American Concrete Institute
Iran Chapter

آیین نامه مسابقات بین المللی دانشجویی بتن شاخه های منطقه‌ای (ACI)

3D Printed Bridge Competition

مسابقه پل ساخته شده با چاپگر سه بعدی

۵ و ۶ دی ماه سال ۱۴۰۵



بیست و نهمین همایش سالیانه انجمن بین المللی بتن آمریکا (ACI) – شاخه ایران و

مسابقه پل ساخته شده با چاپگر سه بعدی

۵ و ۶ دی ماه سال ۱۴۰۵

با همکاری وزارت علوم، تحقیقات و فناوری

مجری:

وزارت علوم، تحقیقات و فناوری
مرکز تحقیقات بتن (متب)
تحصیلات تکمیلی مهندسی عمران
با مجوز ۲۲۰۵۱۱۶

ConREC aci Iran Chapter
Concrete Research & Education Center
Affiliated with ACI International Concrete Institute
Advancing Concrete Knowledge

علاقمندان می توانند جهت ثبت نام و کسب اطلاعات بیشتر به پایگاه اینترنتی

www.aciiranchapter.org مراجعه کرده و یا با شماره تلفن ۸۸۶۶۴۱۵۱ تماس حاصل فرمایند.

دانشجویان علاوه بر سایت انجمن می توانند تمامی آیین نامه های مسابقات دانشجویی و فرم ثبت نام را از کانال تلگرام انجمن دانلود نمایند.

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ACI Iran Chapter 3D Printed Bridge Competition

COMPETITION RULES

1. General description

1. The contest is organized by ACI Iran Chapter and Concrete Research & Education Center.
2. The aim of the competition is to raise awareness of the issues related to bridge construction among young people, the integration of the academic environment and promotion of modern technology used to create contest's models with the use of 3D-printers.
3. The contest can be participated by undergraduate & masters students.
4. The competition is organized annually.

2. Prizes

First, Second, and Third place entries will each be awarded a certificate of recognition, will be recognized in ACI Iran Chapter's newsletter if space allows, and will be recognized on ACI's Iran Chapter website at www.aciiranchapter.org .

3. Organization of the contest

PARTICIPANTS

1. The rules of eligibility have been translated to Persian and attached to this document. See attachment A.
2. Each competition has separate and different requirements and rules of eligibility, so participants in the student competitions should read each document carefully.
3. Teams should complete and send the Registration Form before 18 December 2026 at 5:00 p.m., to be eligible to participate.
4. Each team must sign and submit a Declaration of Trust. See attachment B.
5. Conditions to participate in the competition are:

    - Registration Form completed and sent before 18 December 2026 at 5:00 p.m. .
    - Acceptance of the Contest Rules and Health and Safety Regulations obtaining during making models (Attachment C),
    - Submission of the Declaration of trust (Attachment B),
    - Consent to processing of personal data for the needs of the contest and sharing these details with Partners.
    - Consent to leave contest's model to the Organizer after finishing the Competition.

(1) To complete registration, participants must send a ready to print design of the bridge via e-mail to the Organizer at Convention@aciiranchapter.org The deadline for sending is 22 December 2026 at 5:00 p.m. .

6. Competition entry is a model of a bridge structure printed by the participating teams using 3D printing technology. A ready to print design is made and sent to the Organizer by the participants before the deadline.

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7. A fair course of competition will be ensured by the ACI Iran Chapter competition committee. The committee will be announced at the day of the competitions. All decisions of the contest committee will be taken by a majority of votes.
8. Tasks of the committee are:

    - Supervising accordance of the course of competition with the rules of the contest.
    - Settling disputes during the competition.
    - Qualification of projects for the 2nd stage.

9. The ACI Iran Chapter has a right to exclude participants who are acting against the rules.

4. Time and place of the contest

1. The contest is divided into 2 stages:

- I – Preliminary stage: registration and delivering the printed bridge (assembled and glued) In Person at the first day of the convention.
- II – Main stage: endurance test - construction loading, announcing winners.

2. I stage starts from the date of publication of the contest rules. From that moment Participants can register.
3. Deadline for registration is 18 December 2026 at 5:00p.m. . It is required to send the full ready to print files by 22 December, 2026 via email at Convention@aciiranchapter.org .
4. In case of cancellation of the team's participation in the contest after paying, fee payment is not refunded.
5. Application:

Registration form

- Statement of self-reliance in designing a model (Attachment B)
- Working and Health and Safety Regulations obtaining during making models (Attachment C),
- Contest`s project – file *.stl format and *.dwg format. The name of the file should contain the name of a Participant's University and the name of a team, for example: Azad_University_i.stl – where 'i' is no. of drawing.

1. By taking part in our competition, Participants agree to publishing their personal data on the competition's website: http://aciiranchapter.org .

2. II stage of the competition will take place on December 26-27, 2026 at the Convention Center.

3. Making models from printed elements should take place before sending the bridge.

3D Printed bridge parts should be printed, assembled and glued and ready for the endurance test before submitting them to the competition committee. The 3D Printed Bridge must be submitted In Person at check-in on the First day of the convention December, 26, 2026. See the ACI Iran Chapter website for registration forms and additional information.

