

FROM COLLAPSE TO CATCH: ENGINEERING A BETTER GEAR SHELF



ABSTRACT



For my engineering project, I fixed the shelves in my catcher's baseball bag. The shelves were attached with Velcro, but they kept falling down when we picked up the bag. It couldn't hold the weight of my gear, so it was hard to get my gear out of my bag. My goal was to make the shelves stronger and keep them in place for less than \$20. I researched different materials and ways to attach the shelves. I decided to use Gorilla Fabric Glue on the back and sides of the shelf and cut a small hole in the front and put a strip of canvas through it to allow some flexibility when lifting the bag. The design made the bag stronger and more reliable.

PROBLEM

The problem was the shelves in my baseball bag weren't staying in place so it was very difficult to get my gear out.



MATERIALS

- Existing shelves
- Gorilla Fabric Glue
- canvas fabric
- scissors



CRITERIA/ CONSTRAINTS

Criteria:

- It has to hold the weight of my helmet
- It has to stay attached when lifting my bag
- It has to be light weight

Constraints:

- It has to be \$20 or less
- Time limit: must be completed before science & engineering showcase deadline.

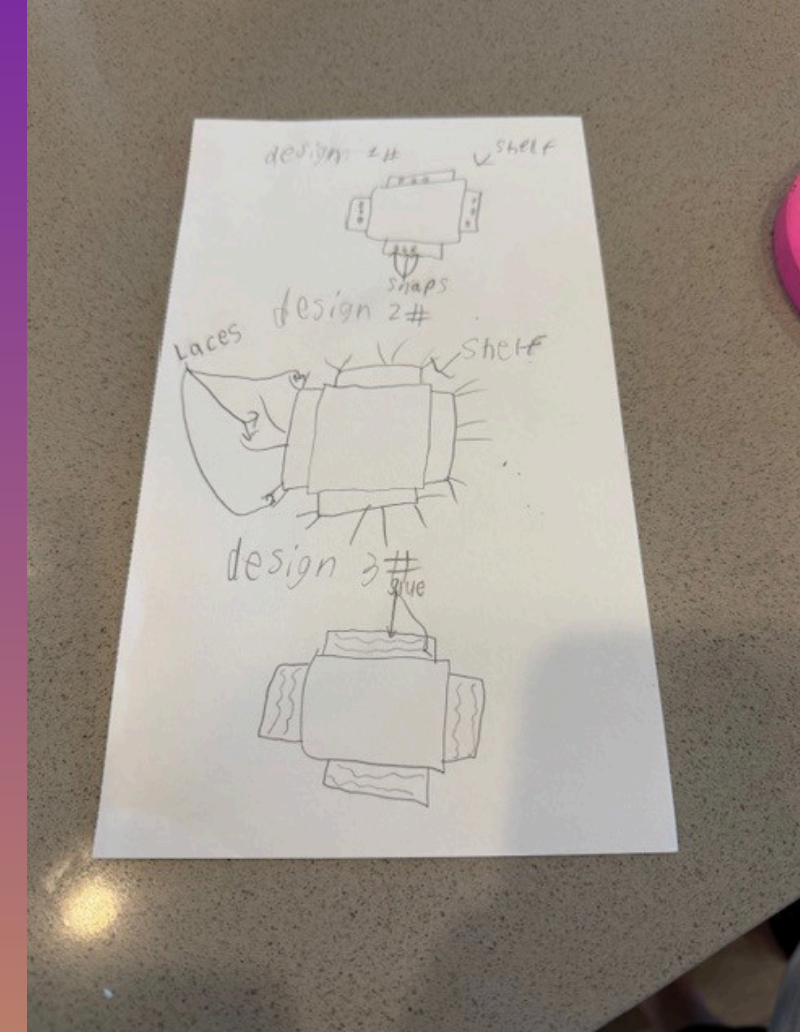
DESIGNS

The first design that I made was putting snaps, but we feared that the snaps would unsnap easily.

