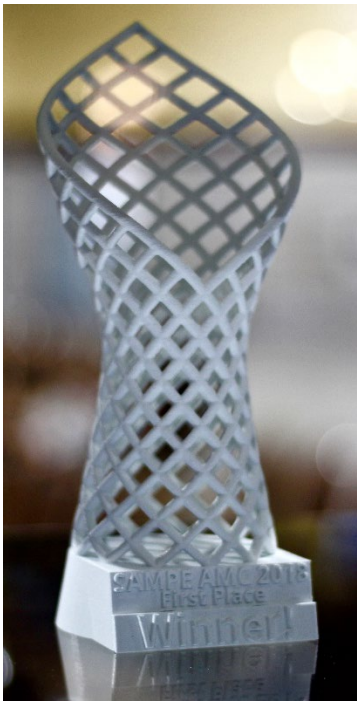
Student Additive Manufacturing Competition (AMC)

Rules and Guidelines 2025-2026



Important Dates

- February 20th– Deadline for Design Summary
- March 6th– Deadline for STL Submission
- April 28th– Competition Day and Student Check-in

Contestant Requirements

1. The contest is for enrolled students at an accredited university, college, community college, or high school only. Students attending the contest must be 16 years of age or older in accordance with SAMPE conference regulations. The following rules are to be considered as 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 additive manufacturing and engineering design. Any design or concept not consistent with these rules' spirit will be disqualified. Students are encouraged to ask for clarification of these rules.

2. Contest entries will only be accepted on an individual basis with only one entry allowed per student; in other words, **students may enter only one category, not both**. Students must be SAMPE members. Students are encouraged to solicit advice, instruction, and training from faculty, peers, and industry members during the design of their structure; however, the final design entry must be the original work of the submitting student.

3. Each student must submit a **1-to-2-page** design summary in **PDF form** for their entry for approval by the Governing Committee (email address: studentadditive@sampe.org). Students must use the **AMC Design Summary template** linked on the competition page and **fill out all information completely** to be entered while also following the Name_Summary__Category_Date.pdf naming convention for the file. Each design summary will be checked for compliance with contest rules and scored by the Governing Committee.

NOTE: Your registration number should be 11 characters and will contain a combination of letters and numbers. If you registered online, your Registration Number was generated and sent to you via email as part of the registration process. If you registered via mail or fax, your registration number will be emailed to the email address provided on your form once SAMPE has received it into the registration system. If you are unable to location your number, please email Lauren McLean at lauren@sampe.org

4. Registration is allowed through the Design Summary and STL Deadline; however, entries that have not submitted their design summary and STL file for approval by the week of the deadline may be subject to disqualification if they are not fully compliant with the competition rules.

The Governing Committee will approve or send instructions for required revisions to attain approval no later than 5 business days after the Design Summary Deadline and STL Deadline.

NOTE: Students are encouraged to submit design summaries early to receive approval and helpful feedback. If there is enough time, the Governing Committee will recommend improvements if significant design issues are noticed during the review process.

General Rules

Students will design a structure tested to failure between the platens of a typical load frame. See this link for more information. The load will be limited to 10,000-lbs to protect the load frame. The design must be approved by the Governing Committee so as not to put the load frame in jeopardy. This limit is only intended as an upper bounding limit with the optimal design solution unlikely to approach this limit. Entries may be assembled from multiple printed pieces. Only printed parts may be used in the assembly with no adhesives allowed. Support material may be used to create the part, but support-free designs are suggested since removal can damage delicate features. Any trapped support material will be considered part of the structure and thus included in the weight. Basic hand tools (hobby knives, files, sandpaper, etc.) will be available for finishing and fitting work at the conference if needed.

Design Summary Evaluation

Design summaries and entry models will be evaluated by the AMC Committee. The following Design Summary criteria will be evaluated from 1 to 10 points, for a maximum score of 20 points.

Design Summary Evaluation Criteria:

- Technical content (thoroughness of analysis, sources cited, adherence to rules, etc.)
- Readability (font, text formatting, conciseness, etc.)

