Engineering Projects Portfolio

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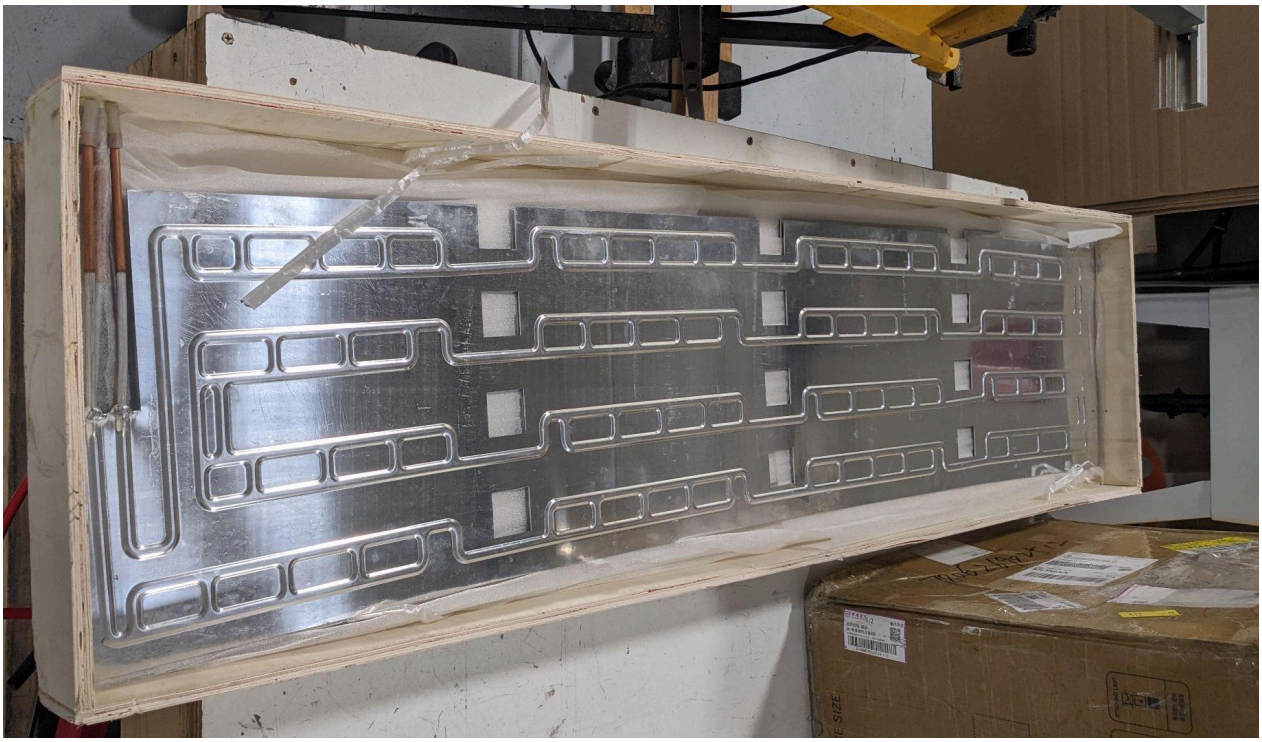
Evaporator Bending Jig: (Delta Development Team)

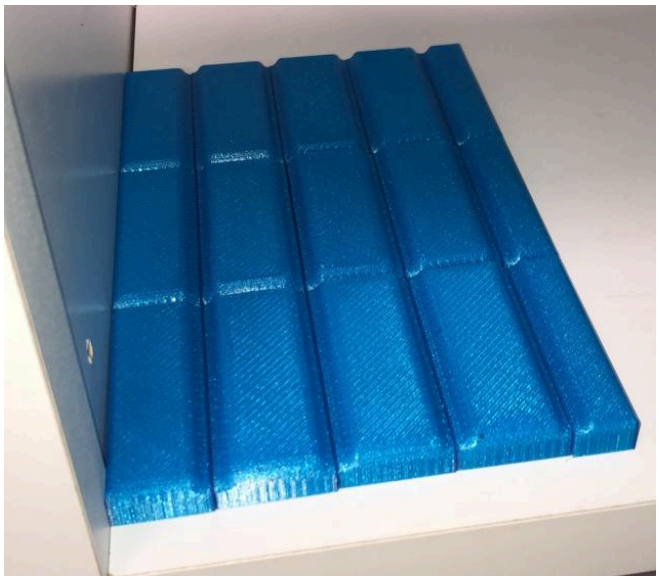
Displayed on the subsequent page is an evaporator, initially obtained in a flat sheet format, underwent transformation into a square configuration to suit the requirements of Delta's portable-autonomous refrigerator. Entrusted with the task, I was assigned to lead the design and prototyping process of the bending jig depicted above. This apparatus secures the sheet in place through clamping mechanisms and employs rotating arms to execute three precise bends, thereby achieving the desired square shape. Drawing inspiration from the original design of the smaller unit, I meticulously engineered this new iteration tailored for the larger variant of the refrigerator. Subsequently, my proposed design garnered approval from the project lead, prompting the procurement and assembly of all requisite components. Upon conducting the initial trial, the bending jig effectively transformed the evaporator into the desired square configuration.



