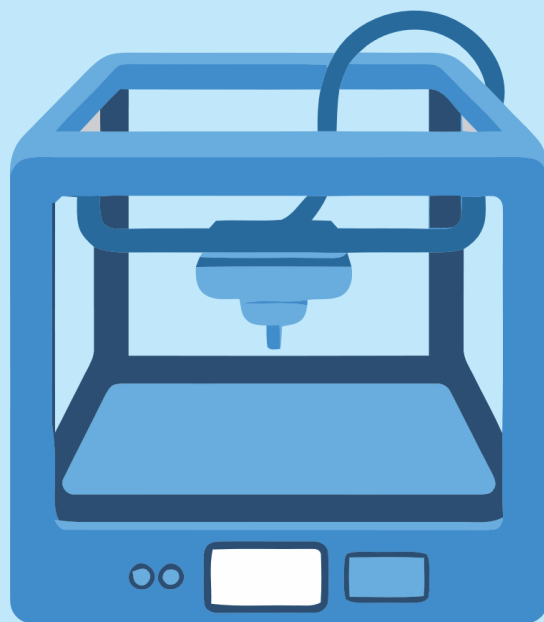




NEXTGEN CREATORS

CATEGORY

FINAL STAGE RULES

BAKU 2025

Introduction

In recent years, 3D printing technologies have led to revolutionary changes in various fields, including industry, medicine, education, and daily life. Digital models are transformed into real objects through 3D printers, accelerating design processes, reducing production costs, and facilitating the creation of customized products.

Unlike traditional manufacturing methods, 3D printing builds objects by adding material layer by layer. This process has a wide range of applications, from creating prototypes and medical implants to aerospace components and customized consumer products.

The primary goal of 3D printing is to make manufacturing processes more accessible, rapid, and cost-effective. By simplifying prototyping, this technology speeds up product development and allows the creation of custom parts and models tailored to individual needs. Additionally, it is utilized in the medical field for producing prosthetics, personalized implants, and even organ models. In education and creativity sectors, it has become an essential tool enabling students and engineers to bring new ideas to life. The "NextGen Creators" category aims to leverage these technologies to foster creativity and innovation.

1. Final

- 1.1.** Three-dimensional printing (3DP) is an emerging construction technology. 3DP works on the principle of creating a three-dimensional object by consecutively adding layers of material. This technology reduces labor costs, minimizes material waste, and optimizes construction time. Although three-dimensional printing technology has long been used to create prototypes and small-scale models in the construction sector, it is now also being applied in building houses and bridges.
- 1.2.** The objective for participants is to design an aesthetically appealing, robust, and rigid bridge. The bridge should require as little assembly time as possible and meet specified geometric requirements. Participants must pay close attention not only to the design but also to the details of the printing process, as print quality plays a significant role in the shape, accuracy, and load-bearing capacity of the bridge. During the competition, participants are expected to demonstrate teamwork, organizational skills, analytical thinking, and creativity.

1.3. Bridge Dimensions

- The bridge must span an open gap of **440 mm**.
- The total length of the bridge must be **500 mm**.

- The overall height from the lowest surface to the highest surface of the bridge must not exceed **130 mm**.
- The width of the bridge must not exceed **130 mm**.
- The bridge models must be positioned on the testing device in such a way that **no additional elements, protrusions, or obstructions** are present beneath the areas where the supports are located.
This requirement is intended to ensure that the bridge rests **completely, stably, and evenly** on the supports of the testing apparatus.
- • If these dimensional and placement requirements are not met, the **bridge model will not fit properly on the device and may not be admitted to the testing phase.**

Along the cross-section of the bridge:

- The clear span width must **be 80 mm**, and the clear span height must be greater than **60 mm**.
- These dimensions must be maintained throughout the entire length of the bridge, allowing a test square of these dimensions to pass through unobstructed. (See Appendix A - Figure 2).
- There must be a flat and continuous 3D-printed deck surface along the **80 mm** clear width.
- The bridge must consist of at least **4 separate components**, but must create a smooth and continuous surface after assembly. The use of additional materials (adhesives, tapes, nails, etc.) at the assembly joints is strictly prohibited.
- When determining the bridge's weight, the deck is also included.
- The deck must cover the open span of at least **440 mm**. (See Appendix A - Figure 1).

