# UTM BRIDGE COMPETITION 2026
# Secondary School Category: Da Vinci Bridge Model

## 1.0 TEAM COMPOSITION

a. Each participating team shall consist of one (1) Advisor and four to five (4–5) student members. The Advisor must be a full-time teacher from the respective secondary school.

b. Participating teams must represent a registered secondary school, and all student members must be currently enrolled at the secondary school level during the competition period.

b. A registered school means a school that is officially recognised and approved by the government or relevant education authority.

c. Each participant may only represent one (1) team throughout the competition. Students are not permitted to register or compete under multiple teams.

d. Each team shall appoint one (1) student member as the Team Leader for official correspondence and coordination with the organizing committee.

e. A maximum of two (2) teams from each secondary school may qualify to participate on the official competition day.

f. Any replacement of team members or Advisors after registration must receive prior approval from the organizing committee. The organizers reserve the right to verify the eligibility and institutional affiliation of all participants at any stage of the competition.

## 2.0 BRIDGE MODEL SPECIFICATIONS

a. The Da Vinci Bridge model (hereinafter referred to as “The Model”) shall be designed based on the fundamental concept of the Da Vinci Bridge, where structural stability is achieved primarily through gravity load, friction, and interlocking mechanisms. Examples of Da Vinci Bridge can be referred to Figure 1.

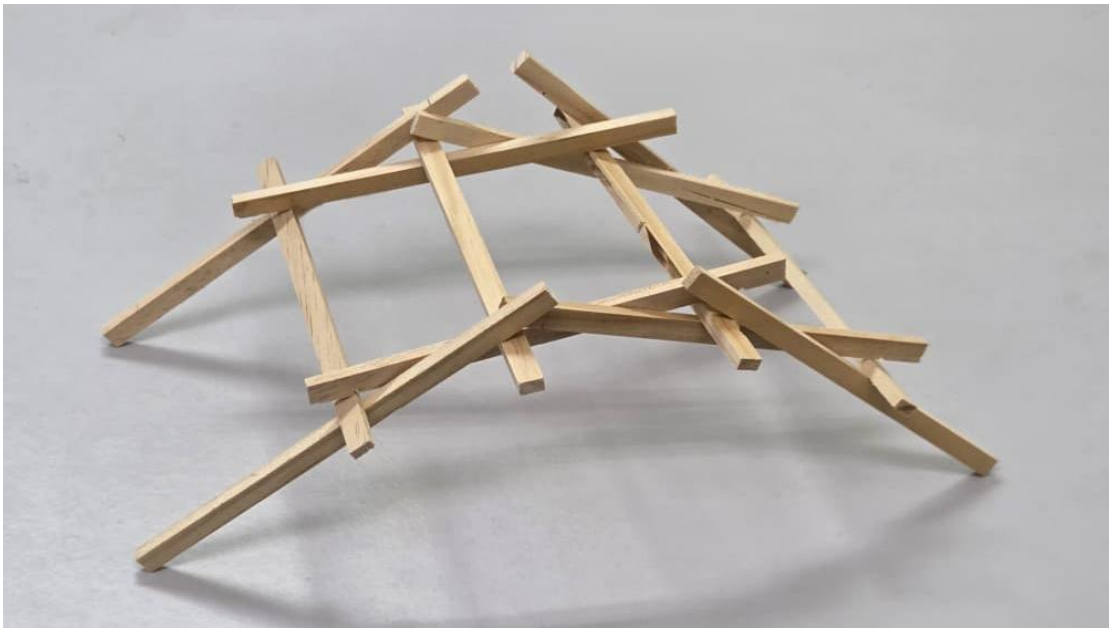

**Figure 1**: Example of Da Vinci Bridge Model

b. All bridge construction works shall be carried out during the competition day using only the materials provided by the organizing committee.

c. Pre-assembled bridge components are not permitted. All bridge assembly must be completed during the competition session

d. The ultimate objective is for the Model to achieve failure at an optimum target load of 5 kg. This requirement is intended to promote understanding of efficient and optimum structural design while avoiding both overdesign and underdesign.

e. All bridge construction materials shall be provided by the organizing committee. The exact type, size and properties of the materials will only be disclosed during the competition day.

f. Participants are only permitted to use the materials supplied by the organizing committee for bridge construction. The use of additional or external materials, including but not limited to paper, glue, adhesive tape, strings, staplers, pins, nails, screws, or any other fastening materials, is strictly prohibited.

g. Participants are permitted to modify the supplied materials for construction purposes, including cutting, trimming, grinding, shaping, or notching, provided that the original supplied materials remain the primary structural components of the bridge model.

