

## 2021-2022 New Student Chapter SAMPE Fuselage Contest Rules

### ALL FUSELAGES MUST BE AT LEAST 24" IN LENGTH

#### Section 1: Teams

1. The contest will be for enrolled students at an accredited university, college, community college associated with SAMPE. Students attending the contest must be 16 years of age or older in accordance to SAMPE conference regulations; younger students may participate as team members but may not attend. The following rules are to be considered an outline of the requirements and are subject to interpretation by the Governing Committee. The contest is intended to provide an opportunity for students to learn and expand their abilities in composite manufacturing and design. Any design or concept which is not consistent with the spirit of these rules will be disqualified. Students are encouraged to ask for clarification of these rules. The governing committee will publish the question(s) and the committee's answer on the SAMPE contest web site.
2. Individual teams must be composed of **no more than five members** (one team leader and up to four additional members) to allow each student to have a hands-on experience involving design and manufacture of a composite structure. In order to encourage autonomous function of different teams, each entry must meet three requirements:
  - a. **Student Fabricated Fuselage:** The students are encouraged to solicit advice, instruction, and training from faculty, peers, and industry members during the course of the project. However, **all work involved in fabrication of the entry fuselage must be accomplished by the team members themselves without assistance from any other parties.**
  - b. **Unique Team:** Each registered team must have unique student team members.
  - c. **Unique Design:** Each team can only enter one design. The university or college associated with SAMPE may have more than one team, as long as each team has a unique design. On Test Day where multiple entries from the same college or university are entered, the Governing Committee will compare all approved Design Proposals for those entries.
  - d. Teams may consist of a combination (maximum of 2) of accredited university, college, community college associated with SAMPE as long as the sponsoring professor, team lead, and a majority of the students on the team are from a new student chapter. Teams using this exception to the team make up should request to do so by 2/25/2022, by sending an email of intent to the fuselage@sampe.org
3. Between **February 1, 2020 and April 22, 2022**, all teams must submit a design proposal for approval by the Governing Committee (email address: fuselage@sampe.org) for each registered entry. Your proposal must include the following elements or they will be returned without review or approval:
  - a. A title page with the following information included:

i.Name of School

ii.Names of students on the team (no more than five per entry); Identify which student is the team leader and include their email address. The student team leader's email address will be used by the Governing Committee to provide feedback and/or approval for the proposal submission as well as the Contest Timeline. The Contest Timeline will be sent about a week before the contest which will give details for where to post your poster and check in your design, and specifics about testing.

iii.Faculty advisor Name, email and phone number

- b. 1 page paper describing the design, materials, manufacturing, and innovation
- c. A drawing showing the fuselage. Include section cuts for each unique cross section.
- d. A spreadsheet with student's names and emails

The Governing Committee will approve or send instructions for required revisions to attain approval no later than March 20, 2020. Upon design acceptance the Governing Committee will provide a registration number.

Changes may be made to a design after the proposal has been approved; however, the design may be disqualified if the changes violate the spirit of the rules according to paragraphs 1 or 2.

**\*\*Students are encouraged to submit design proposals early in order to receive approval and feedback earlier.**

4. Students must provide a bill of materials and description of manufacturing processes.

5. Fuselage categories and Design Loads:

- a. Testing will be a 3pt bend test
  - i. Minimum Required Load: 500 lbf
    - 1. Total Structure must not deflect more than 1" in analysis
    - 2. Structure must withstand an internal pressure of 30 PSI in analysis.
  - ii. Testing 3pt bend test
    - 1. Fixture will be the same as the bridge competition.