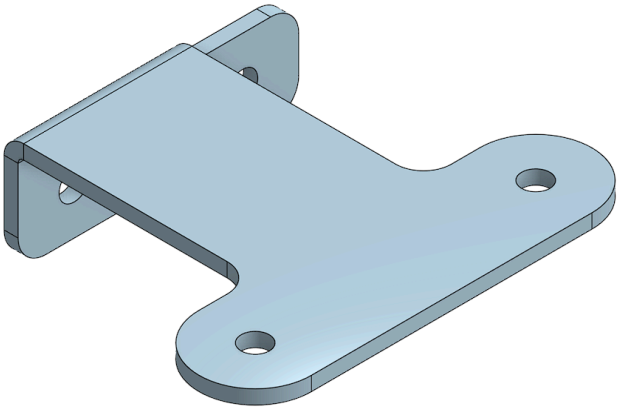
Additional Components Contributing to the Bending Jig:

On the subsequent pages, I spearheaded the design and prototyping initiatives for all showcased elements, with the exception of the ambidextrous bracket. Aiming for efficiency, I enhanced the existing bracket design by incorporating a second hole. This modification allowed us to streamline procurement by purchasing a single part that could be flipped around, eliminating the need for multiple variations.

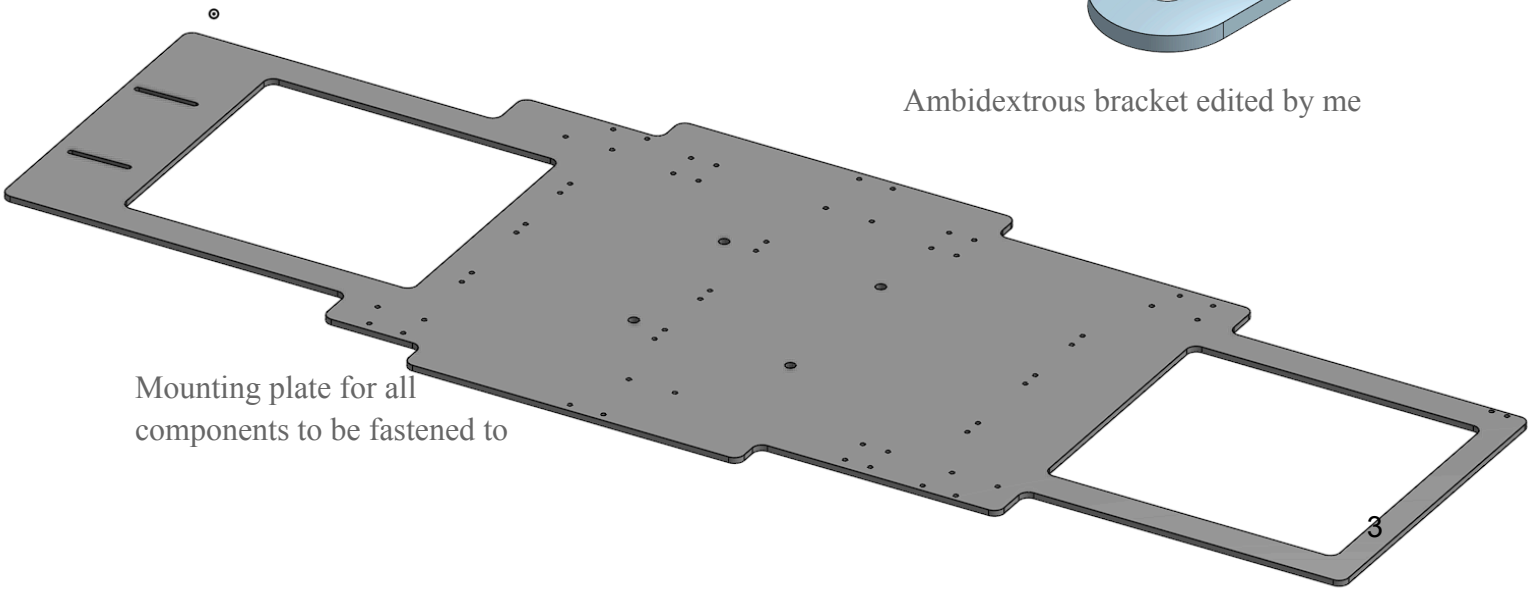
Rollable bases for easy movement out of the way



