Wall-E Inspired Lasercut Box

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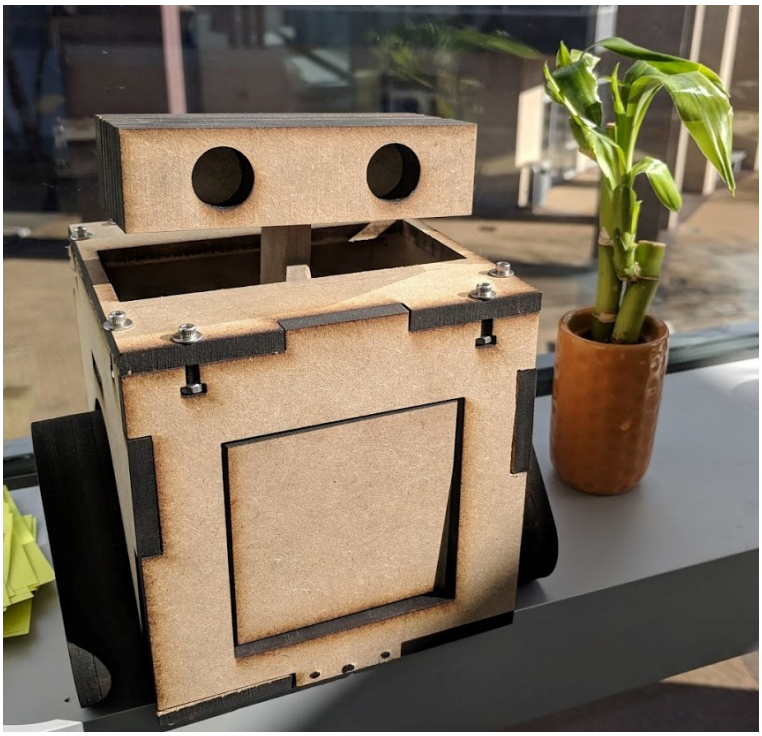


1 Executive Summary

I created a Wall-E inspired box that looks like an ordinary box but can unfold to resemble a Wall-E robot. I chose Wall-E as my inspiration for the box since it reminds me of the place and time I was inspired to study engineering - back in 2008, I saw the Mars rovers Opportunity and Spirit at JPL in California, which the movie Wall-E derived inspiration from.

When folded up, the box looks like an ordinary box with some hardware, but using the levers on the back cause the head and treads to pop out of the box to resemble Wall-E

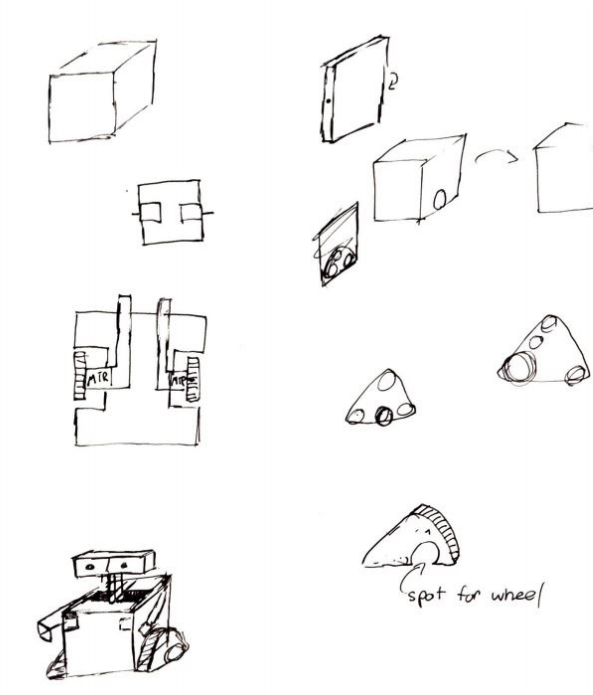
Fasteners Used:

- 4-40 Bolts - Used to secure top side. Chosen for ease of removing top side in case of misalignment of internal components
- Nails - Used on bottom of box for a secure but removable fastener that lays flat against the material so the box sits flat
- Wood Glue - Used to hold parallel head panels together. Chosen for lack of visible features and strength in holding together parallel parts
- Dowels - Used to hold tread pieces together. Chosen for strength in holding together parallel parts and lack of visible features on one side
- Screws - Used to hold hinge to box. Chosen for optimal method of joining metal components to wood
- Friction - Used to hold guides to treads and head. Chosen for lack of need for another fastener in press-fit joints