My second design was using laces, but we wanted to go with the easiest design and worried this would take a while to make.

My third design was to use fabric glue, but we thought that it would put too much tension on the front when lifting the bag with the front handles.

My fourth design was glue on the sides and back and a lace in the front.



PICTURES OF PROTOTYPE



cutting the
canvas



the Velcro in
the bag



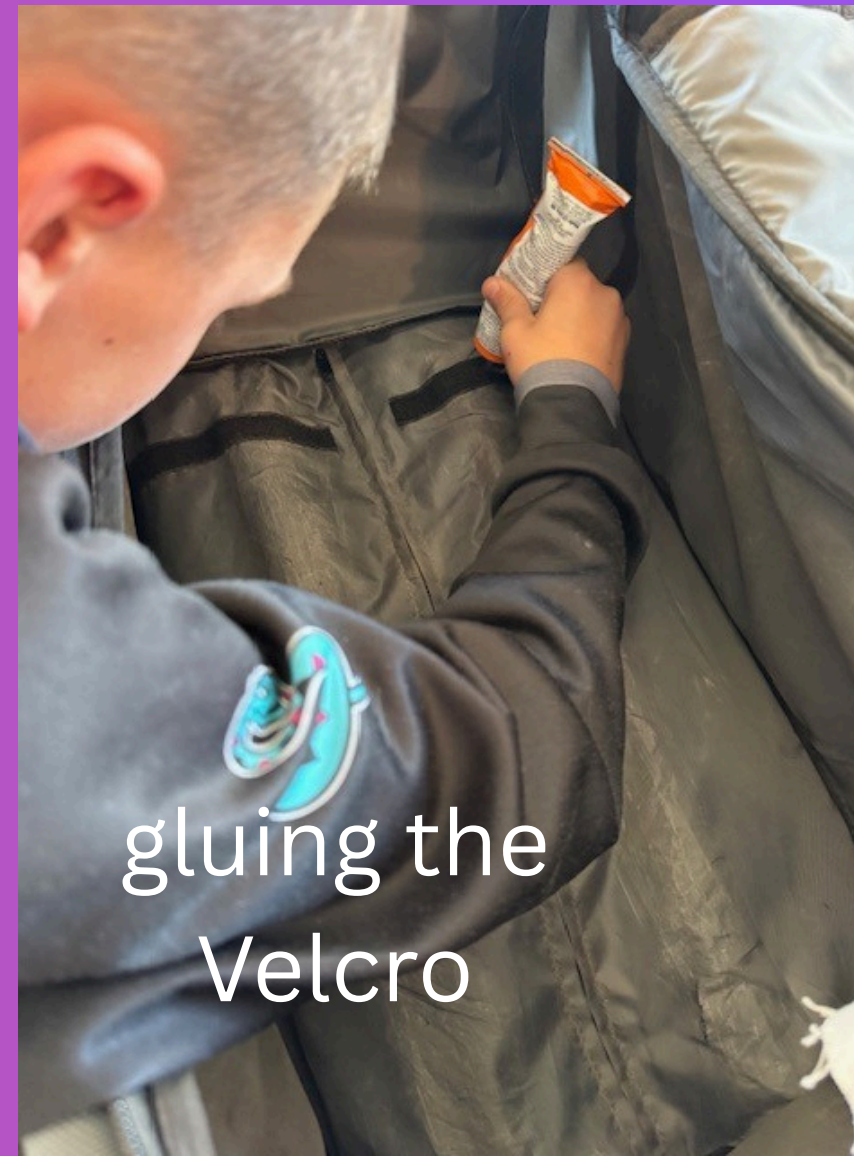
Shelves with tie



the inside
of the bag

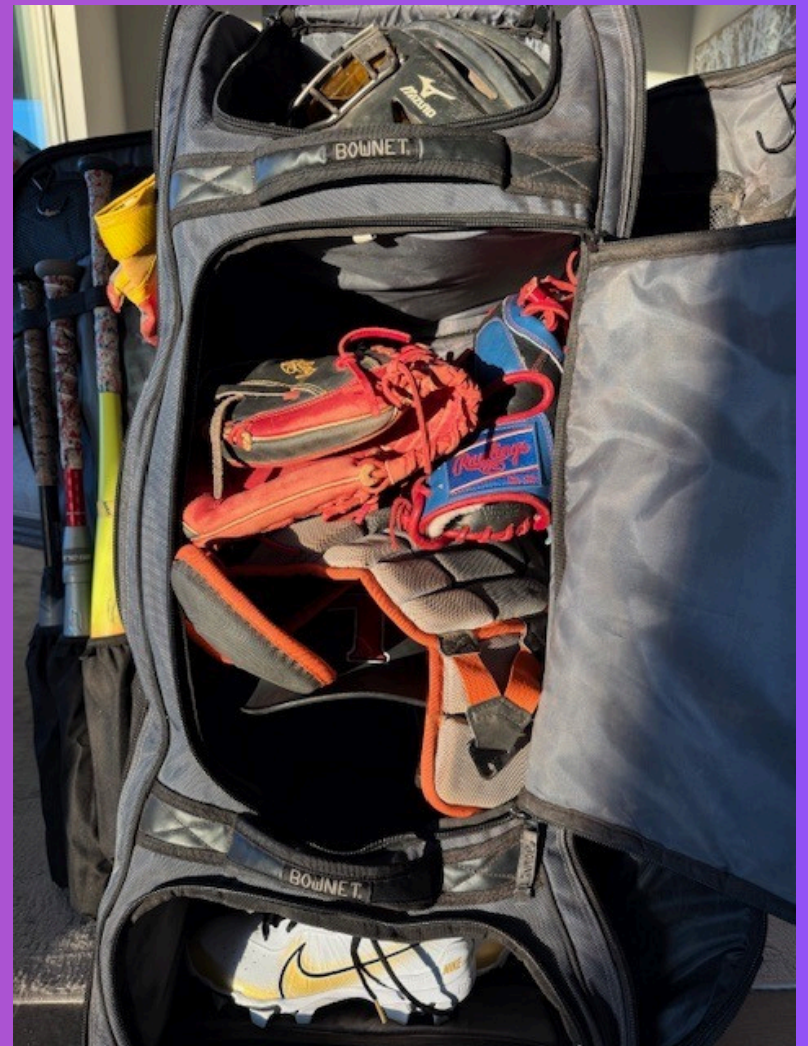


PICTURES OF PROTOTYPE





PICTURES OF PROTOTYPE



RESULTS

Using the design was successful because the lace we put in the front allowed the tension to ease when lifting the bag, and the glue held up my gear through multiple lifts and moving it around. So it was a success and now wherever I go the shelves never fall.



REDEFINE

The changes I would make would be a little tighter on the canvas fabric knot or use a different material, because my shelves keep drifting down a little too much. I have to fix it every time by tying it and redoing the Velcro, but it is better than digging for my gear. That is why I would make that change with the knot that we made.



RESEARCH

FABRIC CHOICES

This list shows options for strong fabrics that might hold the weight of the baseball gear.

- duck canvas
- sailcloth
- nylon ripstop
- polyester ripstop
- denim
- gabardine
- canvas
- duck cloth
- corduroy
- ottoman fabric
- wool tweed fabric
- chenille fabric
- suede fabric
- polyester fleece
- coated fabric

ADHESION METHODS

This list shows adhering methods.

- fabric glue
- heat tape
- staples
- sewing

BIBLIOGRAPHY

Fabric:

- <https://sewguide.com/best-heavy-weight-fabrics/>
- <https://www.threadsmagazine.com/2008/12/21/choosing-fabric-for-plus-sized-designs>
- <https://www.fabricsight.com/blogs/posts/the-top-3-most-durable-fabrics-you-should-know-about>

Adhesion

- <https://cmongetcrafty.com/no-sew-no-problem-how-to-work-with-fabric-without-a-stitch/>