The Optimal Truss

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Purpose: Design and build a truss that has the highest ratio of stability to cost. Procedure: 1.Sketch a design for the diamond truss on a sheet of isometric graph paper. 2.Transcribe the sketch into a 3D model 3.Using known designs, create the Pratt, Warren, and Howe trusses in the same 3D software 4.Export all 3D software files into an .stl format to be used by the 3D printer, and print three copies of each 5.Weigh and test the strength of each truss to determine a strength to weight ratio for each. Data: Pratt Truss: 14.7N/g; Warren Truss: 17.2N/g ;Howe: 16.4N/g; Diamond Truss: 14.7N/g Conclusion: The diamond truss fared distinctly better than the Pratt and Warren trusses in terms of maximum force, but had the lowest ratio. However, In both of these truss's graphs, there is a flatline that occurs at the same N value. I believe that this constant breaking point was caused by the failure of the plastic itself and not the truss as a whole. Within my project setup, the diamond truss did not have the highest strength to weight ratio. Therefore, the data does not uphold my hypothesis. However, that is not to say that the design is terminally inefficient. Due to the tensile strength of the material used to construct the trusses, the true maximums for both the Howe and diamond truss were not determined. They are both known to be greater than 60.80N.

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