

Bridge Building Contest 2024

Swiss SAMPE chapter



Invitation

Swiss SAMPE Chapter has the great pleasure to announce the 2024 Bridge Building Contest: an exercise in design and construction of a scaled bridge model. The contest duration is one semester and could be performed within a project framework in which students will have to use their knowledge and creativity to design a bridge. Students will be introduced into the entire structural design process from the development of the bridge concept, the preliminary design calculations and the material selection to the final bridge fabrication and testing.

Prizes will be awarded to the most resistant structures and the most surprising designs. The contest competition will be hosted by the IMPE Institute of Materials and Process Engineering at ZHAW Winterthur.

Important Dates:

Deadline for inscriptions:

Monday, 23rd October 2023

Material set available:

Monday, 30th October 2023

Bridge Building Contest:

Thursday, 25th January 2024

Organizing committee:

Gion A. Barandun (OST-IWK)

Gregor Peikert (ZHAW-IMPE)

Hans Jürg Gysin (SAMPE)

Participants

Bachelor, Master and PhD students from Switzerland can apply to this contest. Students participating in the contest will have to establish teams. Each team will design and fabricate a scaled bridge model. Teams consist of 1 to 5 students. Bachelor, Master and PhD students can cooperate and get together in one team.

Teams will apply for the competition formally with names of the team, students, coach and affiliation. Each registered team must arrive to the challenge at ZHAW with its bridge and poster describing the performed work, and give a short summary before the test takes place.

Technical rules

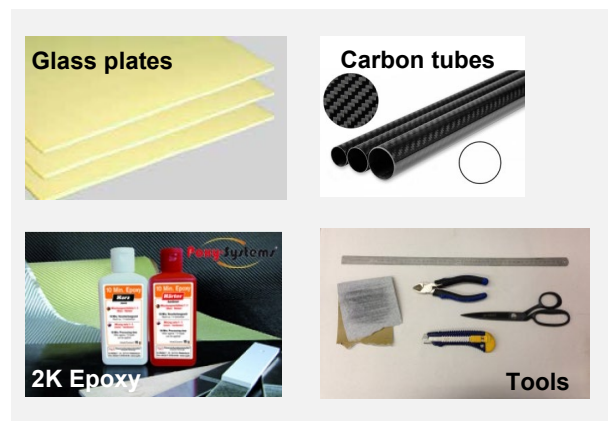
Materials

The bridge will be a **combination of 3D-printed elements and a pre-defined material set.**

Participants will develop intelligent ways to combine those material to the stiffest possible bridge.

A limited set of materials is provided for all teams. It includes the following elements:

- Carbon fibre tubes (inner \varnothing 4mm, outer- \varnothing 5mm), 4 x 1m
- Glass fiber plate (0.8mm, ca. 500 x 1000mm for driving)
- Epoxy 2K adhesive (10min, 480g)



The set is sponsored by SAMPE and will be available end October. The bridge and in particular the load introduction has to be enhanced by 3D-printed parts – the bridge will have to fit in the construction space (see images below). The FFF/FDM technology must be used for printing, the filament will be provided.

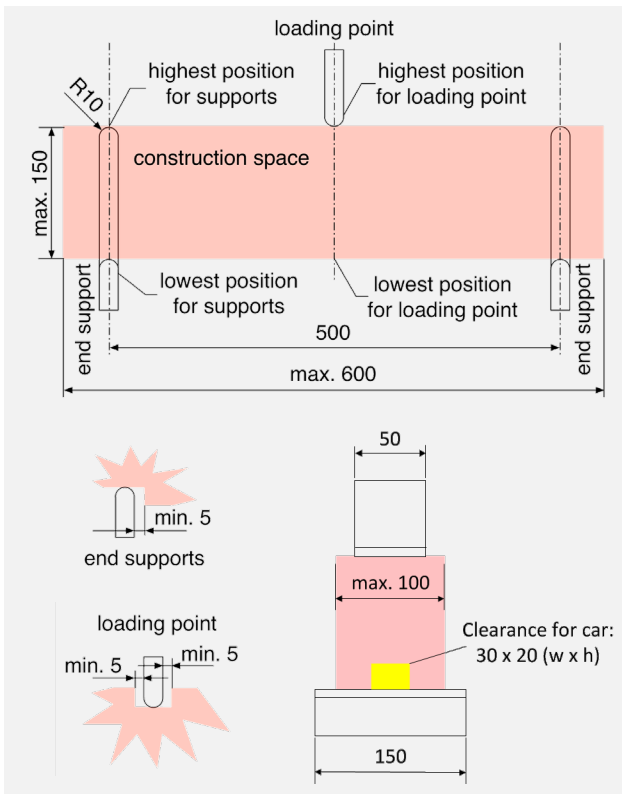
Teams are free to use additional auxiliary materials or tools during manufacture (but not for the tests). A wide field of combinations is therefore given to build the final bridge.

Weight

The maximum accepted weight of the bridge will be 400g. Competitors that exceed this limit will have the chance to remove material from the bridge until the target is met.

Dimensions

The distance between the supports of the bridge will be 500mm. See attached figure for details.



The supports and the loading points contacts have to be rigid parts of the bridge (e.g. not pre-stressed elements).

Loading

The bridges will be tested in 3-point-bending as per the attached figure. At mid-span the loading force will be applied to the deck surface of the bridge. No horizontal forces shall be absorbed by the bridge at the support points (the bridge will be simply supported).

The bridge must have a flat street made from the provided glass plate, where a matchbox car with dimensions 30x50x20mm (width x length x height) is able to cross freely. The plate can be adapted; however the street has to be provided as noted.

Awards

Awards will be granted to the stiffest bridges (1st, 2nd, 3rd stiffness) and prizes will be given for:

- Aesthetic
- Innovation
- Design
- Poster

The total price sum is CHF 800.--.

Scores

Resistance category: the score of each team will be the maximum stiffness of their bridge. After an initial load of approx. 50N, the deflection is measured at 300N. The bridge with the lowest deflection wins.

The bridge will then further be loaded, until complete failure. In a competition, the audience will guess in advance, which bridge resists the highest load.

Aesthetic, Innovation, Design, Poster categories: 5 jury members composed by SAMPE and ZHAW engineers will evaluate the works of all the teams and will decide the winners of each category.

Application

Send an e-mail to gion.barandun@ost.ch providing the following information:

- Team name
- Team members
- Team point of contact e-mail
- Team coach name
- Team coach email
- Affiliation(s)

Agenda

The day at ZHAW will start with the bridge building contest. All the teams will expose their bridges and their posters in the hall of the laboratory. The jury will then determine the winners of the contest.

For more details: www.sampe.ch

Swiss SAMPE Chapter



ZHAW



Contact

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