Loading Conditions

A load will be applied to the bridge;

- This load will be positioned at the center of the bridge and at the midpoint of the span;
- The load will be applied through a **threaded rod with a diameter of 10 mm**, passing through the exact center of the bridge wall;
- A **minimum 13 mm diameter hole** must be located at the center of the bridge wall to allow the 10 mm threaded rod to pass through it. (*Annex A – Figure 3, Figure 4*).

Fastening Requirement:

- To prevent the bridges from moving on the testing device, they must be secured using screws. For this purpose, the bridge deck — which has a width of 130 mm — must include appropriate slots for **M5 screws** on both **the right and left sides**, positioned **15 mm** from each of the four edges (see Figure 5).
- These fastening points must ensure that the bridge sits firmly and stably on the support sections of the testing apparatus. If the screw slots are not placed at the correct distances and are not symmetrically aligned, the bridge will not remain stable on the device, and in such a case, the model may not be accepted for testing

a. Material Restriction

All components must be printed exclusively from **100% plain PLA (Polylactic Acid)**. No other filament materials are permitted.

b. Maximum Weight Restriction

The total weight of the bridge must not exceed **1000 grams**.

c. Mechanical Connection Requirement

Only mechanical connections are allowed. The use of adhesives is strictly prohibited. Teams failing to comply with this rule will be disqualified.

Engineering Notebook

Participants must prepare an engineering notebook. The size of the engineering notebook must be **210 x 297 mm** and should include the following information:

1. Project Information

- Project title
- Project team and participants' names
- Date and version number
- Project objectives and requirements

2. Research and Preliminary Data

- Analysis of existing problems and solutions
- Research on the topic and relevant sources
- Initial sketches and ideas

3. Design Process

- Initial concepts and prototype sketches
- Alternative designs and their comparisons
- Justification for the selected design
- Design specifications (dimensions, materials, etc.)

4. Calculations and Analyses

- Technical and mathematical calculations
- Simulation and modeling results

- Strength, stability, load, and other relevant analyses

5. Prototyping and Testing

- Description of the prototyping process
- Test plan and testing methods
- Test results and their analysis

6. Problems and Solutions

- Challenges encountered during the project
- Solutions to the problems
- Changes made and their reasons

7. Final Results and Improvements

- Final design and applied modifications
- Project outcomes and achievements
- Recommendations for future development

8. Appendices and Graphics

- Technical drawings and CAD models
- Graphs, diagrams, and tables
- Photographs and scanned sketches

Since the engineering notebook is an official document, all entries must be dated, modifications and revisions should be tracked, and the pages should be numbered sequentially.

Presentation Requirement:

In the final stage, teams are required to prepare a **roll-up banner** for the presentation of their projects. The roll-up must meet the following technical specifications:

- Dimensions: **850 mm (width) × 2000 mm (height)**;
- The roll-up design must include simulation images of the bridge model, calculations, structural analysis results, as well as the scientific and technical justification of the project;
- Each team must use the roll-up to visually present the functionality, innovative solutions, and engineering approach of their bridge model.

The design of the roll-up should be aesthetically neat, readable, and should clearly convey the team's project concept.

2.First Day of the Final Competition

- 2.1. Participants must bring the **3D-printed model** of their designed bridge in **unassembled parts**, along with their **engineering notebook** and roll up to the competition area for the final stage.
- 2.2. The next task of the final stage will be announced at the competition area.
- 2.3. Participants **must** bring their **notebook** with them.

3.Second Day of the Final Competition

- 3.1. Participants must begin the construction of the bridge within the allocated time.
- 3.2. A **maximum of 15 minutes** will be given for the bridge assembly.
- 3.3. After completing the bridge construction, teams must present their project and explain the technical details. They must also present their **simulations and academic preparations**.
- 3.4. Teams will **present their bridges** and undergo a **load test**.

