IF WE BRIDGE-
DESIGN AND BUILD CHALLENGE

With the 3DEXPERIENCE platform

Version 1 (Draft)

3DEXPERIENCE®

PROBLEM STATEMENT

IF WE Bridge- Design and Build Challenge!

This competition challenges engineering students to design a bridge using the 3DEXPERIENCE platform and manufacture it with 3D printing technology using PLA material. The goal is to design the bridge to support maximum load with minimum mass of the bridge while maintaining minimal deformation. The competition aims to foster innovation, creativity, and engineering excellence among participants.

RULES

- Bridge Specifications:
  - All bridges must be designed (and simulated) using the 3DEXPERIENCE platform
  - 3D printed using PLA material before competition day
  - Bridge can be one piece or multiple interlocking pieces. Bridge should not consist of any other material that PLA. Metal pins, screws, etc not allowed. (Cyanoacrylate adhesive (fevi kwik) can be allowed to)
  - The bridge span must be 300mm and bridge the gap between Base1 and Base 2 in the arena (details attached).
  - The total weight of the bridge, including any additional support structures, must not exceed 25 grams (TBF).
- Competition Day:
  - Each team will have a designated time slot for testing their bridge.
  - Judges will evaluate the bridges based on the specified criteria.
- Testing Procedure:
  - The bridge will be tested by applying incremental load at its center until either the bridge fails or the maximum deformation (10mm) (TBF) is reached.
  - The Last Applied load (before Maximum Deformation or Failure) will be noted as the Load Supported
- Code of Conduct:
  - All participants must adhere to ethical standards and academic integrity. Respectful and sportsmanlike conduct is expected from all teams.

SCORE CALCULATOR

Mass Efficiency (ME):

Formula:

Evaluate how efficiently the with the least mass.

Prediction Accuracy (PA):

Formula:

Evaluate how accurately Teams carrying capacity

Aesthetics and Innovation (AI):

Consider the visual appeal and innovative aspects of the bridge design.

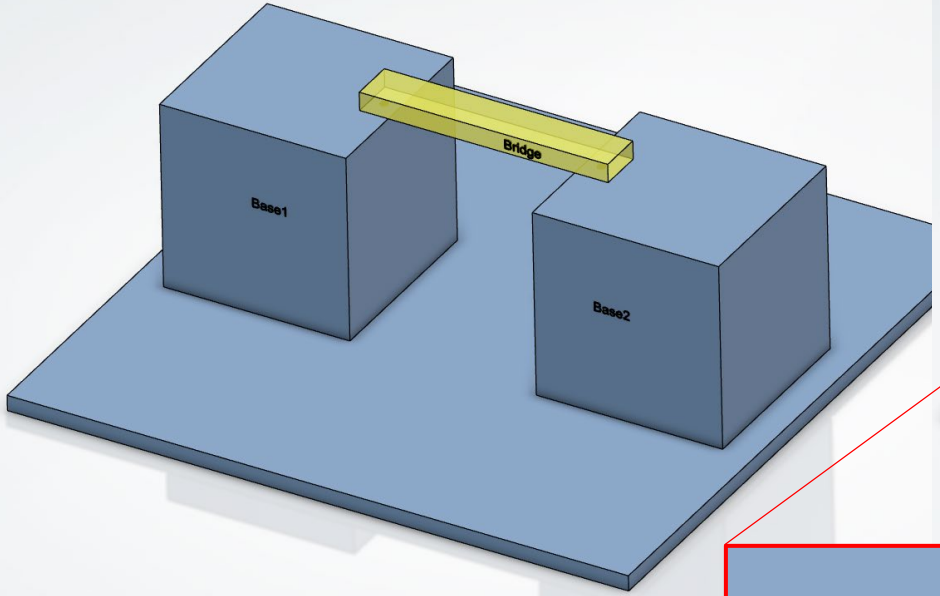
Overall Score: Formula:

