



Rules of The Hall of the Year **ACADEMIC 2024** student competition

The Faculty of Civil Engineering CTU in Prague (hereinafter also referred to as “the Faculty” or “organiser”) announces the 12th year of the Hall of the Year **ACADEMIC 2024** competition held under the patronage of the Faculty Dean and The Czech Chamber of Chartered Engineers and Technicians (ČKAIT). The competition conceived as an international event is open to students at technical universities (in Bachelor’s and Master’s degree studies).

The contestants’ task is to design and build a model of a section of an aircraft hangar structure under which an aerobatic aircraft can “pass”. The model must meet the specified geometric, material and structural requirements.

The competition is announced in the category of models prepared in advance. The evaluation criterion in the competition is the model’s effectiveness, i.e. the ratio between the model’s load-bearing capacity and weight.

Competition venue and date:

The competition will be held in the atrium of the building of the Faculty of Civil Engineering CTU in Prague, Thákurova 7, Praha 6 – Dejvice on Tuesday **9. 4. 2024 from 7:30 a.m. to 4:30 p.m.**

Competition participation and registration

2-3-member teams of students from universities with technical orientation can participate. The competition organiser reserves the right not to accept a team or to require a change in team members so that all the members meet the prerequisite of studying at a technical school.

The applications for the competition can be registered at:
<https://halarokuakademik.fsv.cvut.cz/en/>.

The deadline for submitting registrations is **18. 3. 2024 at 12:00 p.m.** After the deadline, a partial change in the team composition is possible, but the registrant’s name cannot be changed.

The number of teams is limited to 60. In the case of high demand, the maximum number of teams from one school may be limited, in which case, the registration date of individual teams from the same school will decide.

The costs associated with participation in the competition are not covered by the organiser.



Participation in the competition is conditional on the payment of a registration fee of 300 CZK per team, which must be paid to the account of the Faculty of Civil Engineering CTU in Prague. The fee expresses a binding interest in participating in the competition and is refundable - it will be refunded to the registrant at the competition venue on the competition day. In the case of non-participation, the fee will not be refunded. The fee will be refunded to all teams whose model passes the initial registration.

After registering for the competition, the team registrant will receive an email from the organiser informing them whether their registration is valid (for capacity reasons limiting the number of competing teams) and if so, including the account number to which the fee shall be paid. Registered teams are obliged to settle the fee no later than by 22. 3. 2024 at the latest.

Students on an exchange short-term study stay in the Czech Republic (Erasmus, Non-European Bilateral Agreements) and students in Double Degree studies in the Czech Republic apply for the competition under the name of the Czech university where they are on a short-term study stay/in double degree study. The team including these students pays the registration fee.

The registration fee is not paid by a team in which all members are students at universities based outside the Czech Republic at the time of the competition and are not on a short-term study stay/in double degree studies in the Czech Republic.

Prizes and rewards

The teams in the top five places will be awarded the following financial amounts:

- 1st prize – 50,000 CZK
- 2nd prize – 30,000 CZK
- 3rd prize – 15,000 CZK
- 4th prize – 9,000 CZK
- 5th prize – 6,000 CZK

The contestants can also receive special rewards granted by the competition partners. The winners will be selected at the partner's discretion and the rewards need not be related to the load test results. The number of rewards and their value are not specified in advance.

The payment of prizes is governed by the tax laws of the Czech Republic.

Selected structures will be published on the Faculty's website, the Faculty's Facebook pages and used for other Faculty promotional purposes.



Amendments and changes to the competition rules

Should any ambiguity in the interpretation of the rules be found in the time between the competition announcement and the competition day, the organiser will ensure that the rules are supplemented and an amendment to the rules is published on the competition website in the rules section. The organiser also reserves the right to unilaterally change the competition rules, even without prior notice.

Questions related to the competition can be submitted solely by e-mail to the organiser's address at: hala.akademik@fsv.cvut.cz, and technical questions related to further specifications of the rules (proposed solutions, materials, etc.) can be submitted no later than **22. 3. 2024 by 12:00 p.m.**

The organiser reserves the right to terminate the competition at any time for technical, commercial or other reasons. In this case, the paid registration fees will be refunded to the account from which they were sent.

Participation in the competition does not give rise to a legal claim to a prize and prizes cannot be legally claimed. The organiser will inform about any changes on the competition website.

Professional jury

The correctness of the competition results is guaranteed by the professional jury.