4.Competition Area

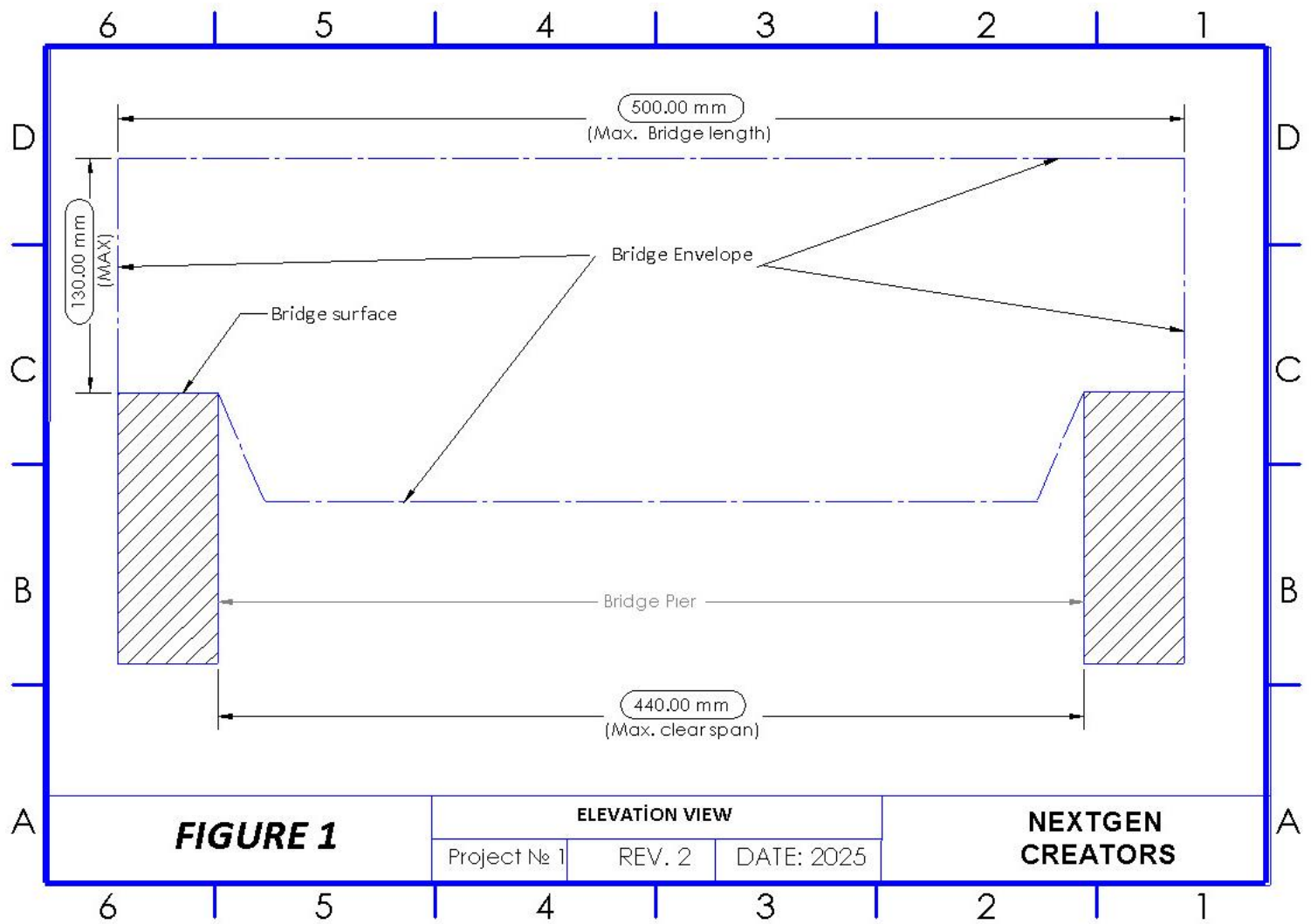
- 4.1. The test device will have an **automatic loading mechanism**. The loading process will be measured using **precise weight sensors**. The device will be stable and will test all bridges under the **same conditions (Figure 6)**.
- 4.2. Once the bridge is placed on the device, **static balance** will first be checked. Then, along with a **wear test**, the results will be recorded when the bridge **deforms under load** or **breaks**.