Additive Catagories

A. Compression Column – Design Competition
B. Compression Column – Design + Fabrication Competition

A.1 Design Requirements (same for both categories)

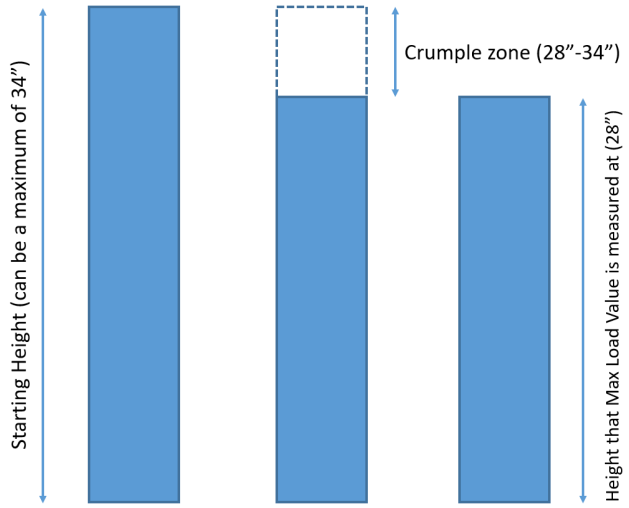
Students will design a rigid vertical support column that must meet minimum load requirements at two different heights, along with the space between those two heights. The column must fit on a 6-in diameter platen and must not be any taller than 34.5 inches when fully assembled prior to test. No part of the column may extend outside this circle (6-in diameter). The entry must support at least 30 pounds at a height of 34 +/- 0.25 inches and while column is being compressed by 6 inches, the column must also support at least 30 lbs at all heights within this “crumple zone”. Please note that there is NO advantage to exceeding this design load; it is a pass-fail requirement. The entry must then be compressed to 28 +/- 0.25 inches and must support at least 100 lbs; **The load carried by the column during this stage of testing is the primary scoring metric**. During the test, the top platen will move down and compress the column at a speed of 7.2 inches per minute.

All inputs will be normalized using the following formula. This means the highest scoring entry for each category will receive a score of 1 and the lowest scoring a 0.

$$Weight/Load/Analysis_{Normalized} = \frac{Entry - Minimum}{Maximum - Minimum}$$

The Weight value is the weight in grams.

The Load value is the load carried by the column **at the 28-inch height**. If the column fails to hold at least 30 pounds at the initial 34-inch (+/-0.25 inch) height, the whole column is considered "failed" regardless of the load carried at the 28-inch (+/-0.25) height. The figure below shows a visual representation of the different stages of the test:



For an example of a column demonstrating a successful crumple zone, see SAMPE Student Additive Competition page on SAMPE website.

The design summaries and analysis therein will receive an analysis score according to the formula below:

$$Score_{Analysis} = 1 - \left|\frac{Load_{Tested} - Load_{Predicted}}{Load_{Tested}}\right| + Design\ Summary_{Normalized}$$

The final score for the competition (and thus placing/prizes) is determined by the following formula:

$$Final\ Score = 0.70 * (Load_{Normalized} - Weight_{Normalized}) + 0.30 * Analysis_{Normalized}$$

First place, second place and third place will be awarded to the highest three scores.

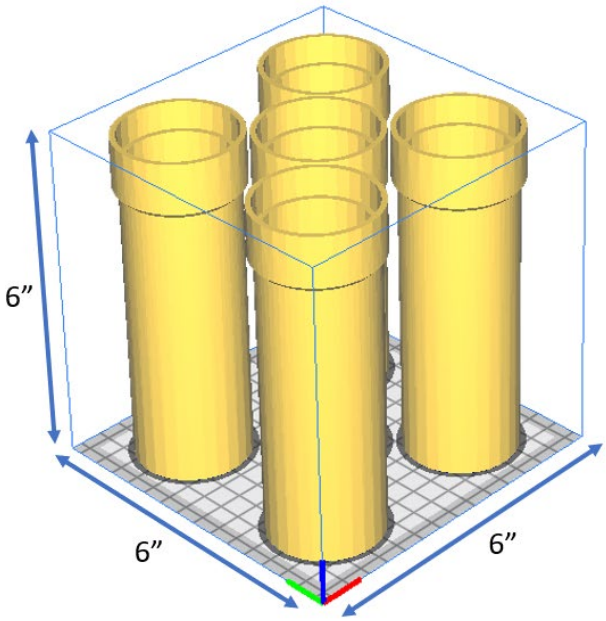
A.2 Column Printing Details – Category A

For this category of the competition, all entries will be printed by SAMPE on a Stratasys® F370 FDM printer from ASA polymer. The entry will be multiple pieces, so **all pieces must be arranged in a single .STL file in the intended print configuration** for review and printing. Please also submit an .STL of the fully assembled column to aid in committee review. For additional resources to aid in column design, see SAMPE Student Additive Competition page on SAMPE website. Students may view their entries beginning at 9am on Tuesday, April 28th. All non-entrapped support structures will be removed prior to delivery. Post-processing and assembly may be required for mating features and can be done prior to the end of the check-in period using the basic hand tools (hobby knives, files, and sandpaper) available at the competition check-in desk for finishing and fitting work. Entries may not leave the test area once formally submitted for cataloging. Students **MUST PHYSICALLY ATTEND** the event to have their entry tested and be considered for awards. STL files will be checked for quality by the committee.