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4. Participants are allowed to use an amount of 20 (cc) plexiglass glue (chloroform).
5. Loading the models will take place 26-27 December, 2026 in the convention center. The endurance testing machine will be operated by an appropriate laboratory worker. On the same day the Committee will choose the winners of the competition.

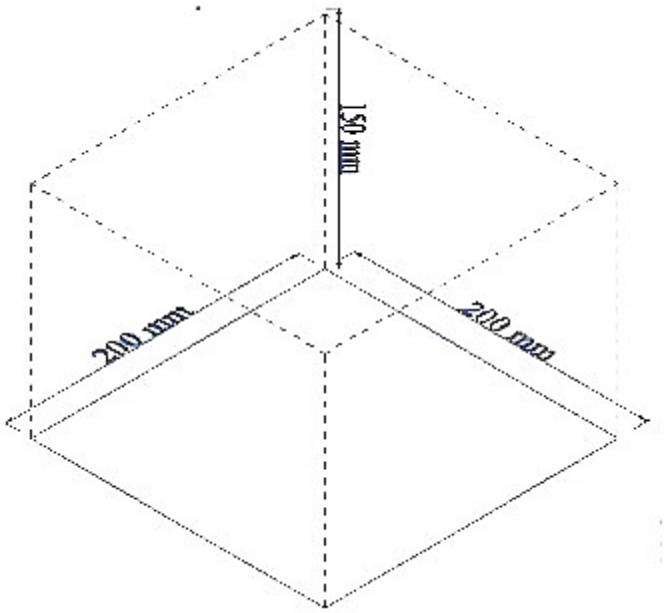
5. Contest's models

1. Participants are obligated to send the following attachments to the Organizer`s e-mail address at Convention@aciiranchapter.org 22 December, 2026:

- Declaration of trust (Attachment B)
- Working and Health and Safety Regulations (Attachment C),
- Drawing of the designed construction in a spatial arrangement, in *.dwg format
- Drawings of segments, which the construction is divided into (every segment in separate file, also in *.dwg format)
- Copy of every drawing in *.stl format.
- Visualization of the model in *.jpg format in definition of 300 dpi and dimensions of 20x30 cm
- Each team is allowed to send only one project.
- The Completed Registration From.

2. Requirements to designed constructions:

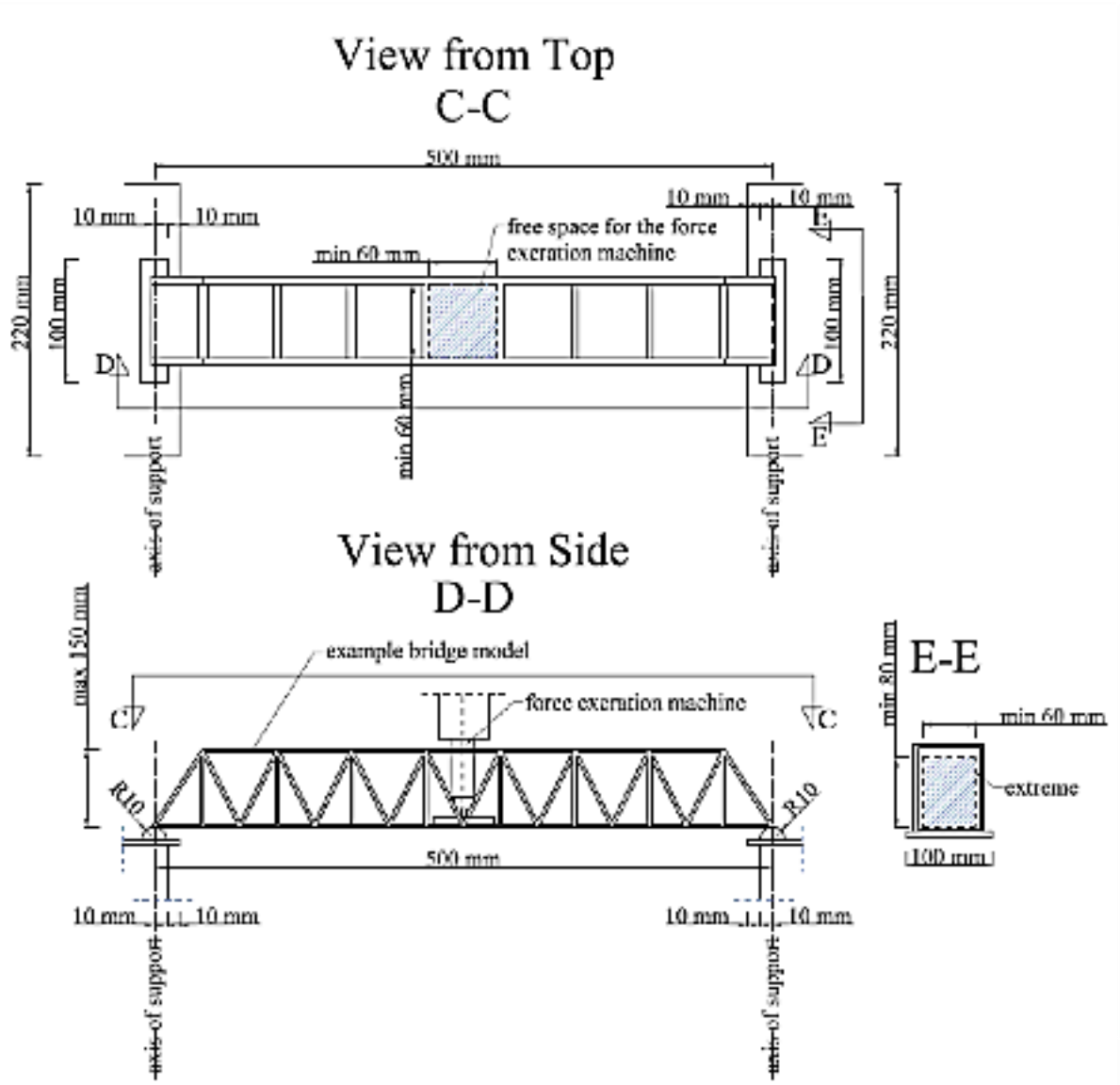
- Participants are obliged to build models by themselves, from previously printed elements.
- To connect the 3D printed elements together, the Participants are allowed to use an amount of 20 (cc) plexiglass glue (chloroform).
- After connecting all elements with the glue, maximum weight of a model cannot exceed 400 g.
- Dimensions of the using matrix printer should be: 20 cm (length) x 20 cm (width) x 15 cm (height). Printed segments of a model cannot exceed these dimensions (Picture no.1).



