2.1.6 Truss Design

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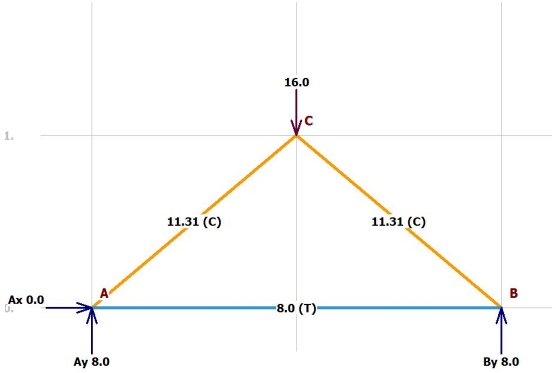
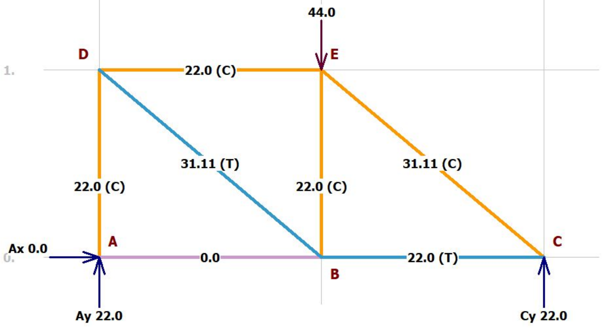
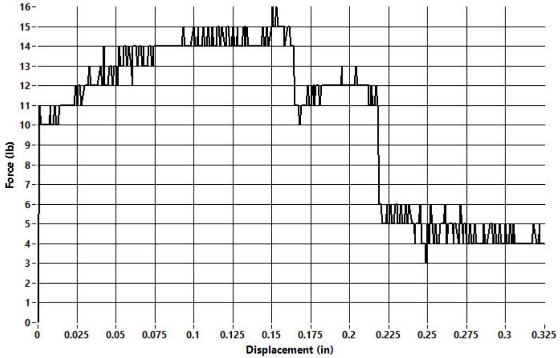
Truss Resolution Diagrams - MDSolids

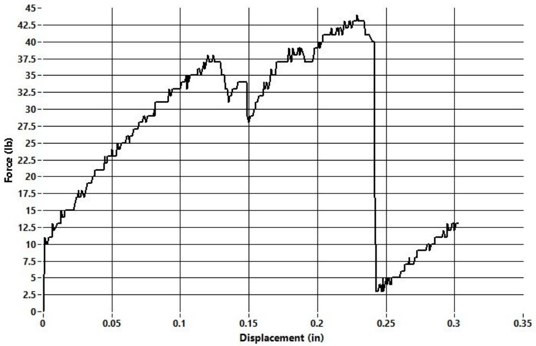




Truss # 1
Max Force: 16 lbs
Efficiency: 11.68

Truss # 2
Max Force: 44 lbs
Efficiency: 11.11





Truss Graphs - SSA

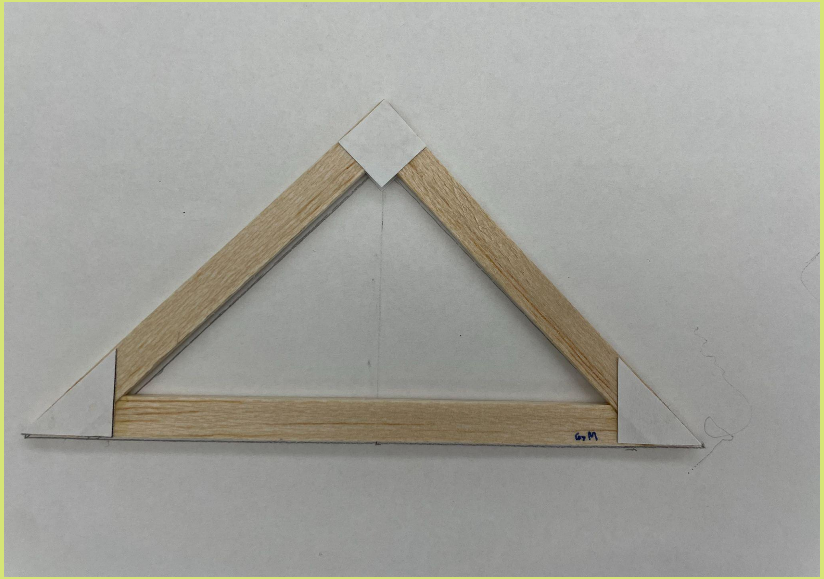
Truss Efficiency Calculations

Truss 1	**W** =Weight of truss (g)	**F** =Force applied at failure (lbs)	Efficiency calculation (**F / W)**
Model 1	1.37 g	16 lbs	11.68

