ESDS (Emergency supply drop and shelter.)

Purpose

The Project is being done for the many people that do not have any resources or lost their homes in a natural disaster. Our project will allow us to provide these people with resources and a shelter. The result of this project is it will aid many people in need safety and economically.

Customers

The people who will benefit from this are those who have lost crucial things and need shelter because they are living isolated and without a place to receive or make essentials. Children and adult will receive a package like this when they are in crucial need for help.

Desired End Results

Our goals and our results that we want is to make the structures being able to survive through harsh climates. We also want the structures to be able to become a strong shelter that can protect those displaced by a natural disaster. The project will be considered a success when the it is able to survive through harsh climates and long periods of time.

Measures of success

When the container arrives at its location the container will be a reliable source that can be turned into a shelter and that can provide goods that are essential to the one who receives the package.

Introduction

Our container was made to be durable in a state of stress.What we had to do for the cardboard pieces with foam, we had to cut the edges of the foam to create a 45 degree angle so that the foam can fit together and we will be able to glue it, without the foam coming apart. After we had glued we decided to make a box to hold the supplies inside, we made it waterproof with tape and add a rope and a hook to lock it. Scientist have already researched with the Tetradecahedron and they were able to find out that the Tetradecahedron can absorbed the impact and it is very sturdy to make as a cargo container.

Questions/ Problems, & Predictions

After a natural disaster caused mass destruction people are in need of food,clothing, medical supplies, and shelter items. The supplies must be delivered safely and economically it is vital to be able to reuse the container or the materials inside for shelter. The container must be able to withstand harsh weather conditions while preserving the aid materials inside.

Investigative Methods or Procedure

On the first day we made measurements for a container that would be 1.2 inches while the boys were making a box that would fit in the container. The same day we found out that the container was too small and the box was too big so we had to make new measurements. The next day, the pieces we had measured for the container were 1 ft. each. With these pieces, the container was a sustainable size to carry the 5.5 inch pieces for the box that the boys had started to re-do. On the third day, the boys glued the pieces of the boxes together to finish it up.

Investigative Methods or Procedure

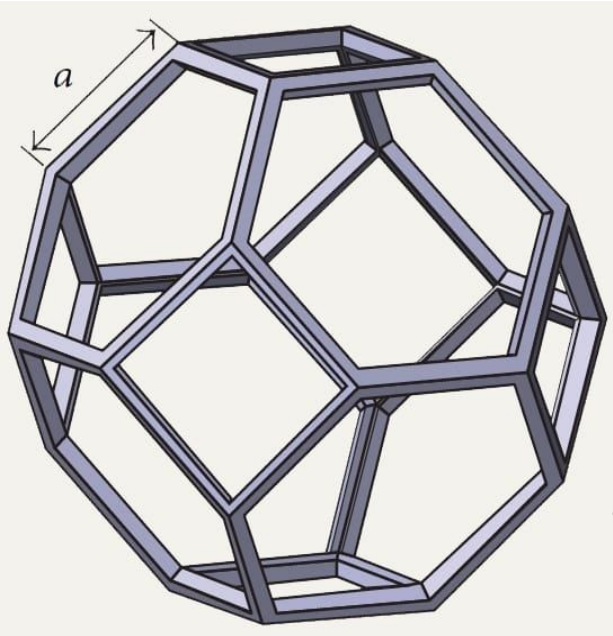
The the fourth day, we started to glue the cardboard pieces to the foam as well as glueing each side of the pieces together to start to create the goal shape. After, we got feedback from Mrs.Molina to cut the foam at an angle so that when we glue each piece they'll attach evenly and easily without the foam pushing each other away by expanding. On the 5th day we secured the pieces that we glued with duct tape and popsicle sticks, making sure that the pieces couldn't detach. The next day we continued to build the container until about 90% done so that we could add the net inside as well as secure the box. We first glued 1 hook on each popsicle stick, then we attached the net to each hook, lastly we placed the box inside making sure that the net would protect it.

Investigative Methods or Procedure

On the 7th day we built the container until only two sides of the container were uncovered so that we could put the box in and then add another net on top which would secure the box in the middle. After adding the net and box, we closed up the box, leaving one spot opened so that we could create an opening where the package could be retrieved and the retriever could get a shelter. The next day we decorated and then tested our project to make sure that it would survive a major drop. Our box was dropped 5 times at 5 different level. It survived all 5 drops with minor creases on a few sides. On the 9th day we tested our container again but this time, we dropped off higher level 2 more times. On our last day, we taped the door to make it stronger, adding a mark too, to make the door distinctable from the rest of the container.