Picture 1. Space of printing in 3D

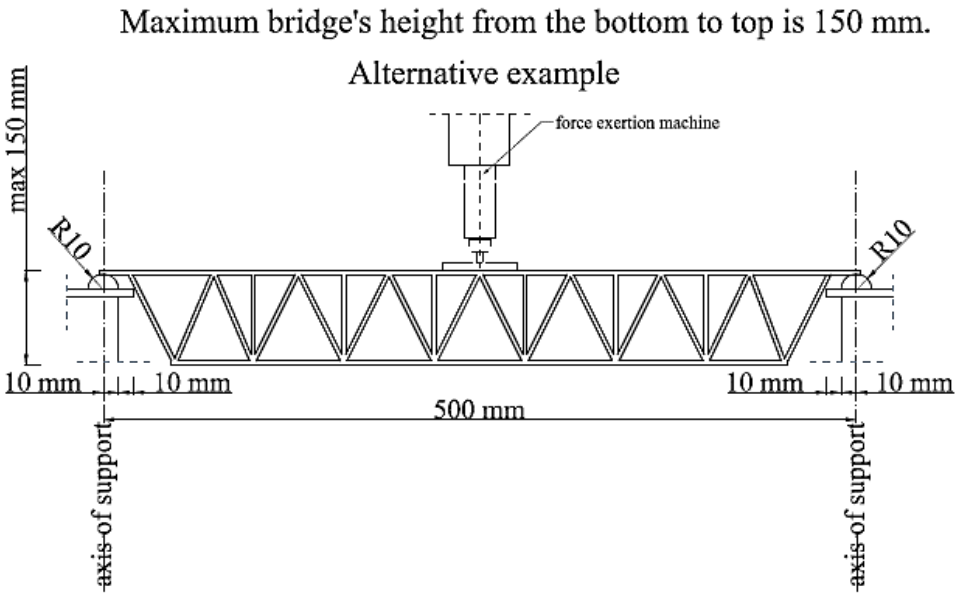
- Span length measured in the axes of the supports has to be 50 cm.
- The model has to have a possibility to be put on supports (Picture no.2).
- Maximum height of a model is 150 mm. The height will be measured after setting a model on supports, from the lowest to the highest point of a construction (Picture no.2 and no.3).
- The object ought to be designed as a simply-supported structure (thrust constructions will be disqualified) with any type of main girder (arch, truss, beam, plate).
- The structure has to be designed as a single-span bridge.
- Minimum dimension of a printed element, in every direction has to elevate in 4 mm.
- Dimensions of elements have to be designed to a 1 mm degree of precision.
- There is no possibility of printing elements with box type cross sections. All of the printed elements have to be designed with a full type cross section (Picture no.4).