Consent to personal data processing

By participating in the competition, each contestant:

- a) grants the Faculty of Civil Engineering CTU in Prague, ID: 68407700, their consent to the use of their address and e-mail for the purposes of sending information about the course of this competition and information about other events organised by the Faculty of Civil Engineering CTU in Prague, and the handing over of potential prizes; this consent is granted for a period of 3 years.
- b) pursuant to Act No. 101/2000 Coll., on Protection of Personal Data as amended, grants the Faculty of Civil Engineering CTU in Prague their consent to the processing of their personal data in the scope of name, surname, address, email, studied school and branch of study, which they will provide to the organiser in connection with their participation in the competition, for the purpose of handing over prizes in the competition, for a period of 3 years; they also agree to their publication in the scope of name, surname, studied school and branch of study in the media and on the organiser's website and Facebook pages, provided such use is related to this competition, in particular, for the purpose of announcing the winners. The provision of personal data is voluntary.



- c) pursuant to Act No. 101/2000 Coll., on Protection of Personal Data as amended, grants the Faculty of Civil Engineering CTU in Prague and the Hall of the Year competition Partners, see <https://halarokuakademik.fsv.cvut.cz/en/partners/>, their consent to the creation of photographs and audio/video recordings of the event and the capture of their person and the competition model and their processing and use, in particular: for the Faculty's own use for the purposes of presentation and promotion and for editorial purposes (i.e. publication in periodicals and other media).

By participating in the competition, each contestant agrees that the photographs and audio/video materials can be altered, used as part of a collective work, or used only in part. They may also be accompanied by a commentary or another accompanying text.

The person who provided the data:

- a) is entitled to withdraw the above consent to the processing of personal data at any time through a letter sent to the following address: Faculty of Civil Engineering CTU in Prague, PR and Marketing Department, Thákurova 7, 166 29 Praha 6; or by e-mail at: pr@fsv.cvut.cz.
- b) has the right to access the personal data provided.
- c) has the right to request the update, correction, complementation and erasure of the personal data provided.

Course of the competition

The acceptance of models will take place at the Faculty of Civil Engineering CTU in Prague from 8.30 to 10.30 a.m. on the competition day. At the acceptance, compliance with the material conditions will be checked and the models will be weighed. All registered models must comply with the geometric conditions of the free protected area that must not be intruded (see the diagram below) and must be made using only specified materials. The registered models will be displayed in the Faculty atrium after acceptance.

The loading of models will start at 11.30 a.m.

The order in the load tests will be published before the start of loading.

The organiser reserves the right to change the competition time schedule.

Geometric requirements

The model represents a section of the load-bearing roof structure of a hangar for aerobatic aircraft. The shape of the hangar is not precisely defined. The structure must span the protected area and, at the same time, allow aircraft to “fly through” (1D).