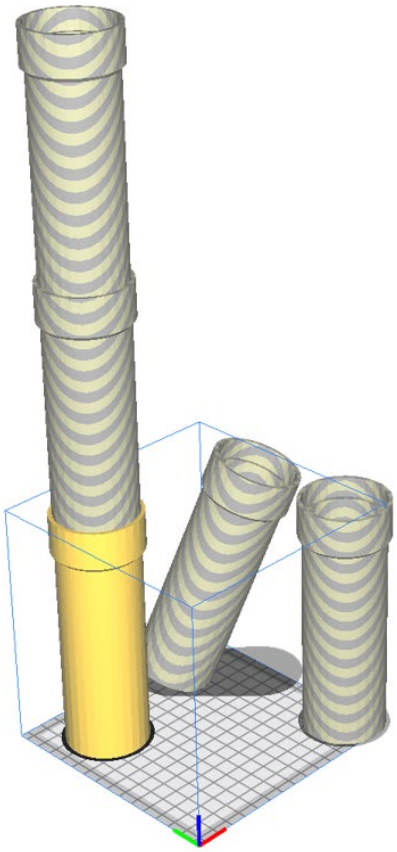
Design notes: Design for printing without support material is recommended. If supports are prohibitively difficult to remove or might be entrapped, they may be left on the part, which will add to your overall weight and may impact column performance if you cannot remove them during 1-2 hours of allotted post processing time during check-in. Features below 0.050” tend to not print well. A minimum of a 0.010” gap between mating features is recommended.

Entries will be printed with 2 contour wall thickness (0.040”) and 30% sparse double dense infill. The default orientation of the print will be the longest dimension aligned in the z-direction. If students would like the fabricator to deviate from default wall thickness or build direction, they must specify it on their design summary; however 30% sparse double dense infill will be a locked parameter and no deviations from this parameter will be accepted. Submitting a .cmb OR a .print slice file are preferred options for specifying desired parameter settings and build direction.

Note, there is no maximum print time requirement. Each entry must be printed in one single print envelope. That is, each entry (including all pieces) must be able to fit within a **6”x6”x6” box** for printing. Due to the height requirements, this will require the entry to be built using multiple pieces that connect/stack together, all of which will need to fit together inside a 6”x6”x6” box. See Below for example.



Properly fits in build envelope requirement



Violates build envelope requirement

A.3 Column Printing Details – Category B

For this category of the competition, students are required to print their own designs and bring them to the competition. All entries must pe printed from FFF polymer material. If the entry is in multiple pieces, **all pieces must be arranged in a single .STL file in the intended print configuration** for review. Please also submit an .STL of the fully assembled column to aid in committee review. For additional resources to aid in column design, see SAMPE Student Additive Competition page on SAMPE website. Students may view their entries beginning at 9am on Tuesday, April 28th. Post-processing may be done providing that the entry is in its completed state by the end of the check-in period. We will have basic hand tools (hobby knives, files, and sandpaper) available at the competition check-in desk for finishing and fitting work. Entries may not leave the test area once formally submitted for cataloging. Students **MUST PHYSICALLY ATTEND** the event to have their entry tested and be considered for awards. STL files will be checked for quality by the committee.

Awards

Each category will have First place winner who will be awarded $500. Second place will be awarded $300 (USD). Third place will be awarded $200 (USD). Awards will be given in the form of a check issued to the contestant and mailed to the address identified on the Registration Form.

Questions

When submitting a question, please reference the relevant paragraph(s) in the rules, and include any supporting pictures/images in a Microsoft Word document if needed. All questions and responses may be posted to SAMPE website:

https://www.nasampe.org/page/additivecontest

Submit question(s) for review by the Governing Committee at studentadditive@sampe.org

The Governing Committee

- Joseph Vanherweg, Lockheed Martin
- Cory Cunningham, The Boeing Company
- Adam Brown, The Boeing Company
- Sukrit Vashisht, Shimadzu