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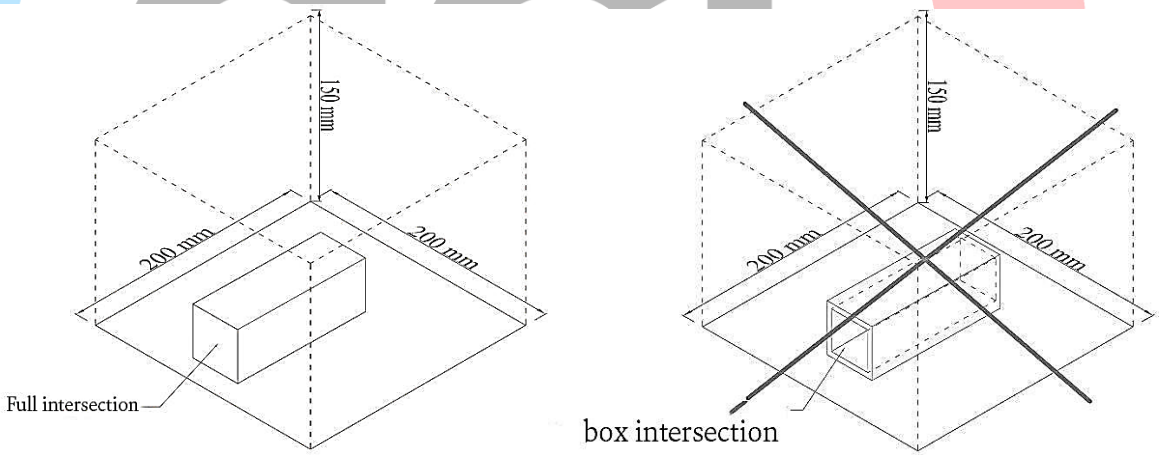


Picture 2. The loading scheme of an exemplar model with marked required extremes.

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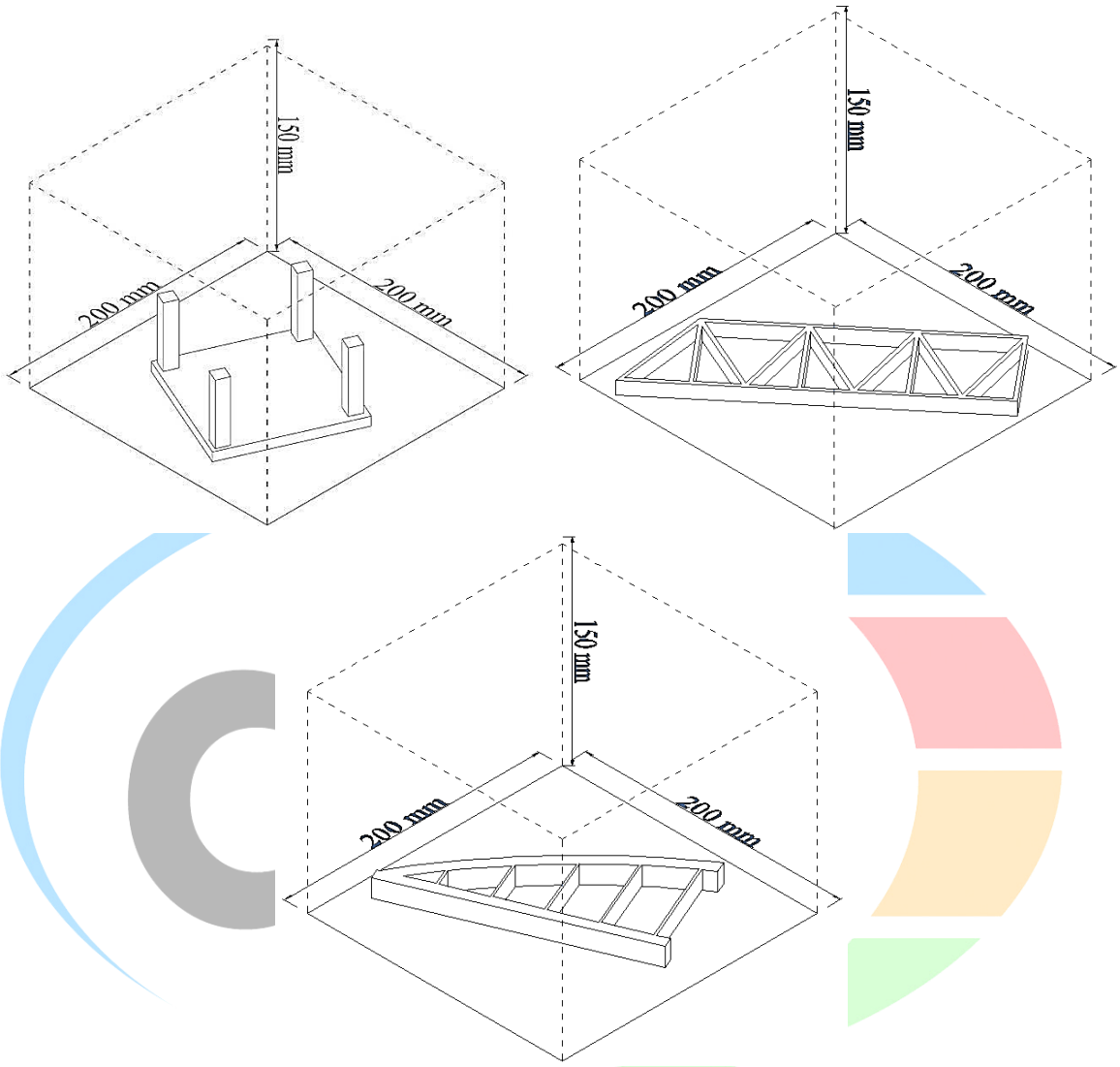
Picture 3. The loading scheme of an exemplary model.