2. Ref Figures 1,2, and 3 for fixture dimensions.

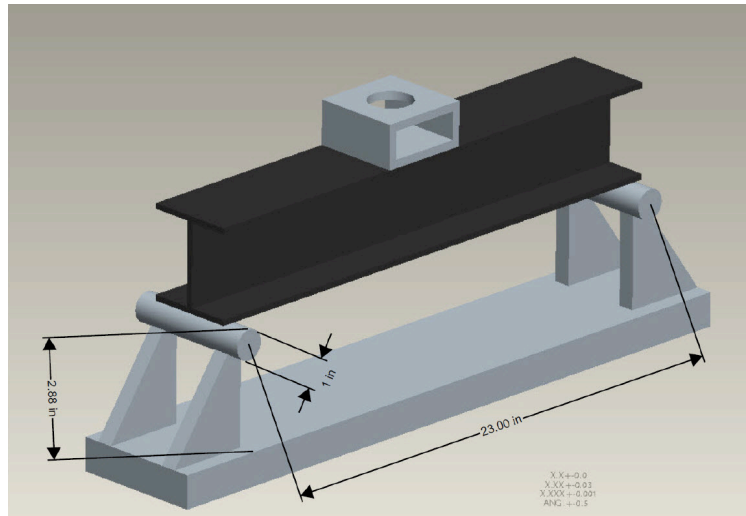


Figure 1: General Outline of Loading Fixture

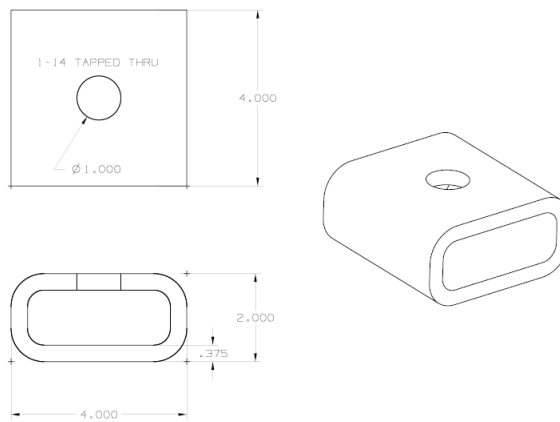


Figure 2: Load Plate Dimensions

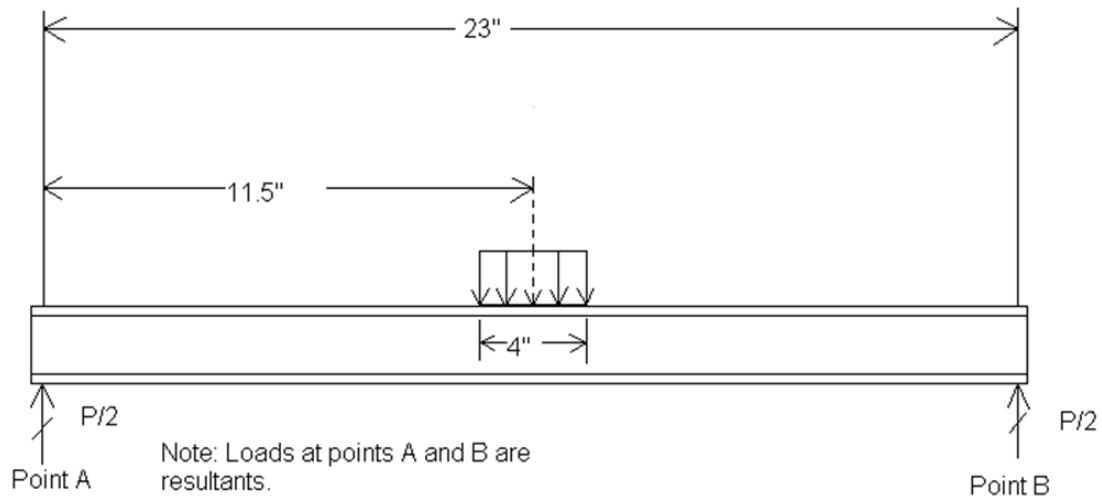


Figure 3: Free Body Diagram of Basic Load Case

b. Geometry Requirements

- i. Fuselage **MUST BE** 24" length minimum
- ii. Inner diameter(including all structure **MUST NOT** be less than 5.5")
- iii. Outer diameter **MUST NOT** exceed 6"
- iv. Fuselage **MUST** include 4 cutouts; 2 on the left and 2 on the right hand side of the fuselage representing airplane doors.
  1. Door Cutouts **MUST NOT** be less than 2"x2"; **MUST NOT EXCEED** 3"x3"
  2. Door Cutouts **MUST BE** at least 10" apart; and no more than 15"
  3. Door Cutouts **MUST BE** at least 5" from the edge of the Fuselage
  4. Door Cutouts **DO NOT** need to be on the top half of the fuselage. However you will need to specify loading orientation.

6. Materials

- a. Fiberglass is the only approved material. No metals or plastics.
- b. Phenolic Honeycomb Core is allowed. Resin filling core is allowed.
- c. Resin systems are open ended.

7. An email describing the details of check in shall be sent to the teams as competition approaches.
8. Evaluation Criteria is based on a combined score of ranking based innovation, uniqueness, and ability to meet requirements.
  - a. Ability to meet requirements. This will be ranked from 1<sup>st</sup> to last based on loading criteria. Score is taken as maximum compression load P (up to that category's design load) where failure occurs. Please note that this means there is NO advantage to exceeding the design load. Weight will be used as a tie breaker. This is weight not P/W. Test fixture is the same as the bridge competition.
  - b. Innovation and uniqueness will be part of the poster session. A panel of SAMPE professionals will review the posters and score each teams poster based on design and manufacturing uniqueness and innovation.
    - i. Evaluation criteria will include
      1. Innovation, uniqueness, and Technical content
      2. Readability and presentation
      3. Relevance to entry
