

AT1 Straw Water Tower Engineering Report

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Introduction

This report details the iSTEM Engineering Design Process used to design a tower made of straws. The goal was to maximize height while ensuring stability, with the main aim being a tower constructed using straws with a height over 100 mm that could hold a golf ball steadily for an extended period of time. The purpose of this report is to detail the process used to build the tower and evaluate strengths, weakness, and improvement opportunities.

In the LetsTalkScience article *Strong Shapes: Cylinders*, I learned that that strong shapes are crucial for producing a functional straw tower design. In particular cylinders, due to their geometric properties, can withstand significant force making this shape a good choice for the straw tower.

The prototype, built with a circular straw base, with a cylindrical platform assembled on top, to balance the golf ball. This was tested for strength and balance. The final tower design met the project goals of being over 100mm in height and with the functional capability of holding a golf ball.

Main body

A project is an opportunity for students to apply their understanding of new and existing knowledge to solve an authentic problem with an engineering approach. The report should demonstrate methodical processes to support critical thinking and problem solving as they build on their field or body of knowledge. The main body of an engineering report is where students articulate their thinking, informed by research and/or experimentation in the analysis leading towards the solution of the problem. This section could be presented in a variety of ways depending on the level of the student and intended audience. It should be well organised so that the reader can follow the development of the student's project.

The main body of the engineering report is structured according to the nature of the project. The student still needs to decide how to structure it and what to include in the sub sections. Information in the report should be placed in context and be well supported with evidence and documentation using references.



Example of types of straw towers researched.

Ms. Ang. (2014, March 8th). *Straw Tower Challenge # 2*. Retrieved March 30, 2025 from <https://msangsclass.weebly.com/structural-strength-and-stability/straw-tower-challenge->

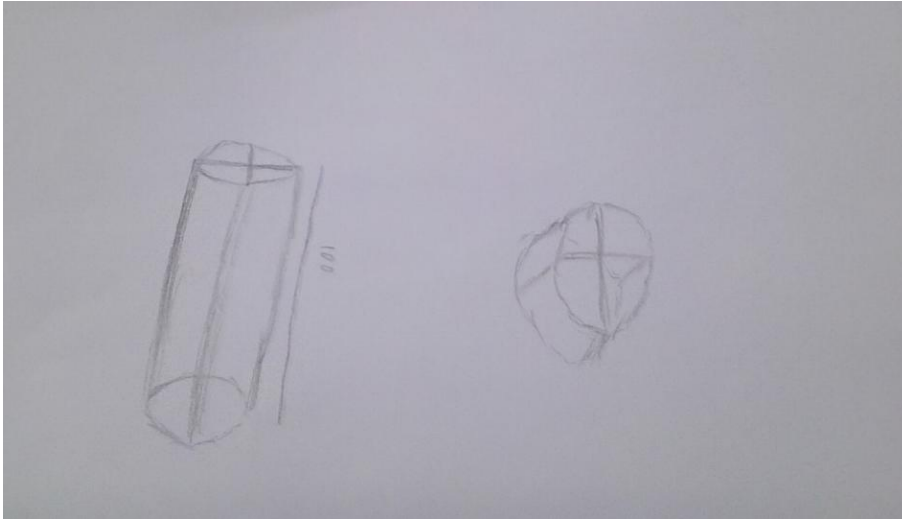
My final paper tower design ended up being a circle but that was only after plenty of research. Originally my straw tower was going to have a triangle base (as suggested by Ang in the Straw Tower Challenge #2) but with only 200mm of tape I couldn't get the triangle base to work so I adapted my design to have a circular base. This ended up being my final design. My straw tower was over the required 100mm tall standing at 103mm tall while only using the allowed 200mm of tape which was given to us, and it was able to hold the golf ball. I used a circle as the base and top of my tower; the circles held the golf ball very well without it falling over. My tower holds the golf ball at a height of 103mm tall with the minimum being 100mm, my tower being over the height it has to be. There are some ways I could have tried to make the tower better; some ways I think I could have done that is by picking a different shape as the base as it was hard to get the straws in the right shape without breaking them. Another way my tower could have been better is if it had not been crushed while it was in my bag, which ruined its stability and strength.

Materials used:

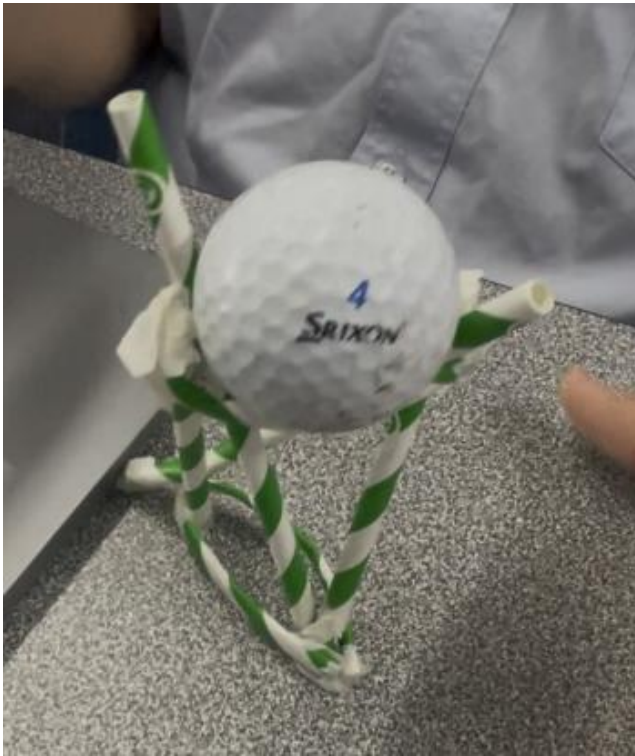
- 8 paper straws,
- 200mm of tape,
- a ruler
- a golf ball.

Production Recount:

1. The first thing I did was bend 4 half straws into half circles
2. Then I stuck them together making two whole circles for the top and base.
3. Next, I got 4 whole straws and cut about 25mm of them to make them all about 105mm tall.
4. Then I stuck them to the base.
5. After that I stuck the top on the straw tower which only used up 6 straws leaving 2 spare straws.



Initial design sketch,
showing proposed shape
and dimensions.



Finished tower holds the weight of a golf ball.



Cylindrical design.

Note: stabilisers shown in image were added after testing as the fragile prototype was crushed in my school bag impacting the tower's stability.

Conclusions

Overall, during the time of doing this challenge my straw tower has changed a lot due to research. My original concept was to make a straw tower with a triangle base but after I tried to make it I ran out of tape. I changed to a circle base as a result as this approach could be completed with the available materials. While building my tower I found some important information that also influenced the design. For example, I found research that indicated that you should build a base that will stand steadily without the golf ball, because if it's hard to get it to stand without the golf ball it will certainly fall over with the golf ball. Another thing I learnt while building my tower was that it's necessary to consider the available materials when choosing a design.

References

Ms. Ang. (2014, March 8th). *Straw Tower Challenge # 2*. Retrieved March 30, 2025 from <https://msangclass.weebly.com/structural-strength-and-stability/straw-tower-challenge->

Martin, Cole. (2018, April 30th). *How to Make Strong Straw Towers* | *ehow.com*. Ehow.com. Retrieved March 30, 2025 from https://www.ehow.com/how_7808514_make-strong-straw-towers.html

LetsTalkScience. (October 23, 2019). *Strong Shapes: Cylinders*. Let's Talk Science. Retrieved March 30, 2025 from <https://letstalkscience.ca/educational-resources/lessons/strong-shapes-cylinders>