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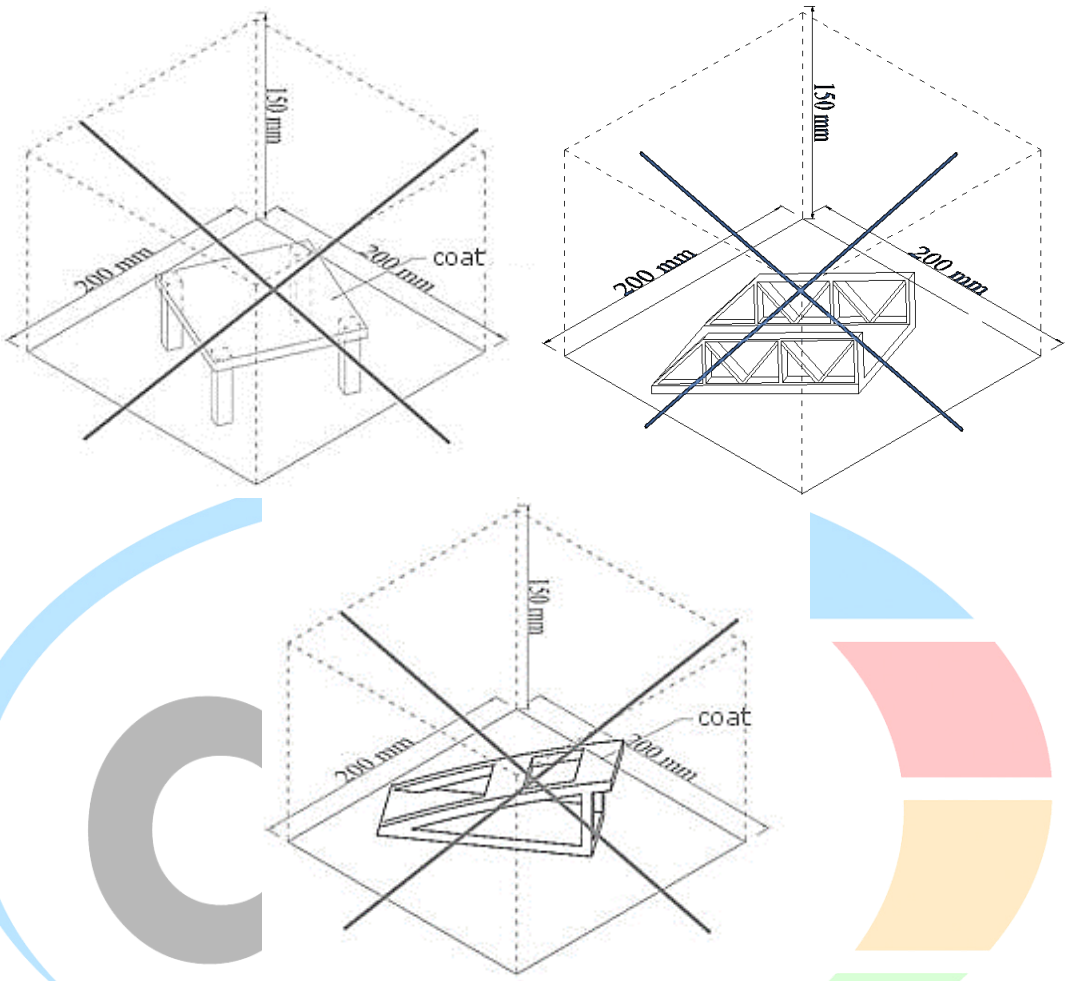
Picture 4. A correctly (on the left hand side) and an incorrectly (on the right hand side) designed cross section.

- Coating elements (shields, plates etc.) can only be printed “on the flat” (directly on the matrix printer). Rules of setting printed elements are illustrated on picture no.5 and no.6.
- Single elements of an arch and a truss girder should be printed „on the flat”.
- The designed model has to be similar to a realistic construction of a bridge and must be usable. That means it has to be possible for a vehicle to drive on it. The vehicle’s dimensions are: 60 mm (width) x 80 mm (height).



Picture 5. Acceptable setting of printed elements on a printer's matrix.