h. Participants are not permitted to use hazardous tools or equipment during the competition. Participants are permitted to use basic hand tools for material modification and assembly. The use of battery-powered or electrically powered tools is not allowed.

i. The connection between bridge members shall rely solely on gravity, friction, and interlocking methods in accordance with the original engineering principle of the Da Vinci Bridge concept. The use of adhesive, mechanical fasteners, or external binding systems is not permitted.

j. Replacement materials will not be provided for any damaged or improperly modified components.

k. Teams are not required to use all provided materials.

l. The completed Model must be capable of spanning a clear gap of 400 mm measured between the inner edges of two supporting tables (edge-to-edge). During testing, the bridge will be placed on two tables positioned left and right, leaving a 500 mm unsupported gap in the middle (see Figure 2).


**Figure 2**: Illustration of 400mm clearance *(Note: The model shown is not a DaVinci Bridge)*

m. The Model shall be designed to carry load at the mid span (see Figure 3). The highest load factor will be given if the capacity (P) is 5 kg. Lower score factor will be given if the capacity (P) is smaller than or larger than 5 kg.

n. Any bridge Model found to be in non-compliance with the material or construction requirements may be penalised or disqualified at the discretion of the organizing committee and judging panel.

o. In case of any dispute, final decision is made by the chief of judges.

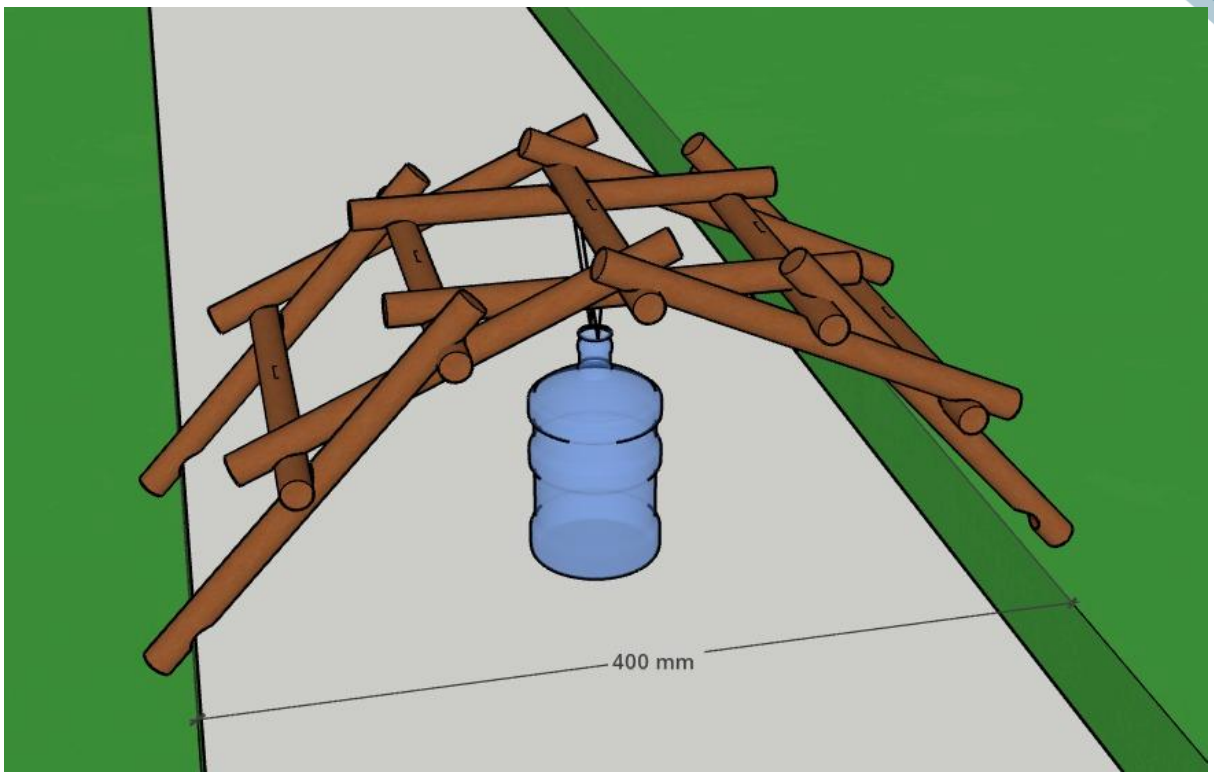


**Figure 3**: Illustration of load test setup

# 3.0 MODEL CONSTRUCTION & ASSESSMENT PROCEDURE

## 3.1 Booth Allocation and Setup

a. Each participating group shall be provided with two (2) tables to support and display their bridge model (hereinafter referred to as the “Model”).
b. Participants are given three (3) hours for booth setup. This includes construction of the Model, posters, and any approved decorative materials.
c. Posters will be limited the size 594 × 841 mm of the bunting stand (refer Figure 4).
d. Any unfair practices, including the use of AI tools or external online resources (e.g., YouTube tutorials) during the competition, will result in disqualification.