3D Printed Rubber (TPU) so evaporator would not dent when

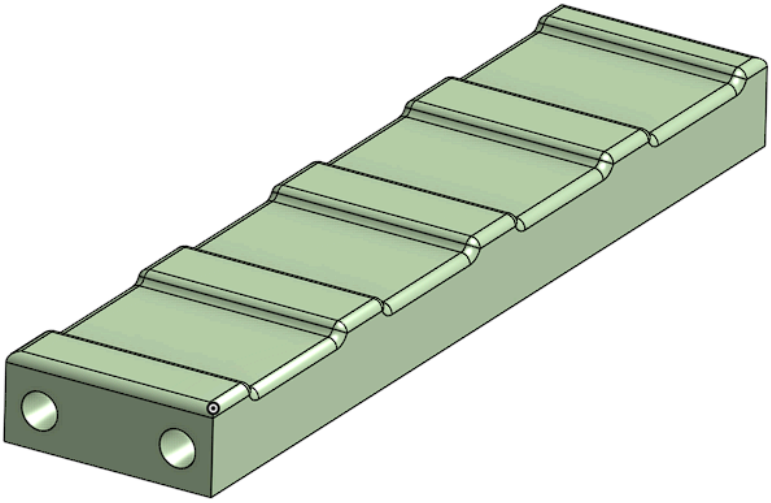


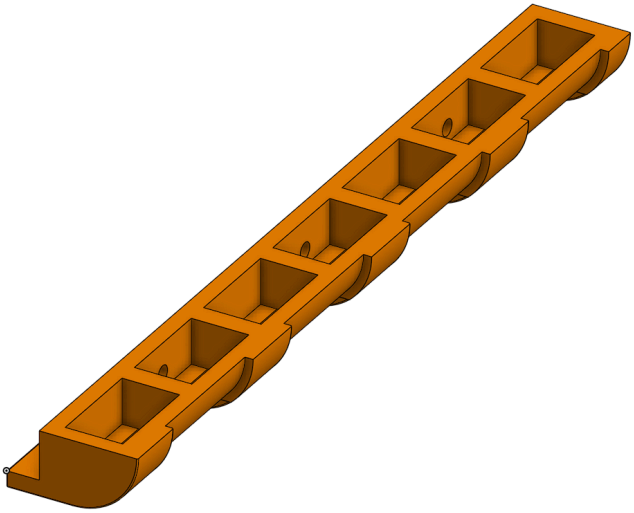
Ambidextrous bracket edited by me

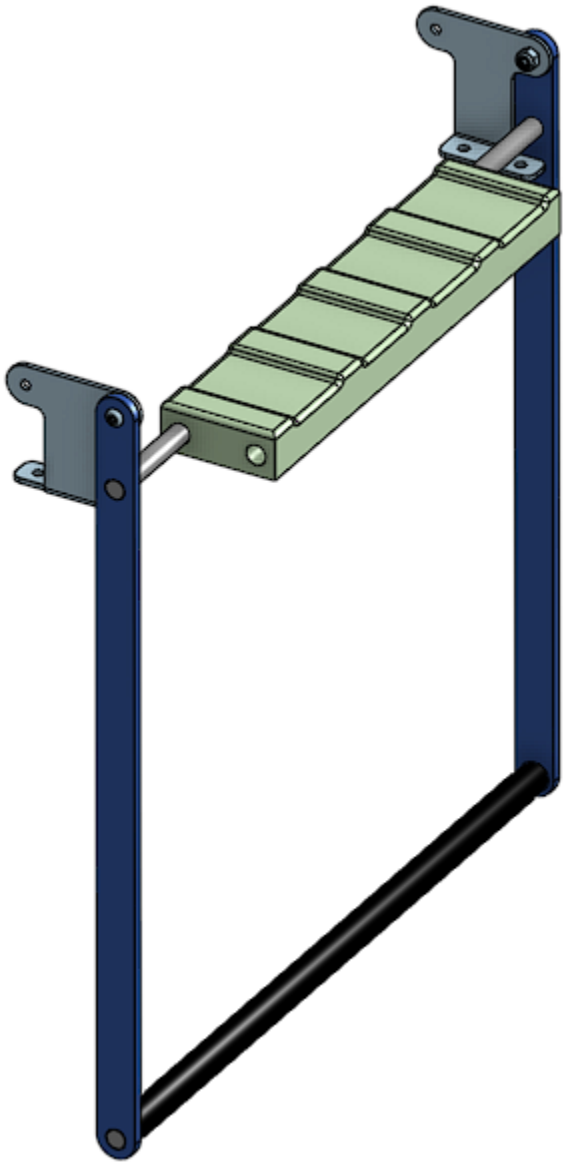


Mounting plate for all components to be fastened to

Additional Components Contributing to the Bending Jig:







Welding the stand to the base and top plates in the bending jig: (Delta Development Team)

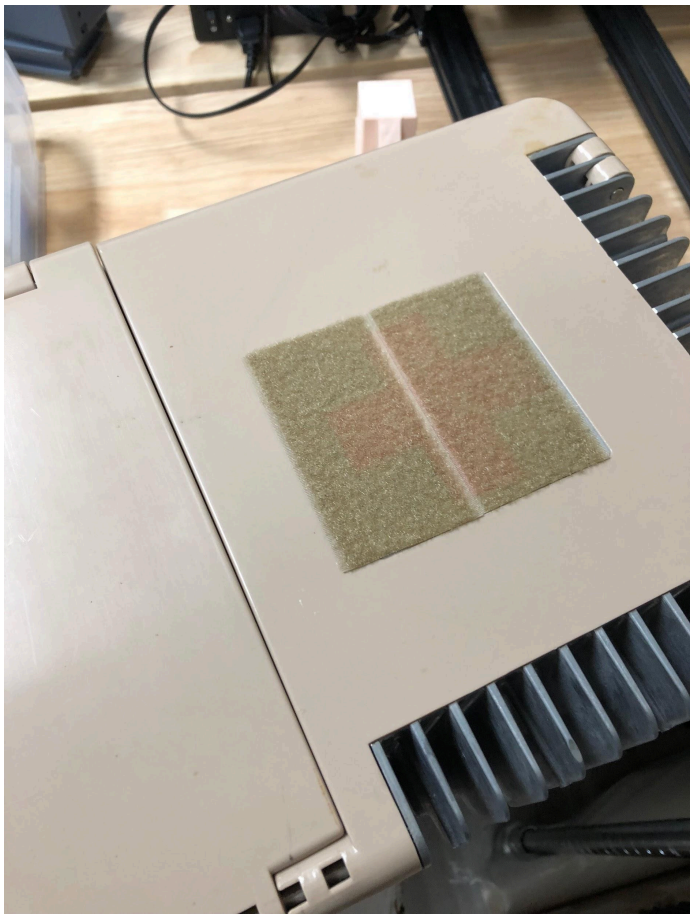
This structure served as the base for the bending jig, and I was granted permission to weld the steel plates together. Although it was my inaugural welding attempt, resulting in a somewhat untidy appearance initially, my proficiency improved progressively. Despite the initial challenges, I successfully fused the pieces, ensuring ample strength to support the bending jig securely.

Air Manifold Sanding Jig: (Delta Development Team)

This project originated from the issue of delayed air release by a small umbrella valve. My task was to create a jig to remove some material from the valve's top, allowing for earlier air release, which depends on the material's thickness underneath. To tackle this, I developed an enclosure for the bottom half of the manifold, incorporating magnets due to the manifold being 3D printed metal, ensuring stability during milling. Figures included in the Dozuki document system outlined the process. Although approved by my supervisor, achieving repeatability proved challenging. As a result, this project continues at Delta, maintaining its core concept.