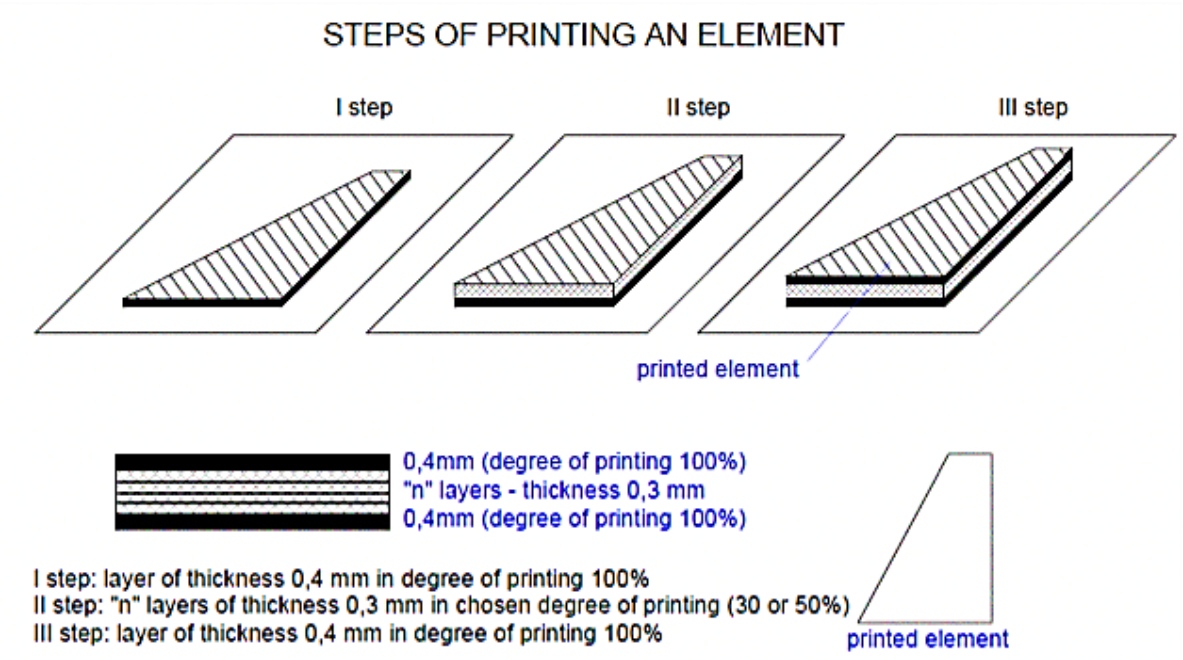
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Picture 6. Coating elements and surfaces cannot be printed in an illustrated way.

- Created construction has to have a possibility to be loaded in the middle of a span by endurance testing machine (force is applied from above by square actuator 50x50mm). There have to be space of 60x60 mm to enter the actuator.
- The degree of printing on 3D printer should be 30% or 50% and it is the value constant for an element. Teams are obligated to send a list of elements with an information about chosen degree for every segment.
- An example of 3D printer method of printing is shown in the picture no. 7.

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Picture 7. Steps of printing an element on the 3D printer.

3. The data of the material, which will be used to print models:
   - The material used to print all of the models is optional.
   - The fulfilment degree of printing in a full type cross sections should be the same for thin elements (2-3 mm) and for thick elements (3-4 cm).
4. All of the models in the competition should be printed by the participants themselves and submitted to the competition committee before the deadline. Deciding on which brand & model of 3D printer to use for printing the bridge is entirely up to the teams.

6. The endurance test - construction loading

1. Before loading a construction, the model will be weighed. The permissible surplus weight is 5% over the maximum weight (400g).
2. The endurance tests are going to be conducted during the construction loading, which will measure a nodal displacement in the middle of a span.
3. Models are going to be loaded by endurance testing machine on the day of the ACI Iran Chapter 3D Printed Bridge student competition 26-27 December, 2026.
4. The process of construction loading:

   1) Inserting the construction onto the endurance testing machine's supports.

   2) Loading the construction in the middle of a span's length. The load is put gradually, until the maximum deflection reaches 20 mm.

   3) The end of construction loading, announcement of results.

5. The main criterion in the "Deflection" category is going to be the relationship between the size of a force, which causes a span deflection of 20 mm or a damage of construction and a total weight of a tested model. The victory is given to a team which will reach the highest "m" factor, specified with a formula:

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$$m = \frac{\text{size of a force, which causes a span deflection of 20 mm or a damage of construction [N]}}{\text{total weight of a tested model [g]}}$$

6. Rules of awarding

1. Main category – „deflection" – Best three bridge constructions will be announced winners.
2. Announcement of results and awarding winners will take place on the second day of the convention.
3. More information about this competition is available at: www.aciiranchapter.org

8. Final provisions

1. ACI Iran Chapter reserves the right to keep all of the 3D printed models and use them for advertising purposes (exhibition).
2. ACI Iran Chapter also reserves the right to modify the contest rules. In that case ACI will inform about changing rules by post on contest site www.aciiranchapter.org
3. Should any circumstances that were not considered in the contest rules arise, it is required for the contestant to obey the law.

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Attachment A:
Eligibility Rules

۱- قوانین مسابقه:

تیم های شرکت کننده در مسابقه :

۱-۱ اعضای تیم ها، دانش آموزان دبیرستانها، هنرجویان هنرستانهای فنی و حرفه ای، دانشجویان دانشگاه های سراسری، آزاد و موسسات آموزش عالی(مقطع کارشناسی و کارشناسی ارشد مهندسی عمران، معماری، مکانیک،معدن ، مهندسی شیمی و ... در تمامی گرایش ها)، مراکز آموزش عالی، مراکز تحقیقاتی پژوهشی دولتی و غیر دولتی می باشند. لازم به ذکر است تعداد تیم های شرکت کننده از هر دانشگاه، موسسه آموزش عالی، دبیرستان، هنرستان و ... نامحدود و در هر گرایش می توانند حداکثر دو تیم داشته باشند که باید اعضای تیم ها متفاوت باشند.