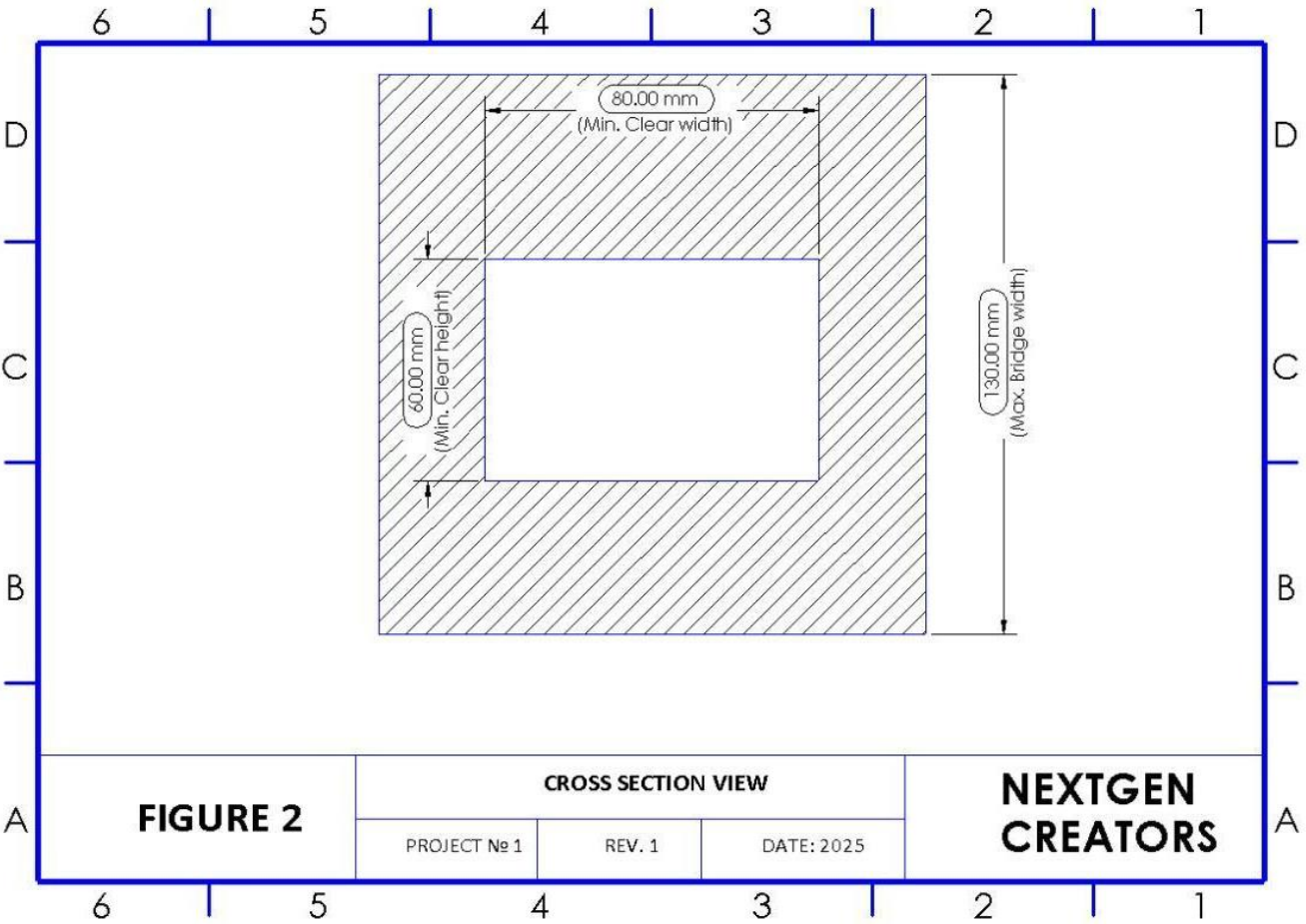
5.Evaluation Criteria

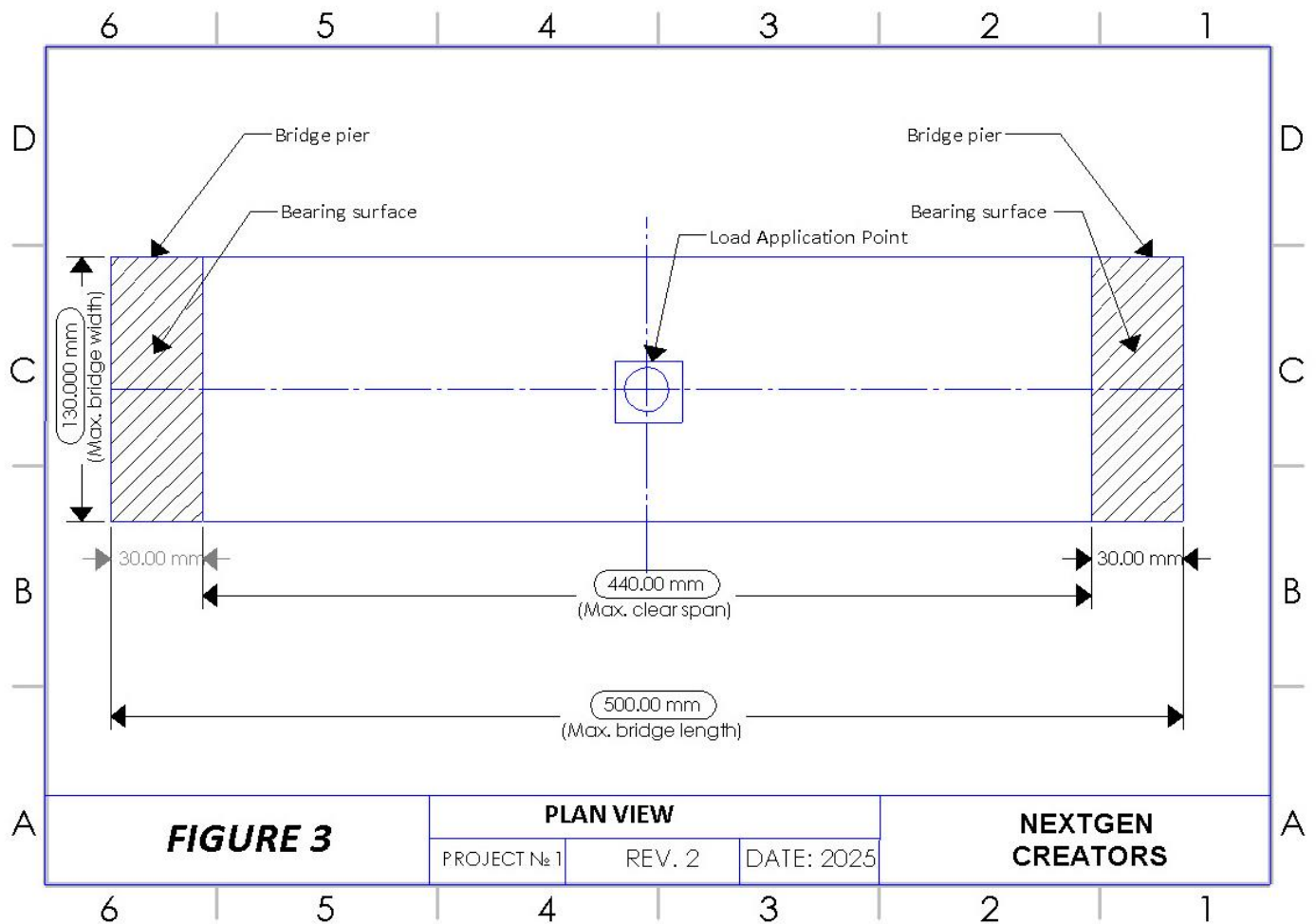
No	Criterion	Sub-Criterion	Description	Points
1	Load-to-Weight Efficiency	–	Measures the structure's ability to bear maximum load relative to its own weight.	40
2	Stress Distribution	–	Evaluation of how stress is distributed across the design and whether it exceeds material limits.	30
3	Efficient Use of Materials	–	Assessment of material optimization by minimizing excess volume or weight.	20
4	Presentation	a) Visual Clarity	Physical model or render is clean, clear, and visually coherent.	20
		b) Clarity of Explanation	Design decisions and rationale are presented clearly and effectively.	30
		c) Logical Sequence	Presentation follows a structured and logical progression.	15
		d) Engineering Notebook	Design process is documented thoroughly with technical notes and planning.	15
5	Design Quality	a) Technical Accuracy	Compliance with all specified requirements and dimensional constraints.	15
		b) Aesthetic and Symmetry	Design is well-balanced, symmetrical, and visually appealing.	15
		c) Mechanical Joints	Parts are connected with stable and functional mechanical joints.	15
		d) Innovation	The design demonstrates creativity and unique technical approaches.	15
			Total:	230