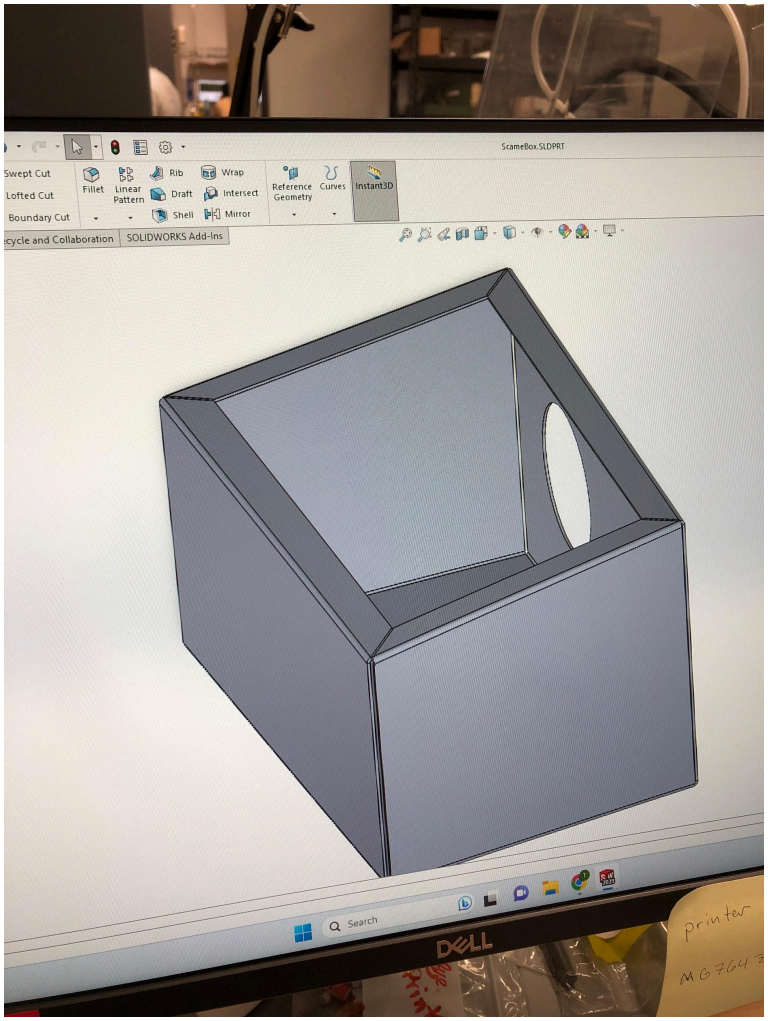
Pictures from the Dozuki guide I created for milling and measuring the depth with the end of a pair of calipers:

Additional pictures of a pressure release process:



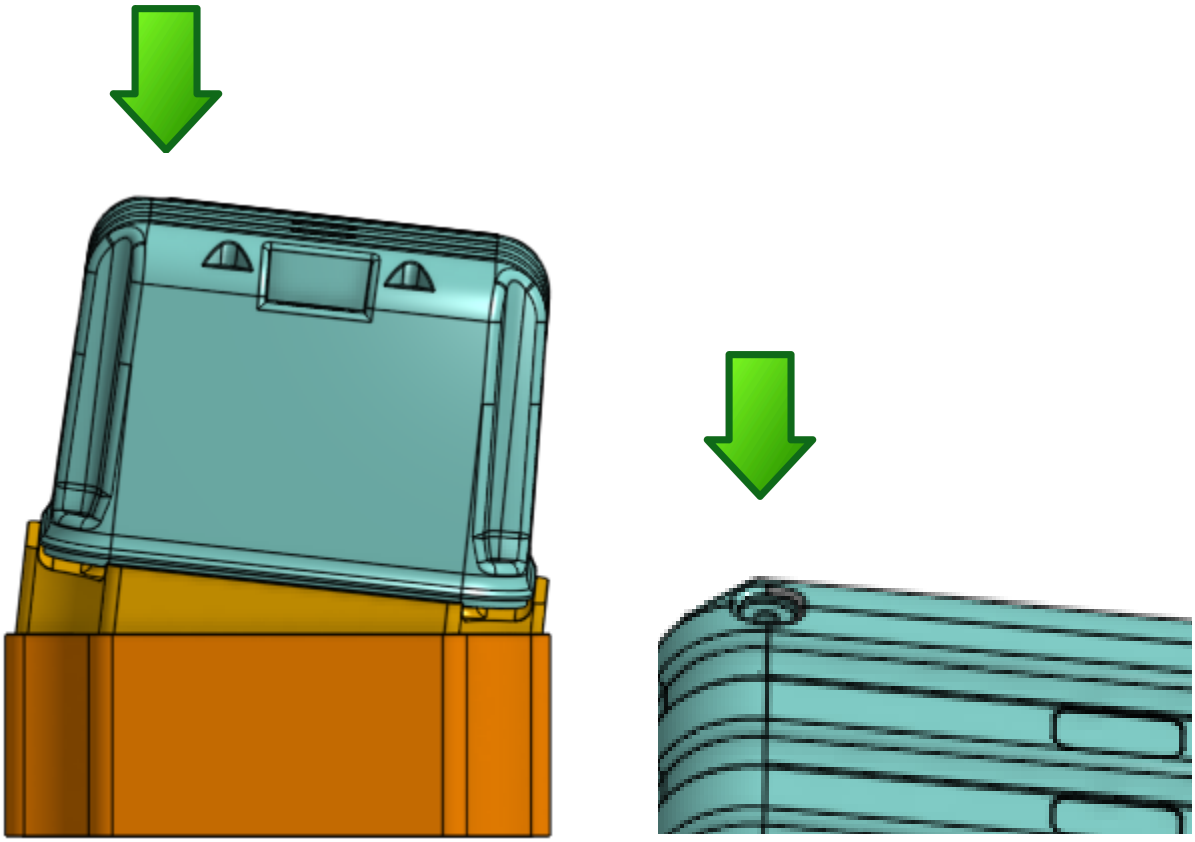
Velcro Patch: (Delta Development Team)