مثال:

تیم A از دانشگاه A جهت مسابقه Epd وCube (استاد راهنما:A و اعضای گروه: ۱و ۲ و ۳ و ۴ و ۵ و ۶ و ۷ و ۸)

تیم B از دانشگاه A جهت مسابقه Epd و Cube (استاد راهنما:A و اعضای گروه: ۹ و ۱۰ و ۱۱ و ۱۲ و ۱۳ و ۱۴ و ۱۵ و ۱۶)

تیم C از دانشگاه A جهت مسابقه Bowling و پل کاغذی (استاد راهنما:B و اعضای گروه: ۱۷ و ۱۸ و ۱۹و ۲۰ و ۲۱ و ۲۲ و ۲۳ و ۲۴)

توجه : تیم C از دانشگاه A اجازه شرکت در مسابقات Cube و Epd را نخواهد داشت.

۱-۲ شرایط مذکور (بند ۱-۱) برای تمامی مسابقات غیر از مسابقه کانو بتنی صادق می باشد.

۱-۳ چنانچه تعداد تیم های شرکت کننده در هر گرایش به حداقل ۴ تیم برسد مسابقه برگزار می شود در غیر اینصورت مسابقه آن گرایش برگزار نخواهد شد و نمونه تحویل گرفته شده به تیم های ثبت نام کننده عودت داده نمی شود.

۱-٤ هرتیم شامل حداقل ۲ نفر و حداکثر ۸ نفر عضو به همراه ۱ نفر استاد راهنما از همان موسسه آموزش عالی، دبیرستان، هنرستان و ... می باشد. همه اعضای تیم باید از یک مقطع تحصیلی باشند.

۱-۵ هر شخص تنها می تواند در یک تیم عضویت داشته باشد.

۱-٦ هر موسسه آموزش عالی، دبیرستان، هنرستان و... برنده حداکثر یک رتبه (مقام) خواهد بود.

۱-۷ استاد راهنما فقط مسئولیت هدایت اعضای تیم و رعایت قوانین مسابقه از طرف تیم را بر عهده دارد.

۱-۸ هر استاد راهنما نمی تواند سرپرستی بیش از دو تیم از یک دبیرستان، هنرستان، موسسه آموزش عالی و ... بر عهده بگیرد.

۱-۹ آخرین مهلت ثبت نام برای شرکت در مسابقه ساخت پل با پرینتر سه بعدی ساعت ۱۷:۰۰ روز جمعه مورخ ۲۷ آذر ماه سال ۱۴۰۵ می باشد.

۱-۱۰ آخرین مهلت ارسال گزارش الکترونیکی و فایل آماده به چاپ طرح پل ساخته شده (طبق بند های آیین نامه) ساعت ۱۷:۰۰ روز سه شنبه تاریخ ۱ دی ماه سال ۱۴۰۵ از طریق آدرس ایمیل convention@aciiranchapter.org می باشد.

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۱-۱۱ تاریخ ارسال و تحویل نمونه های مسابقه ساخت پل با پرینتر سه بعدی:

فرم های ثبت نام (Registration Form) از طریق ایمیل یا فکس می بایست ارسال گردد، شرکت کنندگان فرم ثبت نام را می بایست از وب سایت www.aciiranchpter.org دانلود و تکمیل نموده، به همراه مدارک خواسته شده (معرفی نامه برروی سربرگ دانشگاه یا گواهی اشتغال به تحصیل، کارت دانشجویی معتبر، کارت ملی، فیش واریزی ثبت نام و فرم کامل شده B و C) به دبیر خانه همایش از طریق ایمیل به آدرس convention@aciiranchapter.org و یا از طریق فکس به شماره ۸۸۷۹۷۴۵۴ تا روز جمعه ساعت ۱۷:۰۰ مورخ ۲۷ آذر ماه ۱۴۰۵ ارسال نمایند.

۱-۱۲ نمونه های تحویل داده شده به کمیته مسابقات برای شرکت در مسابقات توسط تیم های شرکت کننده عودت داده نمی شود.

۱-۱۳ شرکت کنندگان مسابقه پل ساخته شده با چاپگر سه بعدی می بایست فایل های کامل آماده به چاپ پل را در فرمت های stl، dwg یا هر فرمت استفاده شده برای طراحی و چاپ (بخش ۴ آیین نامه) را تا تاریخ ۱ دی سال ۱۴۰۵ به ایمیل Convention@aciiranchapter.org جهت داوری طرح ارسال نمایند.

۱-۱٤ هزینه واریزی جهت ثبت نام به هیچ عنوان عودت داده نمی شود.

۱-۱۵ استاد راهنما باید از اعضای هیات علمی و یا مدرسین دانشگاه تیم دانشجویی مربوطه باشد .