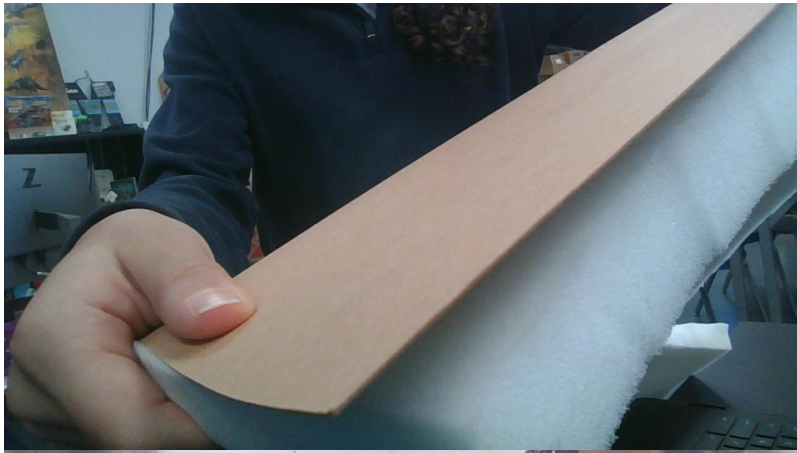
Results and Data Visualization

- **We first learned about the Tetradecahedron we learned that it is a very strong and durable shape.**
- **We decided to use this shape because after When we were doing more research about this shape we also learned that it can hold up to 1-2 pounds when well constructed.**
- **But we learned that it will mostly depend on the quality of how it is made and the quality of the materials used to make it.**



Results and Data Visualization

- **When we first started to build the design had to take measurements for the box that we are going to build**
- **After the measurements we started to cut the cardboard and hot glued foam to the cardboard.**
- **After we glued the foam we started to cut out the edges of the foam to give it an angle so when we glued it together it could be strong and stay together**
- **After glueing we started to glue popsicle sticks to the parts when we glued the foam together so it can be stronger and we used tape so the popsicle sticks can stay for longer.**

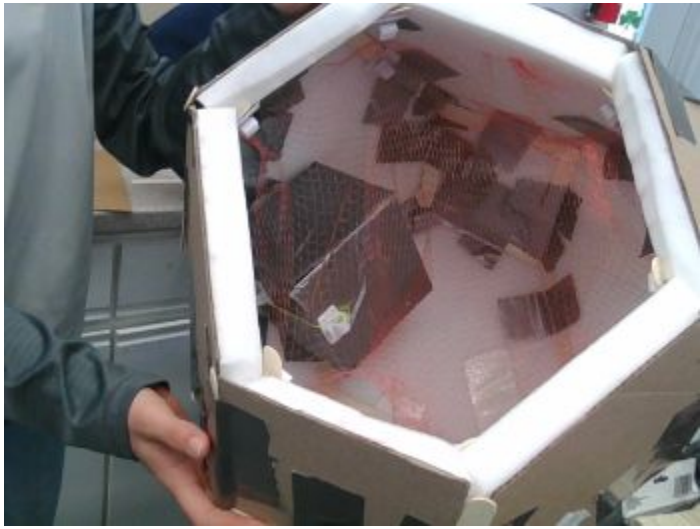


Results and Data Visualization

- **After we glues the pieces together and cut them out we did that to the rest of them**
- **And than after we glued the pieces we started to make a smaller box so it can go inside of the tetradecahedron**
- **But before we fully built it we had to reinforce the inside so when it is tested it will not break on impact**
- **For the box we added tape to it and a lock mechanism so when we drop it and their is supplies in side it will not break or fly out, the tape was used to make it waterproof.**

Results and Data Visualization

- **After we put some pieces together, we took some time to observe it and see if it would come out like our reference**
- **Then we started to make the net that is inside of the tetradecahedron After the net was down we put the box inside and placed another net on the top of it to secure it in place.**
- **After we had finished putting the final pieces on we observed it and put tape on the outside to secure it and keep it from breaking.**
- **We wrapped the whole shape with tape to secure it and decorate it we had put a lot of tape to make sure it would not break or rip.**
- **We had made a door to be able to access the inside of the shape where we have a smaller box**
- **We put hooks to the outside of the box and closed it with a piece of string tied and twisted around the hooks to make the opening.**
- **We took it outside to test in on the stairs we had tested it from 5 different heights and it took minimal damage (only creases)**



Discussion and Interpretation

Our design is reliable and can endure trials without significant damage. We tested our design multiple times by dropping it off five different stair levels. When dropped the container absorbed the impact of the fall due to its sphere like shape. Each time, the container survived with only a few creases in the cardboard which we patched up with tape. The materials inside stayed safe and secure. One problem we faced during testing was that the net inside came unhooked during one of the falls. We corrected this by tying the net around the hooks tighter. Once we tested it again the net stayed secure.

Discussion and Interpretation

Some limitations we faced were we could only drop our container from the top of a staircase instead of somewhere higher like a rooftop. According to our research the shape of our container allowed it to take the force of the impact. This resulted in minimal damage for our design. Our design was a success as it can transport good with like to no damage and convert to a working shelter.

Implications And Ideas For Future Research

Our design is important to the world because it will help people affected by natural disasters. In the event of a natural disaster people are often left without basic necessities like food, medicine, clothing, etc. Our project will allow these people to obtain the supplies they need to survive. It will also be able to convert to a shelter which will be a great help to those displaced during a natural disaster. Our project would be able to make an impact globally as natural disasters occur all around the world.

Implications And Ideas For Future Research

If we were to develop our project further we would use different materials. Instead of cardboard we would use wood to make the container and the box inside. The mechanism to open the container would be similar to opening a door. We'd have hinges on the side, a handle to open it, and a latch. The net inside would be nylon and the hooks would be steel. The foam would be a gel padding. The container itself would be large enough for a person to fit inside or large enough for the container to be transformers in to a shelter.

References

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