Originally, the device featured a red cross sticker, which posed an issue for certain customers unable to have such symbols on their devices. They resorted to covering it with their own velcro patch or sticker. Delta entrusted me with the task of sourcing a supplier, obtaining samples, testing velcro strength, and establishing a bulk order relationship. I successfully fulfilled these responsibilities and convened a change order meeting with top executives including the CEO, COO, CTO, head of manufacturing, and head of purchasing to discuss process modifications. Upon board approval, the change order was transmitted to production. Delta now employs the velcro patch solution, enabling customers to easily replace it with their preferred patch, streamlining the customization process.



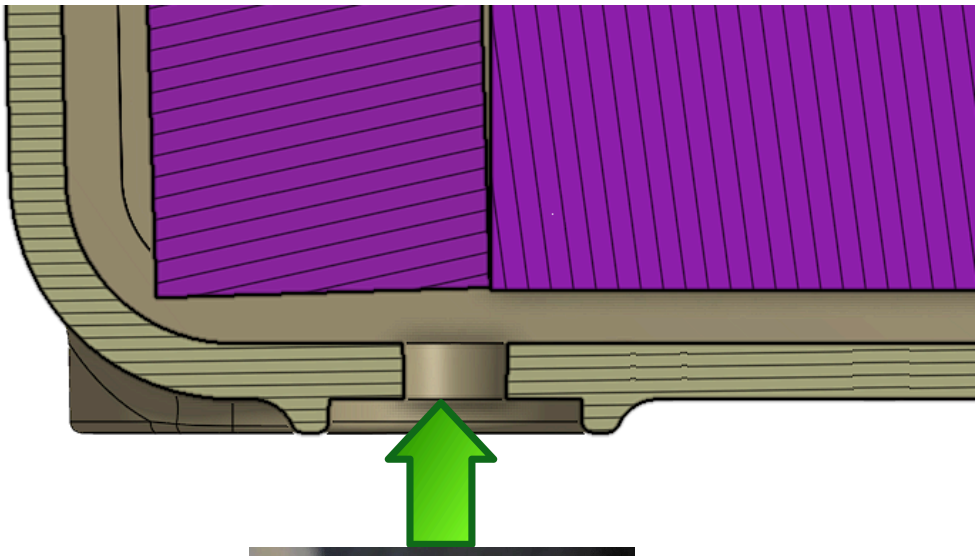
Solidworks Scame Housing for the Tricon: (Delta Development Team)

This project aimed to safeguard water-sensitive components for a device designed to withstand submersion. Utilizing SolidWorks sheet metal tools, I crafted a sheet metal box and obtained quotes from local manufacturers. However, the design proved unviable with conventional manufacturing methods due to the inability to bend the required shape. Subsequently, my supervisor and I delved into exploring alternative designs. Despite our efforts, extensive analysis revealed the impracticality of the initial concept. While the project did not progress as intended, the thorough investigation contributed to informed decision-making and propelled the exploration of more feasible solutions.