**Figure 4**: Example of bunting stand for A3 poster

### 3.4 Judging Procedure

a. There shall be no formal presentation session.
b. Judges will visit each team's booth for evaluation.
c. Each team shall be allocated a maximum of ten (10) minutes for judges' interaction, including questions and evaluation (Q&A session).
d. The judges' marks (J) shall be based on a total of 100%.

### 3.5 Judging Criteria

The evaluation criteria for judges' marks (J) are as follows:

**Table 1**: Evaluation criteria and marks allocation for the judge's marks (J)

| Criterion | Marks (%) | Description |
|---|---|---|
| Engineering concept and design | 50 | This criterion evaluates the structural efficiency, engineering rationale, stability, and practicality of the Model. Judges will assess how well the team applies engineering principles, including load transfer mechanism, structural configuration, material utilization, and overall functionality of the Model. |

| | | |
|---|---|---|
| Aesthetic quality | 20 | This criterion assesses the visual appearance and overall attractiveness of the Model. Consideration will be given to workmanship quality, neatness, finishing, proportion, and the overall presentation of the Model. |
| Poster presentation (A3 size) | 10 | This criterion evaluates the quality and effectiveness of the technical poster displayed by the team. Judges will assess clarity of information, technical explanation, graphical presentation, layout organization, and the ability of the poster to communicate the design concept effectively. |
| Question and answer session | 20 | This criterion assesses the participants' understanding of their Model and their ability to explain the engineering concepts, design decisions, structural behaviour, and construction process. Judges will also evaluate the team's confidence, communication skills, and ability to respond accurately to technical questions. |

### 3.6 Load Testing Procedure

a. Participants shall transfer their Models to the designated testing platform.
b. A load holder shall be installed at the midspan of the Model (see Figure 3).
c. Load shall be applied incrementally up to a maximum of 8 kg or until failure occurs, whichever comes first.
d. For each load increment, the Model must sustain the applied load for a minimum of thirty (30) seconds before the next increment is applied.

### 3.7 Load Capacity Definition

a. The load capacity (P) is defined as the load sustained by the Model for at least thirty (30) seconds without failure.
b. The Model shall be considered as failed when any of the following occurs:

- The load holder detaches from the Model or touches any external object;
- Any structural component of the Model detaches, fractures, or breaks;
- The Model loses stability or collapses.

### 3.8 Load Factor

a. The Load Factor (L) shall be determined based on Figure 5.
b. The ultimate objective is for the Model to achieve failure at an optimum load of P = 5 kg, with a maximum Load Factor (L) of 1.0.

c. This requirement is intended to promote understanding of the concept of optimum design, encouraging participants to avoid both overdesign and underdesign in their structural solutions.

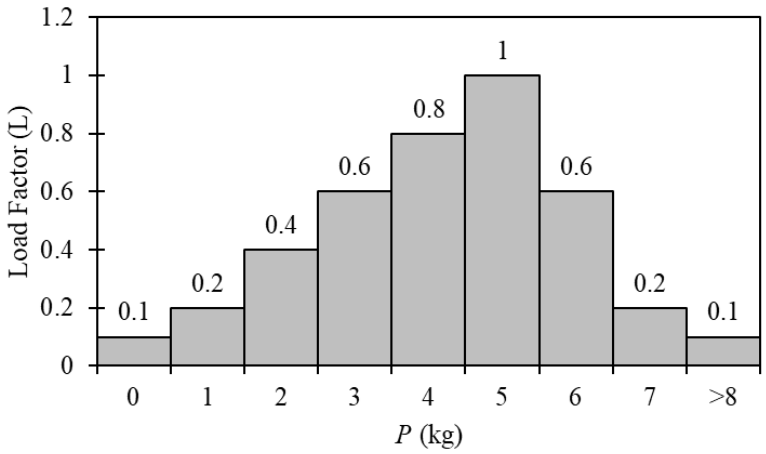


**Figure 5:** Load Factor (L) graph

## 3.9 Scoring System

a. The overall score shall be calculated using the following equation:

$$\text{Overall Score} = J \times L$$

b. In the event of a tie in the overall score, the team with the higher judges' marks (J) shall be ranked higher. If the teams remain tied after all criteria have been considered, the teams shall be declared joint champions.
c. In the event of any dispute, the decision of the Chief Judge shall be final and binding.
d. Participants are required to dismantle their Models and clear their booths upon completion of the competition.