۱-۱۶ گزیده هایی از مسابقات ملی بتن مورخ ۵ و ۶ دی ماه سال ۱۴۰۵ به صورت زنده (Live) از وب سایت مرکز تحقیقات بتن www.ConREC.ac.ir پخش می شود. جهت اطلاع از جزئیات پخش مسابقات بتن به وب سایت مراجعه نمایید.

۱-۱۷ نتایج بیست و نهمین دوره مسابقات دانشجویی ملی بتن، مورخ ۵ دی ماه سال ۱۴۰۵ در مراسم اختتامیه جشنواره و کنفرانس بتن و زلزله مرکز تحقیقات بتن (متب) اعلام می شود.

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قابل توجه شرکت کنندگان بیست و نهمین دوره مسابقات سالیانه ملی دانشجویی انجمن بتن آمریکا (ACI)- شاخه ایران:

به مناسبت **بیست و نهمین** سال مسابقات سالیانه ملی دانشجویی انجمن علمی بین‌المللی بتن آمریکا (ACI) ـ شاخه ایران به اطلاع می‌رساند: با مجوز **بنیاد ملی** نخبگان به شماره **۸۹۷۱/۱۵**، این مسابقات به مشابه مسابقات مهارتی دانشجویی مورد تأیید و حمایت **بنیاد ملی** نخبگان قرار گرفته است و برترین‌های این مسابقات از امتیازهایی که برای این قبیل مسابقات در شیوه‌نامه‌های بنیاد تعیین شده است، بهره‌مند می‌شوند.

برای کسب اطلاعات بیشتر جهت نحوه ثبت نام و شرکت در همایش به وب سایت انجمن مراجعه نمایید.

www.aciiranchapter.org

www.ConREC.ac.ir

❖ **قابل توجه کلیه دانشجویان و شرکت کنندگان در بیست و نهمین همایش ملی سالیانه بتن و زلزله و مسابقات سالیانه دانشجویی انجمن بین المللی بتن آمریکا (ACI) – شاخه ایران :**

همایش ملی سالیانه بتن و زلزله و آیین نامه مسابقات دانشجویی مرکز تحقیقات بتن (متب) طبق مصوبه وزارت علوم، تحقیقات و فناوری متعلق و خاص این مرکز بوده و استفاده از آنها خارج از مسابقات فوق پیگرد قانونی خواهد داشت.

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Attachment no. B

CONTEST
ACI Iran Chapter 3D Printed Bridge Competition
Declaration of trust

Being aware of criminal responsibility for false representation, we hereby certify that we are the only persons responsible for the design of our 3D Printed bridge construction. Further- more, we declare that our project:

- Does not infringe any copyrights.
- Has not been a part of another contest project.

....

Place, date, signature of all team members.

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Attachment no. 3

CONTEST
ACI Iran Chapter 3D Printed Bridge Competition
Working and Health and Safety Regulations

During work it is required to maintain cleanliness and order. All tools and objects used during work must be located in designated places. Participants are responsible for all damages caused by themselves and are obliged to cover them from their own funds or when there is a possibility to repair them.
While using dangerous tools, glues and acetone-based solvents, particular caution should be exercised. All work related to cutting elements should be done on the table directly on the board designated for this purpose. It is unacceptable to cut elements directly on the table.
Available resources can cause allergies and irritation. It is important not to allow any chemicals get inside eyes, nose, mouth etc.. Each participant is obliged to inform immediately competition committee about observed irregularities.
ACI Iran Chapter is not responsible for participant's property which can be lost, damaged or stolen during the competition.
Competition Participant is obliged to comply with instructions given by the student competition committee. At the same time they are submitted to all Health and Safety Regulations, Fire Regulations and Rules obtaining at the Convention.

Glue:

- Do not try to tear off the glue from skin or release glued fingers by force. You can tear skin!
- Put some nail polish remover with acetone on glued area of skin. Acetone dissolves glue - even Super Glue, but you should take into consideration that it also irritates skin (skin is blushing).
- If your fingers are glued together or you have much glue on your skin it is best to wet the entire Surface in a bowl with remover with acetone / pure acetone.
- After dissolving of glue wash the rest with soap and warm water.

COMMENTS:

- Acetone as well as nail polish remover may discolor clothing and wooden surfaces.
- If glue gets in the eye it is required to call an ambulance immediately.
- If glue gets into the mouth it is not allowed to close them. It is necessary to call an ambulance immediately.
- Acetone dissolves different types of glue - Super Glue, nail tips glue etc.
- Washing glue (Super Glue) from skin using nail polish remover with acetone may take some time, so you have to be patient.

American Concrete Institute
Iran Chapter

I hereby state that I have read the Working and Health and Safety Regulations and I pledge to comply with its rules, I understand the risk connected with work during the competition and I have appropriate qualifications to use tools such as a hammer, sandpaper and glue, and I am aware of all the risks associated with their use. At the same time, I agree to the dissemination of my personal data (name, last name and the name of the team) and my image on the photographs from the contest in media, press and on websites promoting competition.

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Place, date, signature of all team members.