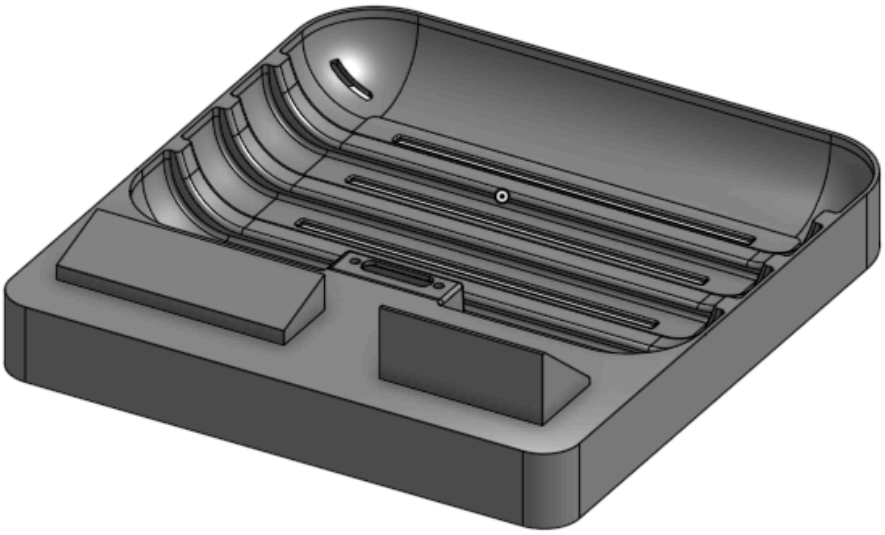
ICE PCM Fill Stand: (Delta Development Team)

This project marked my initial involvement upon joining the team. Its focus centered on filling a pack with a precise volume of a fluid known as PCM. Much of the groundwork had been laid prior to my arrival. The challenge lay in aligning the fill hole and nozzle to minimize the risk of spillage. My contribution entailed devising legs for the stand to achieve optimal proximity between the fill hole and nozzle. Upon approval by the project lead, my design successfully facilitated perfect alignment between the fill hole and nozzle, effectively mitigating the risk of spills. While subsequent iterations have refined the design for enhanced stability, my initial contribution served its purpose as a functional first step.



Foot Scraper Tool: (Delta Development Team)

This project involved creating a stainless steel tool with a 3D printed handle designed to clear foam from feet holes on the bottom of the device. The challenge arose from the design of the feet, which act like an umbrella upon insertion. The internal foam would not allow the feet to fully insert and they would fall out on occasion. Collaborating with the head of manufacturing, we iterated through multiple 3D printed handle versions to ensure comfort and usability. Once the handle design was finalized, I verified the dimensions of the metal piece to prevent damage to internal parts, finalized the order, and assembled the handles accordingly.