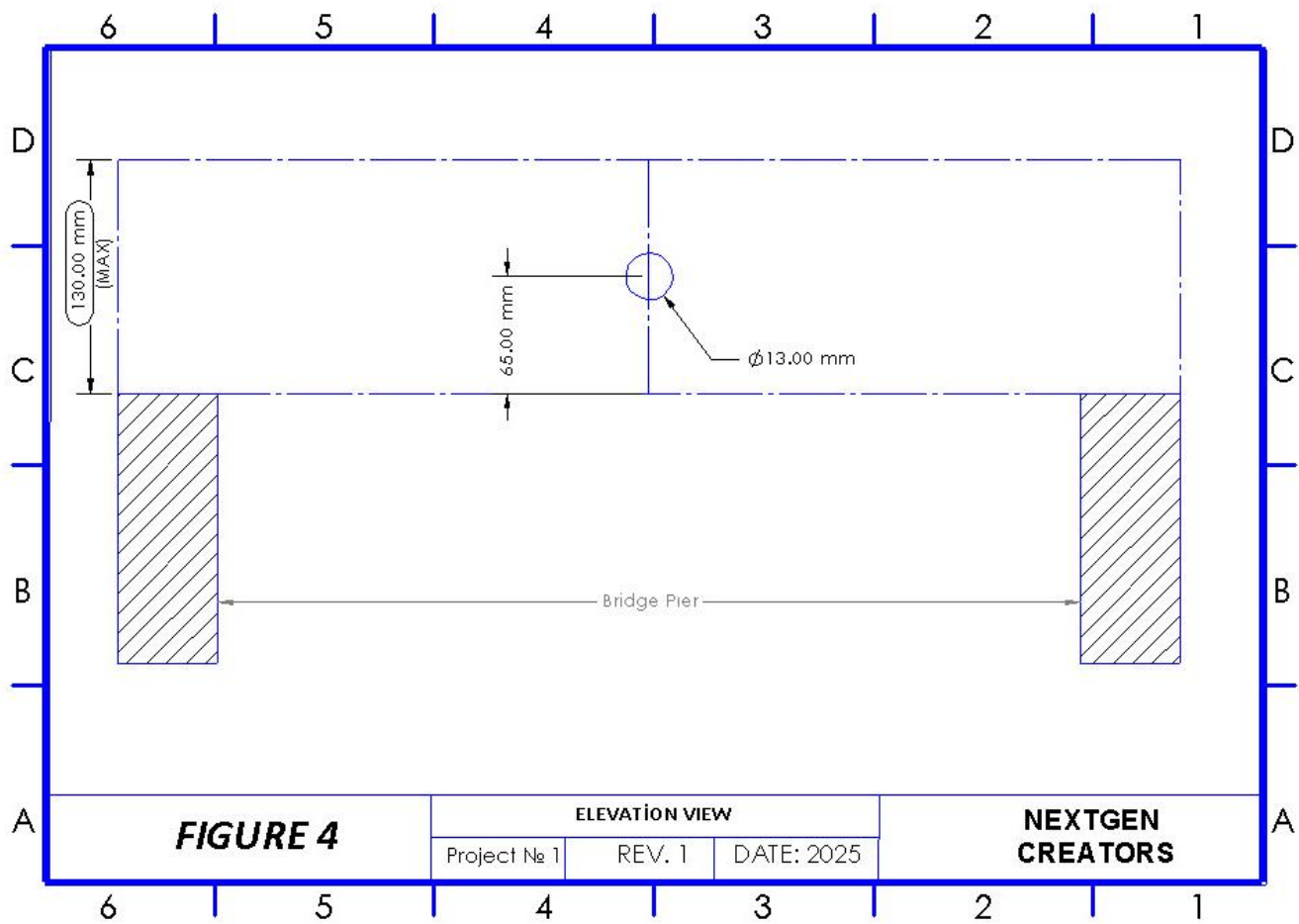
Safety and Discipline Rules

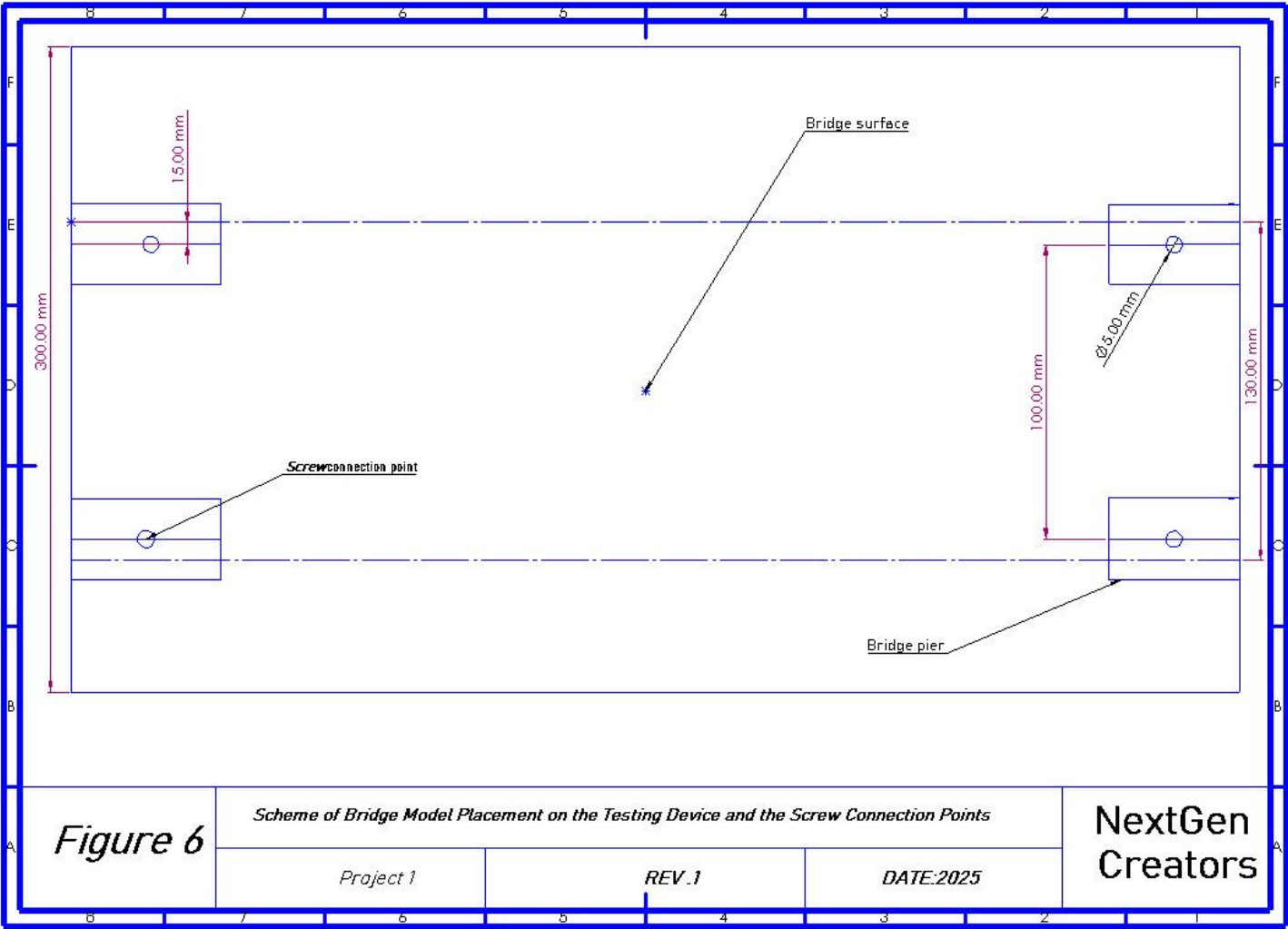
1. During the testing process, all participants must strictly comply with **technical safety regulations**. The use of the testing device, electrical equipment, and other technical tools is permitted **only under the supervision of the responsible person or the jury members**.
2. **Unsafe behavior**, unauthorized interference with the devices, obstruction of other teams' work, or any **violation of ethical standards** during the competition or testing process is strictly prohibited.
3. Teams or participants who fail to comply with the rules, damage equipment, or negatively affect the progress of the competition will be **immediately disqualified**.
4. Each team is **fully responsible** for the conduct of its members and for ensuring compliance with safety regulations.











