective teams.

8. Report Submission

8.1. The solution submission of the problem statement will be done by each team via online mode. The team has to email the final report at tttms.saeindia@gmail.com. In case of any assistance, the team can contact the event coordinator at (+91) 8433235236.