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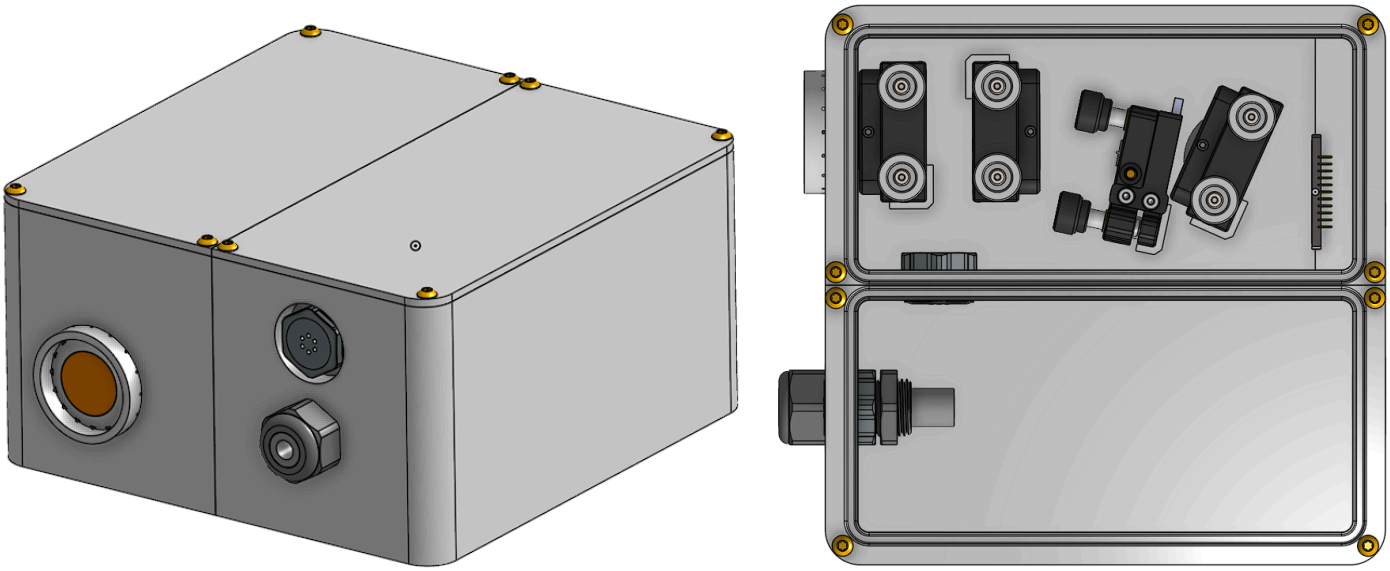
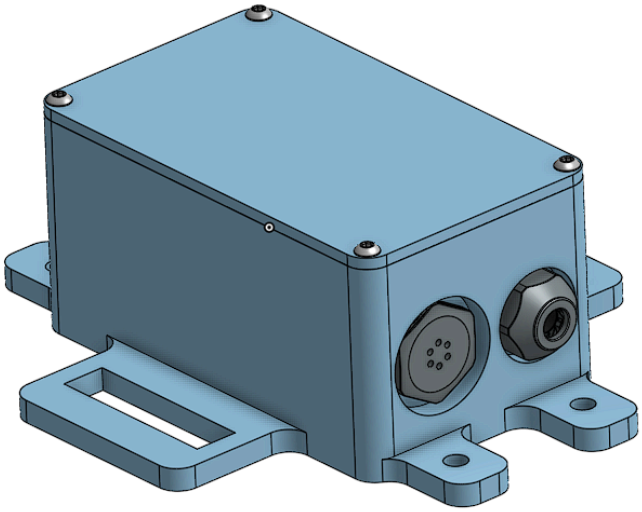
3D Printing Adventures: (Delta Development Team)

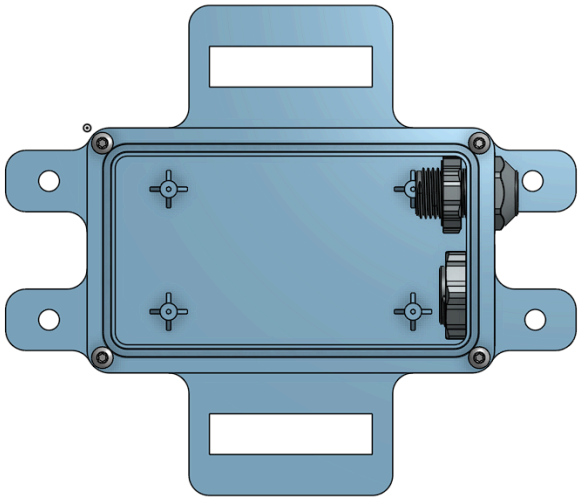
These two items represent straightforward projects where my involvement mainly revolved around the printing process. The top image depicts a sizable print measuring approximately 8”x8”, which required a lengthy 36-hour printing duration. Due to the printer's age, I had to monitor it closely throughout the process. Nevertheless, the print completed successfully and now serves its purpose in a QC DAQ station. In the bottom picture, I made minor adjustments to the design and primarily focused on printing prototypes of ideas the project lead had in mind, which provided valuable insights for further design refinement and project progression.



Capstone Project: (NAU)

This image showcases the nearly finalized design of our spectrometer, albeit with pending contributions from our electrical engineering team. Despite this, the project provided invaluable experience for honing my design skills and familiarizing myself with component selection and procurement protocols. Using OnShape, I meticulously crafted the entire device, handpicking all mechanical components except for the optics system, represented by the black mounts and colored circles denoting lenses. At present, the functionality of the device remains uncertain, as the gap between theoretical predictions and experimental outcomes in light-related applications can be significant. Nevertheless, this project serves as an important learning opportunity and a testament to our collaborative efforts.





Tree Stress Project: (NAU - SICCS Department)

This project I was tasked with leading the design and prototyping efforts of a cost-effective alternative to an existing product. Working closely with a fellow electrical engineering student, who designed a suitable board while I focused on designing the enclosure and selecting components. A paramount objective on my end has been to ensure the box's waterproofing, preventing any ingress of water. As of now, the project remains in the developmental phase, but plans are underway to commence printing prototypes once the printer becomes available.