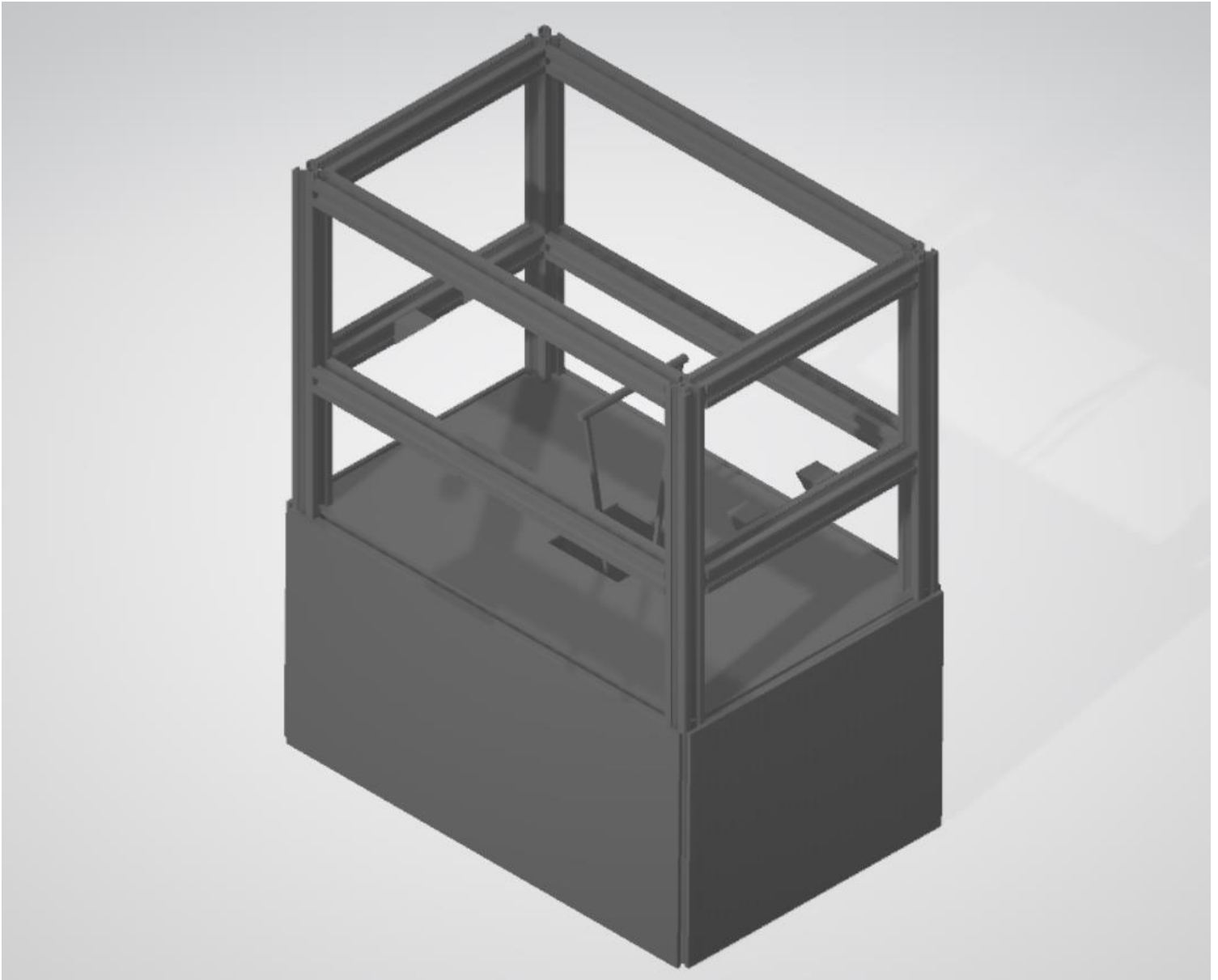


Figure 6.