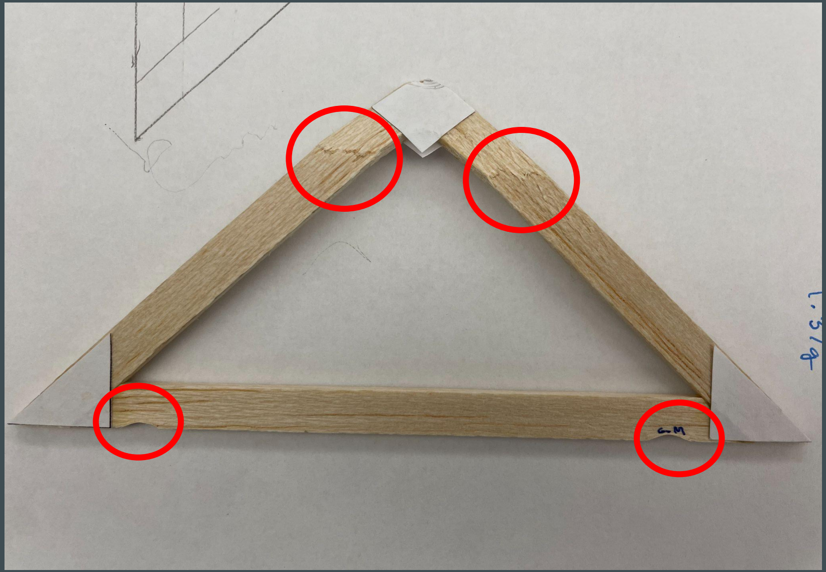
Truss 2	**W** =Weight of truss (g)	**F** =Force applied at failure (lbs)	Efficiency calculation (**F / W)**
Model 1	3.96 g	44 lbs	11.11

