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Mizzou steel bridge design

Each year the American Society of Civil Engineers in conjunction with the American Institute of Steel Constructors promote the National Student Steel Bridge Competition. This event is designed to help undergraduate Civil Engineering students with emphases in structures to apply the knowledge they gain in class to a real world problem. The rules are annually created and distributed by AISC. Each year these rules are altered and inevitably make the competition more challenging. The design of the bridge is of the utmost importance because the scoring of the competition is based on the assembly time, aggregate deflection, and weight. The 2006 Mizzou Steel Bridge is a rather unique structure combining the efficiency of a truss with the simplicity of a girder line bridge. After careful calculations and much deliberation between undergraduate team members, graduate peer advisors, and faculty, the final geometry of the bridge was chosen. It will be composed of two girder lines which have moment resisting connections supported by an overhead truss utilizing the minimum number of chords and diagonals as possible. Using the structural analysis software RISA, a simulated model of the bridge was load tested to find maximum deflections using various member shapes. After running the 36 possible load cases and checking for lateral stability, it was decided that the girder lines and cross braces would be composed of 4"x2" x 14 ga. rectangular tubing. Material will be cut from the webs of the tubing to reduce weight and make the bridge more aesthetically appealing. The top chords of the bridge will be composed of 1"x1" square tubing ripped longitudinally and spread apart to make a space truss member. These chords will efficiently bare the high compression forces without being as susceptible to buckling as a regular piece of 1"x1" tubing. The tension members of the truss will be made of 3/4"x3/4" 16 ga. tubing. Smaller sections could have been used for these members, but this section is optimal as it will allow minimal deflection for little extra weight added and improve the overall performance during timed construction.

The entire design of the bridge is based on hours of logistical planning that will allow for quick assembly time and ease of construction. By reducing the number of members, connections, and multiple member connections, the bridge can be assembled more quickly. Careful consideration is given to the site conditions and "construction limitations." The 2006 Mizzou Steel Bridge design for the National Student Steel Bridge Competition is unique and inspiring. The design incorporates two fundamental structural designs, the truss and girder line bridge. Using the advantages of both the bridge will be constructed quickly and will efficiently hold any of the 36 possible load combinations with minimal deflection.