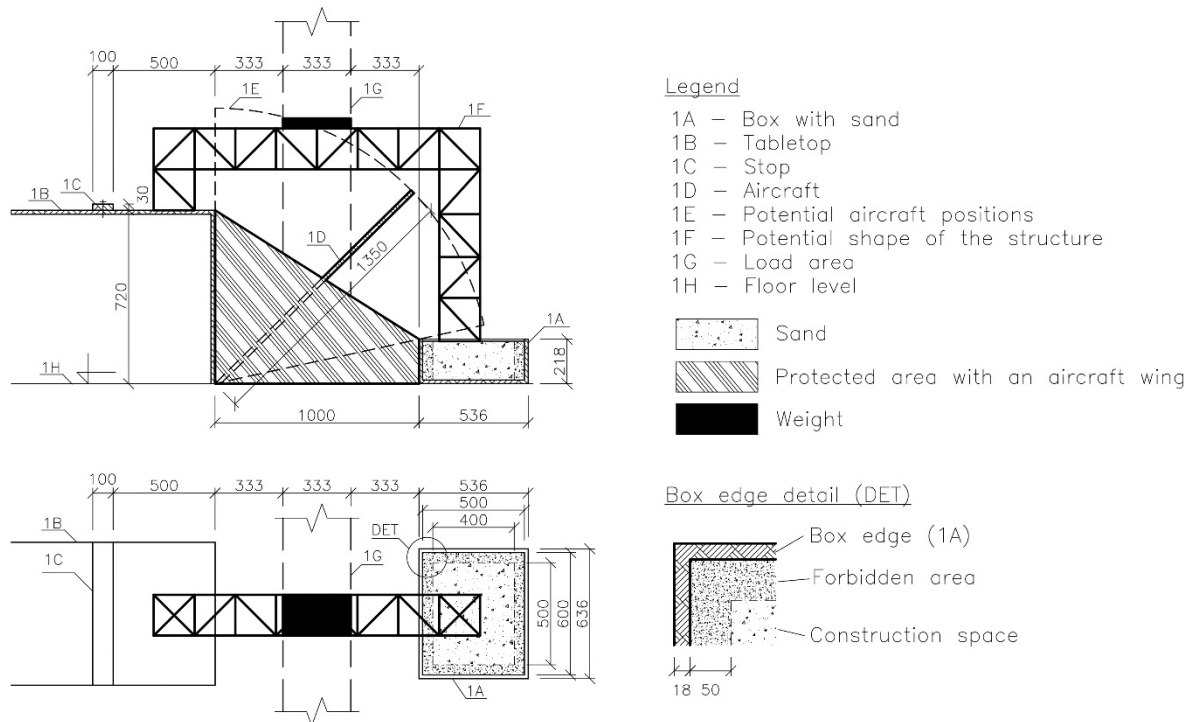


Fig. 1 – Scheme of the structure

The hangar model will be supported at two different height levels. The upper support is the tabletop (1B) at 720 mm above the floor level (1H), while the lower level is the sand box (1A). The height of the upper edge of the box will be 218 mm above the floor level, and the sand surface in the box will be at a height of 208 mm (+/- 10 mm).

The hangar model must not intrude into the protected area defined by the floor, the outer left side of the box and the side of the table. The shape of the protected area section is indicated by hatching in the diagram.

The aircraft wingspan is represented by a plate with a cross-section of 1350/10 mm, which must be able to be placed inside the hangar interior space so that it touches the lower left corner of the hangar (turning point). The plan width of the hangar floor is less than the aircraft width.

The roofing model must allow the placement of a uniform load in the load space (1G) in the middle third of the span, which is defined as the distance between the edge of the table and

the outer edge of the box. The load may be placed directly onto the roof structure, or a local adjustment may be made to allow its placement.

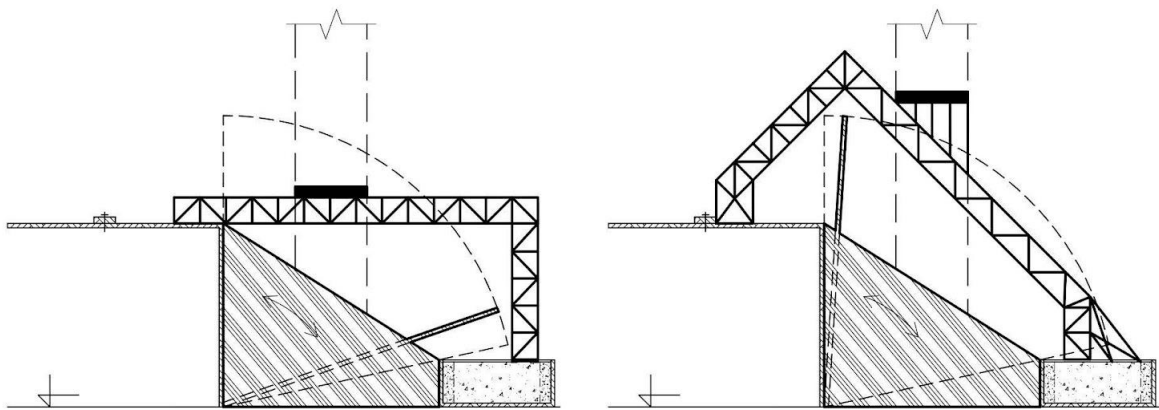


Fig. 2 - Shape arrangements of the structure

Figure 2 shows some potential shape arrangements of the model structure complying with the specified conditions.

Test site

During the load test, the model will be placed on a test site consisting of a bench 720 mm in height and a box with sand placed on a platform at a distance of 1000 mm from each other. A 100 x 18 mm stop (1C) will be placed on the bench top.

The box with external dimensions of 636 x 536 x 218 mm (the box wall thickness being 18 mm) will contain adequately moistened sand reaching 10 mm below the upper box edge. Adequately moistened is defined as sand moistened to the consistency to form sand cakes. The relative positioning of the bench and the box is shown in diagram (1). The model can be supported on the bench or on the sand surface, or it can be embedded in the sand.



The stop can be used to support the model, but its use will be “penalized” by a 25 % increase in the weight of the model included in the rating.

Material requirements

The models must be made using only the following materials:

- Wood profiles up to 10 x 10 mm in size from coniferous wood species commonly growing in the temperate geographical zone. The use of spruce (picea spp.), pine (pinus spp.), fir (abies spp.), larch (larix spp.) and Douglas fir (pseudotsuga) is permitted. The use of thickened, impregnated or otherwise chemically or physically treated timber is not permitted. The use of veneers, plywood and glued laminated timber is not permitted.
- Jute string.
- Any glue. The glue may only be used for joining profiles. The glue must not be used for the surface treatment of wood profiles.

No other materials can be used. To check the materials, the contestant shall submit samples of all materials used to make the model in their raw state. The used glue need not be documented.

The materials can be machined with common hand tools. By conventional hand tools we also mean tools powered by electricity, such as a hand drill, a circular saw, a hand milling machine or a jig saw.