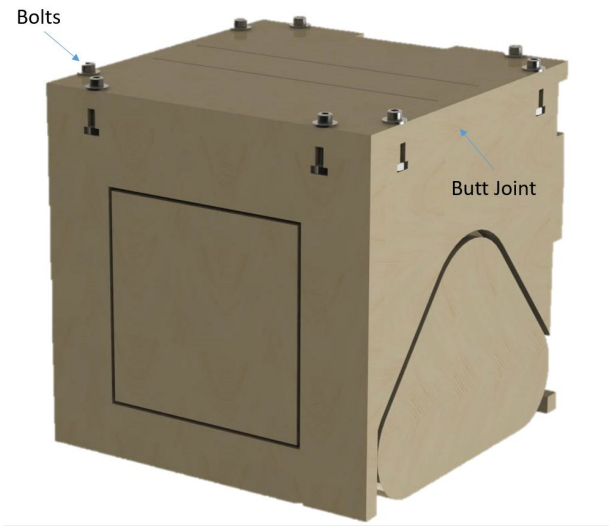
Joints:

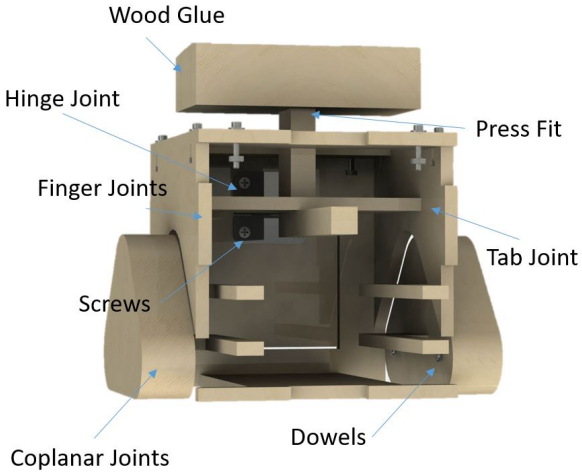
- Coplanar Joints - Chosen for simplicity of joining parallel sides
- Finger Joints - Chosen for rigidity of joining corners
- Tab Joints - Chosen for parts that intersected in a T
- Hinge - Chosen for part mobility
- Butt Joints - Chosen for simplicity and clean aesthetic

2 Initial Sketches

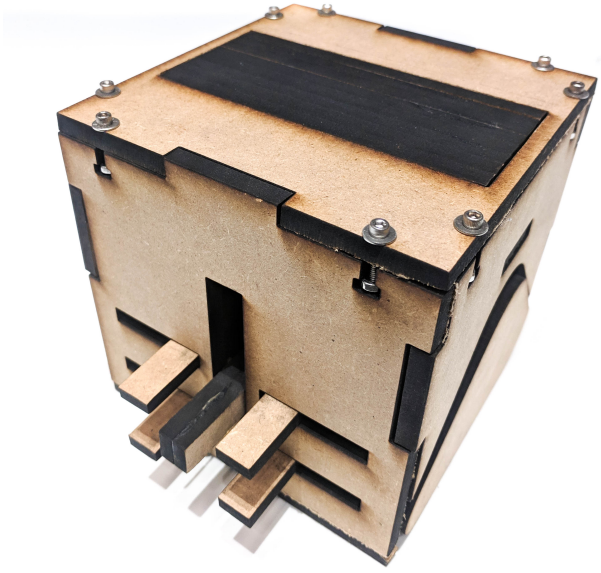


3 SolidWorks Model





4 Physical Assembly



5 Reflection

This project taught me a lot about SolidWorks, designing for manufacturing, and how lasercut parts interact with each other in the final assembly. Some things that I'll keep in mind going forward based on my experiences during this project include:

- Sliding parts need extra thought to tolerances
- For good-fitting parts (not press-fit or sliding), no additional tolerance is needed
- Nails are hard to put into soft materials without visible damage and aren't that secure
- Small amounts of glue when used right go a long way
- For thicker materials, the curf from the laser cutter is noticeable
- Considering how the assembly will go together while designing it is important

Overall, the tolerances and general assembly worked out well, but specific things like using nails and the loose tolerances could have been better. I think I also got lucky with a lot of things that could have ended poorly but worked out - I didn't think about how the parts would go together beforehand, but assembly still worked out. Some specific things I learned while doing this project were using dowels properly, how effective sandpaper can be when used properly, and how adding moving parts to the assembly makes it more difficult to make but pays off in making it more animated. Other SolidWorks-specific things I learned included using the toolbox for common hardware and using the rendering software to create much better visuals of the project compared to simply saving it as a .JPG.