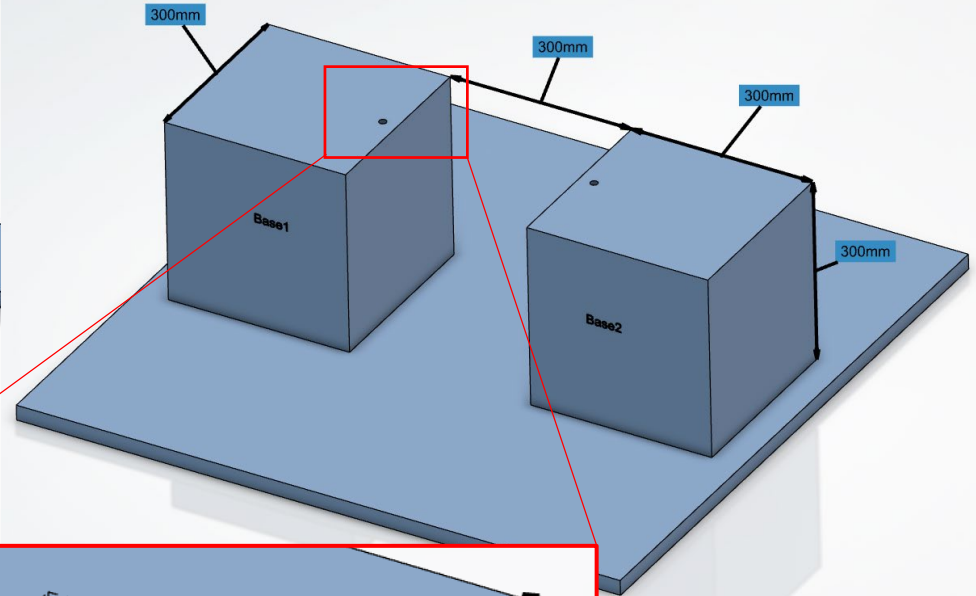
$$ME = \frac{\text{Load Supported (gm)}}{\text{Bridge Mass (gm)}}$$

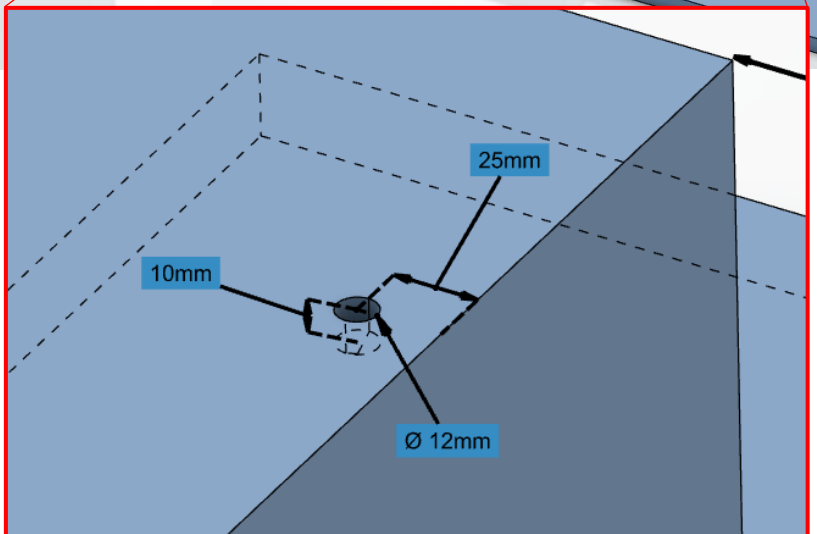
$$PA = \frac{|(\text{Load Supported} - \text{Predicted Load})|}{\text{Load Supported}}$$

AI = Subjective score from Evaluator 0 to 5 for Aesthetics + 0 to 5 for Innovation

Overall Score = (0.6 x ME) + (0.2 x PA) + (0.2 x AI)







ARENA

DASSAULT SYSTEMES

NOTE

- The exact details of the bridge dimensions and weight etc will be tested and finalized. Upon agreement on the overall problem statement and concept, we can try out the solutions and accordingly finalize the details.
- The Organizing team will have to allocate some efforts and resources for-
    - Building the Arena
    - 3D Printers, Printing Time and Material
    - Build/Arrange equipment for bridge testing and measurement- The exact methods for applying the test load and measurement of deformation can be tried and chosen before launching the competition. It can depend on the equipment available in the college/university.
- Expected Apps to be used-
    - Part Design/ Assembly Design- to design the bridge
    - Functional Generative Design- for Topology Optimization- to remove unnecessary material and manage weight
    - Lattice Design may be used to generate a lattice structure in the bridge for further weight management
    - SIMULIA Apps for prediction of Load Carrying Capacity
    - Other apps can be used wherever possible
        - Other design/simulation apps on the 3DEXPERIENCE platform
        - 3D Story to present the design concept
        - Project planning for Project Management
        - Collaboration and PLM features of the 3DEXPERIENCE platform
    - For generating G Code for the 3D printer, the printer's slicing software can be used

DASSAULT SYSTEMES