The use of laser or waterjet is not permitted, nor is CNC machining (milling, drilling, cutting, etc.).

In the case that a contestant uses a machining technology whose result could be interchangeable with CNC machining technologies, the manufacturing process must be documented with a video.

The compliance of the materials and machining technologies used shall be confirmed by the competing team by means of an affidavit.

Should a contestant be in doubt about the suitability of a selected material or the method of its tooling and gluing, they need to contact the organiser by e-mail at: hala.akademik@fsv.cvut.cz by 24.3.2024 12:00 p.m.

Model weight

The minimum weight of the model is not specified.

The maximum weight of the model is 1000 g.



Structural requirements for load tests

The model of the structure must be able to carry the basic uniform load with weights placed in the load area (minimum load).

Subsequently, the model will be loaded with concentrated load in the load area (maximum load) until collapse.

For load test No. 1 (minimum load)

In load test No. 1, the model's ability to carry the minimum load will be verified. In this test, the structure will be loaded with small weights with dimensions of 150 x 40 x 5 mm (mass of 235.8 g). The weights must evenly cover the entire load area in the plan projection, i.e. eight weights will be placed in the load area.

The weights will be placed flat in the load area, with the longer side perpendicular to its longitudinal axis.

During this loading the protected area must not be intruded, i.e. the deformed model structure must not hit the protected area and the model must allow the placement of a plate representing a flying aircraft even after the deformation.

Load test No. 1 will be successful if the model can carry the uniform load and does not hit the protected area.

For load test No. 2

In load test No. 2, the limit load will be determined at which the model collapses or the model deformation hits the protected area.

In this test, in addition to uniform loading, the model will be further loaded with small, medium and large weights placed in the load area.

The following weights will be available for the test:

- small weights: dimensions of 150 x 40 x 5 mm (mass of 235.8 g)
- medium weights: dimensions of 150 x 30 x 30 mm (mass of 1059.7 g)
- large weights: dimensions of 150 x 40 x 40 mm (mass of 1886.4 g)

The weight must be placed on the model so that it does not become a substantial part of the model. If a contestant has any doubts about the load placement pattern, they should contact the organiser no later than within 10 minutes after the end of the contested load test.



Model test

The test of the model includes

- model placement on the test site
- performance of load test No. 1
- performance of load test No. 2

The placement of the model on the test site and performance of the two load tests is done by the competing team under the supervision of the test inspector.

Health and Safety

All team members must be wearing safety glasses at all times during the test. Failure to do so may be the reason for the disqualification of the entire team.

While loading the model team members must move so that they are protected from the hazard of a falling load.

Time limit

Each team has a time limit of 12 minutes to place the model on the test site and carry out both load tests. The maximum time for placing the model on the test site is 4 minutes. The test may be interrupted by the test inspector for organizational reasons (checking model geometry, preparing weights, etc.). In the case of the test interruption, the timer will be paused.

Placement of the structure on the test site

After the timer is started, the contestants place the model on the test site.

The model may be supported on the sand surface, or it may even be anchored in the sand, but it must not touch the edges of the box, even during the load tests. The minimum distance between the model and the side walls of the box is 50 mm. The model may rest on the bottom of the box.

Sand cannot be used as part of the model or as a passive load and must not extend over the top edge of the load box.

After the structure is placed on the test site, the geometric requirements will be checked by the test inspector. The timer will be paused during this time.



Load test No. 1

After the structure is placed, the contestants start to load the model on the test inspector's instruction. After placing the load, the test inspector checks the geometric and structural requirements, during which time the timer may be paused.

A detailed description of load test No.1 is specified in the section "Structural requirements for load tests".

The loading procedure is arbitrary. No temporary supporting structure shall be used during loading. The load shall be placed loosely on the structure so that it does not become a substantial structural part of the model.

Load test No. 2

On the test inspector's instruction, the contestants shall start to load the model.

The test inspector continuously checks that the model construction does not intrude into the protected area.

The weights shall be placed one at a time, the last weight placed before the limit load is reached will not be counted in the total load-bearing capacity.

Each model will be loaded until its collapse, if possible. The limit load will be identified as the lowest load of the following states:

- reaching ultimate deformation (the model hits the protected area)
- reaching ultimate load by the collapse of the structure
- reaching maximum load at a weight mass of 100 kg

The loading procedure must be chosen so that the loads are placed evenly along the entire length of the load area during the test.

A detailed description of load test No. 2 is specified in the section "Structural requirements for load tests".

Determination of final ranking of models in the competition

The final model ranking will reflect the model's effectiveness, i.e., the ratio between the total mass of the ultimate load and the total weight of the model.

In the event that the contestants use the stop to anchor the model, the total weight will be increased by 25 % to calculate the overall model's effectiveness.

The models meeting the geometric, structural and material requirements will be evaluated.