    - ii. A panel of industry judges will give each poster a rating of 1 to 5 for each criterion, 5 being the best and 1 being the worst. The ratings will be summed to yield a total score for each criterion. The scores from the judges will be a summed and averaged for each poster to derive the entry's total score.
  - c. A team's final score will be the sum of their poster ranking and designs ability to meet requirements, divided by 2.
    - i. A team that gets a ranked 3 in the poster and 5 in ability to meet requirements will have a final score of 4. This will then be compared to other teams combined scores.
  - d. If a tie occurs on the final score, weight will be used to break the tie.

	Requirements			Poster					Final Score	Final Ranking	
	Weight(lb)	Failure load(lb)	Ranking	Innovation, Uniqueness, Technical Content	Readability and Presentation	Relevance to Entry	Average Poster Score	Ranking			
Team 1	0.7	490	3	4	3.7	4.1	3.93	2	2.5	2	
Team 2	0.5	503	1	2.5	4.7	4.7	3.97	3	2	3	
Team 3	1	800	2	3.6	3.9	4.2	3.90	4	3	4	
Team 4	0.2	450	4	4.7	4.3	4.6	4.53	1	2.5	1	Won Tie break due to Innovation Score

9. All student team entries must also submit a poster presentation highlighting the uniqueness and innovation of their fuselage. **Each entry requires a poster. Posters must be hung upon check-in.**
  - a. Posters shall contain the members of the team, sponsoring advisor, and school.
  - b. **Registration number shall be in the Top Left Corner and easily legible.**
  - c. Posters shall be 24"x36" Landscape format (orient it horizontally)..

10. Question submission guidelines: **When submitting a question, please reference the relevant paragraph(s) in the rules**, and include any supporting pictures/images in a Microsoft Word document. All questions and responses will be posted to SAMPE website:

Submit question(s) for review by the Governing Committee to

[fuselage@sampe.org](mailto:fuselage@sampe.org)

## Appendix

### Appendix A: Consolidated Schedule

Registration Start: February 1, 2022

Registration End: April 22, 2022

SAMPE Charlotte: May 23-26, 2022

- Note Schedule for SAMPE Conference will be provided at date.

Test Date: TBD

Awards Announcement: TBD