“The KitKat” Bridge

Have a Break

OPPORTUNITY

Efficiently support a train load while optimizing structural performance, material usage, and constructability under course-defined constraints.

OBJECTIVES

- Carry > 400 N load
- Maximize strength-to-weight ratio
- Meet dimensional constraints and fabrication limits

DESIGN HIGHLIGHTS

- Angled Webs
  - Improve stability by distributing compressive forces diagonally.
- Central Underlayer
  - Added layer under glue tabs increases Ybar and strength.
- Matboard-Efficient Construction
  - Design tailored to conserve material while maintaining strength.

DESIGN OUTCOMES

- Max expected load before failure: 996 N
- Central reinforcement optimized for max moment zone
- Angled webs and bottom flange prevent vertical buckling
- FOS ≥ 2 across all critical stress modes (shear, compression, glue)

BRIDGE DESIGN

Air Pump Platform

Dynamic Chair Stabilizer for Study Spaces

TEAM VALUES & DESIGN DECISIONS

- **Responsibility**: Safe glue handling outdoors with PPE.
- **Efficiency**: Python code used to model failure loads and optimize FOS.
- **Sustainability**: Reduced glue width to preserve material.
- **Precision**: Constructed with utility knives, fold scoring, and layout optimization.

KEY DESIGN DECISIONS

- Cross-sections designed for equal stress distribution using shear and axial stress formulae.
- Local buckling prevented through diaphragm placement, optimized using bucking formulae.
- Final bridge predicted to fail from flexural compression, not glue or shear

BRIDGE ITERATIONS

Drawings created by Angelina Yee