AISC Steel Bridge Design Competition

Trevor Neece

INTRODUCTION

When designing a steel bridge, you must find a balance between structural stability and construction costs. Each year, the ASCE and AISC challenge undergraduate civil engineering students to build a steel bridge using a real-world problem statement. Factors such as deflection, construction time, and material usage give the bridge a score to determine how effectively it balanced cost and strength.

OBJECTIVES

- Under the scope and requirements designated by the competition committee, design a steel bridge that holds 2,500 lbs with minimal deflection.
- Fabricate a design with a low total weight
- Construct the bridge live with a low total build time.

METHODS

- Researched design types from previous CSU build and competition winners.
- Performed buckling and sway analysis using Solidworks.
- Collaborated with various bridge engineers to gain insight into the design.
- Performed construction tests with the final design.

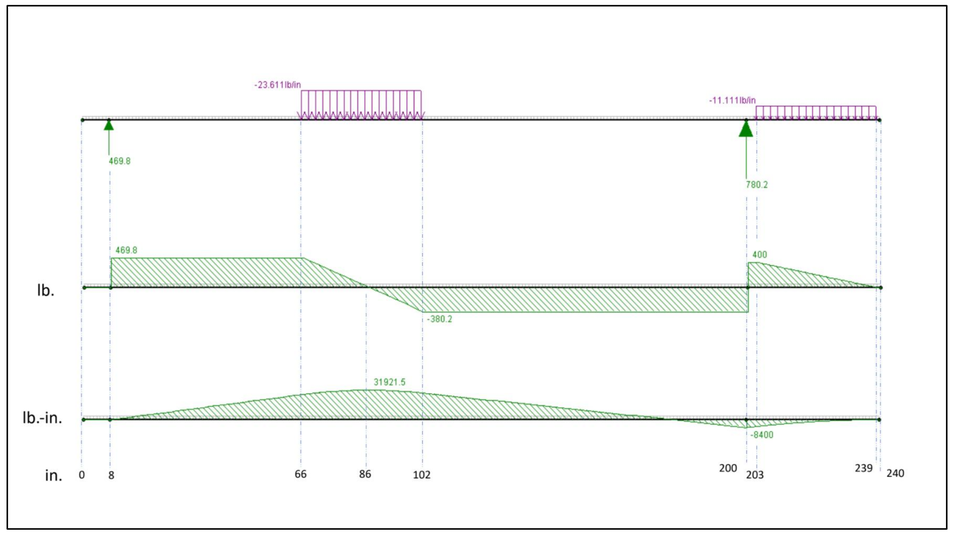

Figure 2. Simulated Strength Test on Individual Member.

RESULTS

- 220-lb total weight (1st out of 9).
- 0.52-inch total deflection (2nd out of 9).
- 25:04 construction time (4th out of 9).
- 4th place overall score

CONCLUSIONS

Featuring high strength and low weight, the steel bridge designed by Cleveland State passed all the strength tests for sway and load capacity and won awards in lightness, stiffness, and structural efficiency.

Figure 4. Cleveland State Steel Bridge Team

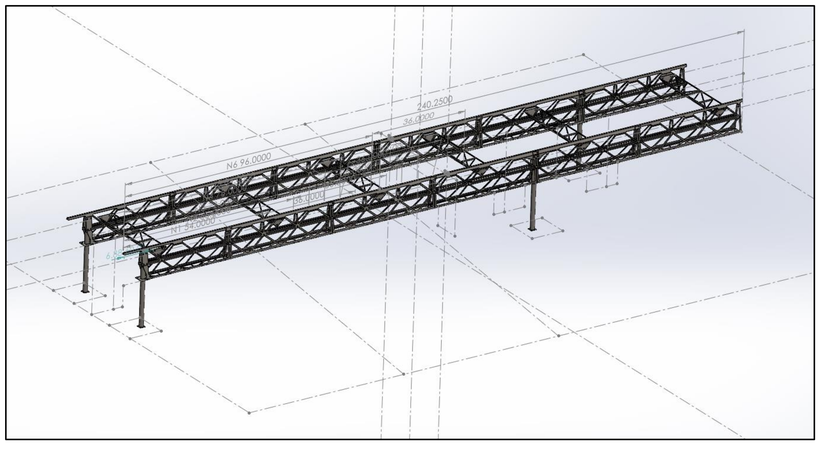

Figure 1. Solidworks View of the Final Design.

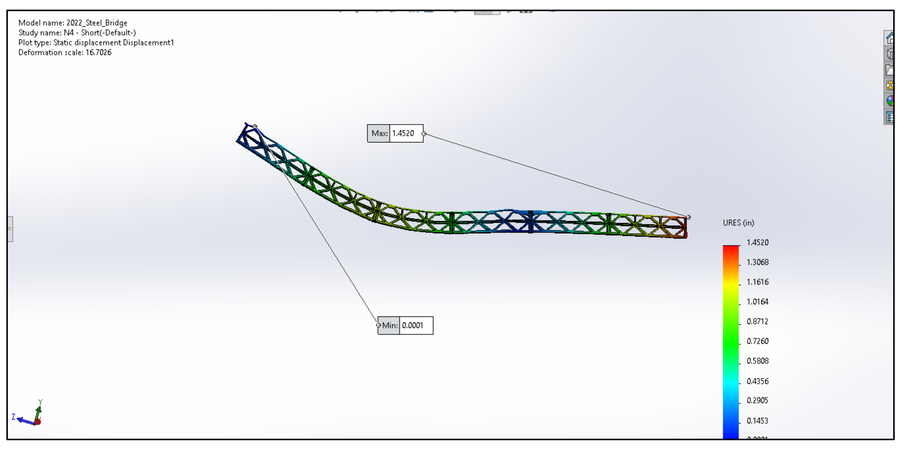

Figure 3. First Iteration of the Solidworks Deflection Tests

FUTURE WORK

This competition can be continued for years to come by Cleveland State Students. With recent rule changes requiring brand new design types, this design can be built off for future success and improved scores.

References

(1) ASCE/AISC. Student Steel Bridge Competition - Aisc.org. 2021, https://www.aisc.org/globalassets/aisc/university-programs/ssbc/ssbc-2022-rules.pdf.

(2) ASCE/AISC. “University Programs.” AISC, 2021, https://www.aisc.org/education/university-programs/student-steel-bridge-competition/team-resources/.

Acknowledgments

CSU Student Team: Ryan Giering, Chelsea Hicks, & Brendan Kelly
CSU ASCE Government: Christina Ortiz, Trey Moodry, & Ben Hubbard
CSU Alumni Mentors: Ryan O’Hearn & Emry Hollopeter
CSU Staff: Dr. Christopher Huhnke, Dr. Stephen Duffy, & Diane Tupa
Financial Sponsors: RE Warner, Great Lakes Construction, CSU SGA, & George and Linda Palko