Before / After test of Truss # 1

= Areas of failure



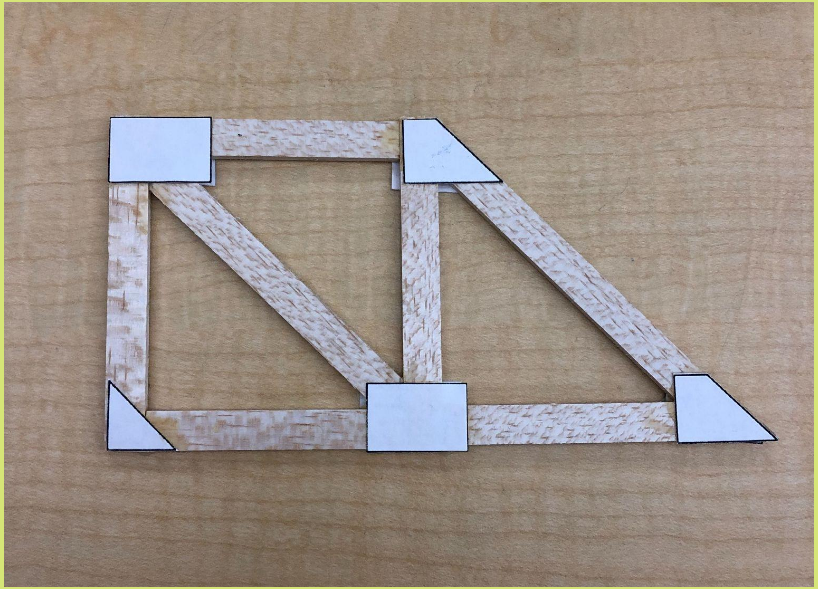
Before



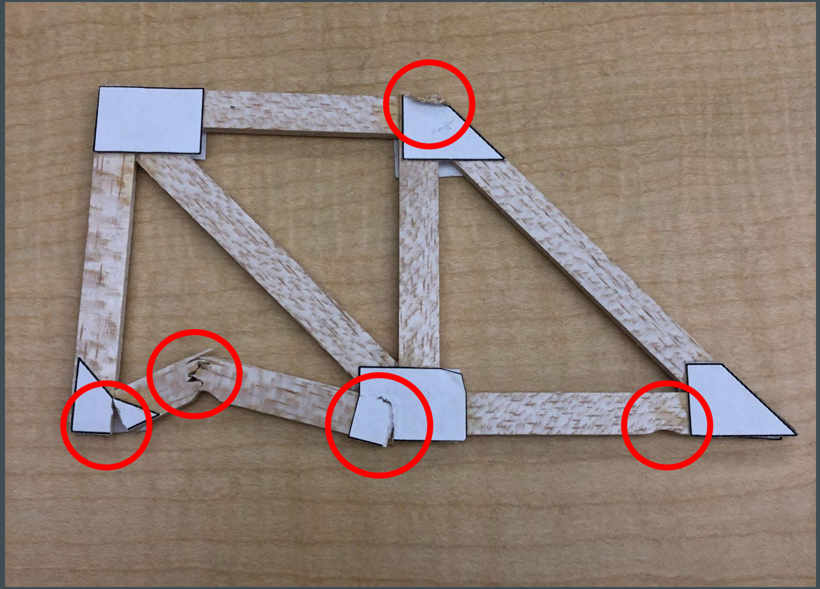
After

Before / After test of Truss # 2

= Areas of failure

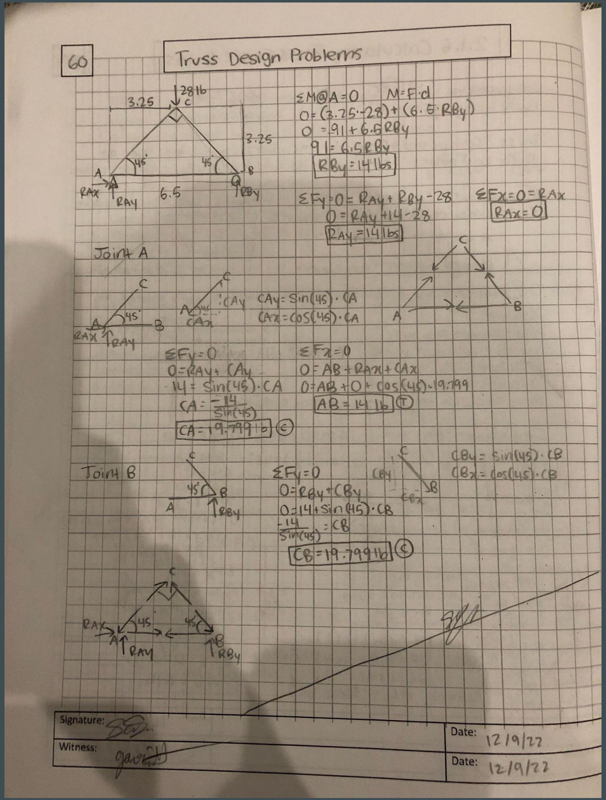


Before

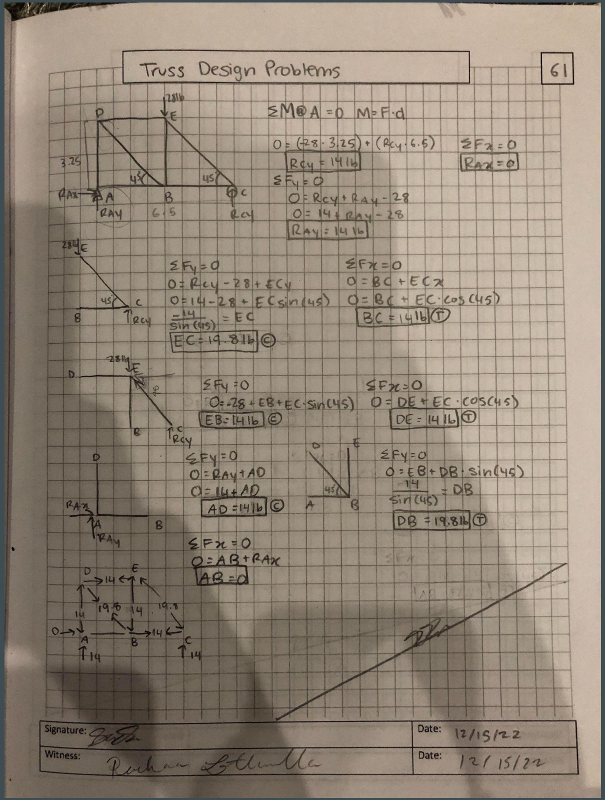


After

Truss Calculations using 28 lb load



Truss # 1



Truss # 2

Project Objective: The objective of this activity was to design and test trusses that could withstand a load while recording documentation of the test and process. The materials available included popsicle sticks, wood glue, and cutting tools to create our trusses. The truss was required to be at a height of 3.25 in. and a length of 6.50 in.

Learning Target: The learning target for this activity was focused on understanding how to calculate both internal and external forces of trusses when given a load and learning about possible failure locations and loads on a truss. This also includes efficiency calculations and the necessity of accurate documentation to prevent similar mistakes in the future. The activity also focused on understanding the purpose of trusses for efficiency and strength and the parts of it- including the members, joints, gussets, and supports.

Personal Reflection: This activity allowed me to gain a better understanding of how trusses work and how to calculate their forces. Monitoring the different trusses with forces during testing allowed me to determine what systems worked better and ways to make them more efficient. Before this activity, I knew nothing about trusses and their purpose, but now I understand the importance and logic behind their use in everyday life. I also learned how to create a free-body diagram and determine if a truss was statistically determinant. Additionally, I was able to learn how to use MDSolids to create a truss resolution diagram for my trusses.

Conclusion Questions:

Explain why you think failure occurred at the truss member where it did. Did your truss fail at the member that your calculations revealed as undergoing the most stress?

For Truss #1, I believe that the failure occurred at members AC and CB because they were both in compression and had the greatest amount of stress acting upon them. So yes, the truss did fail at the members that underwent the most amount of stress.

For Truss #2, I believe that the failure occurred at member AB because there was no force acting upon it, and it was not supported by anything. The truss did not fail at the member undergoing the most amount of stress, but rather the opposite as the stress of member AB was at 0 lbs.

If given a chance to redesign your truss after testing, what changes would you make?

For Truss #1, I would make the change of using a different type of material as a much stronger one would have enabled it to last longer, under a heavier load. I would also add more members to strengthen the truss as that would provide more support.

For Truss #2, I could have added more glue to ensure that the members were stiff in place as they were still slightly loose when I tested. I would also add more members to provide more support- specifically with triangle shapes.