

ePIC SVT Partial Disc Prototype

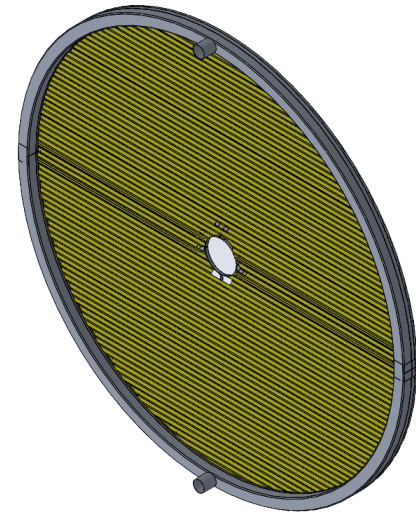
Elaine Buron

ePIC SVT Working Meeting
2026 10 08

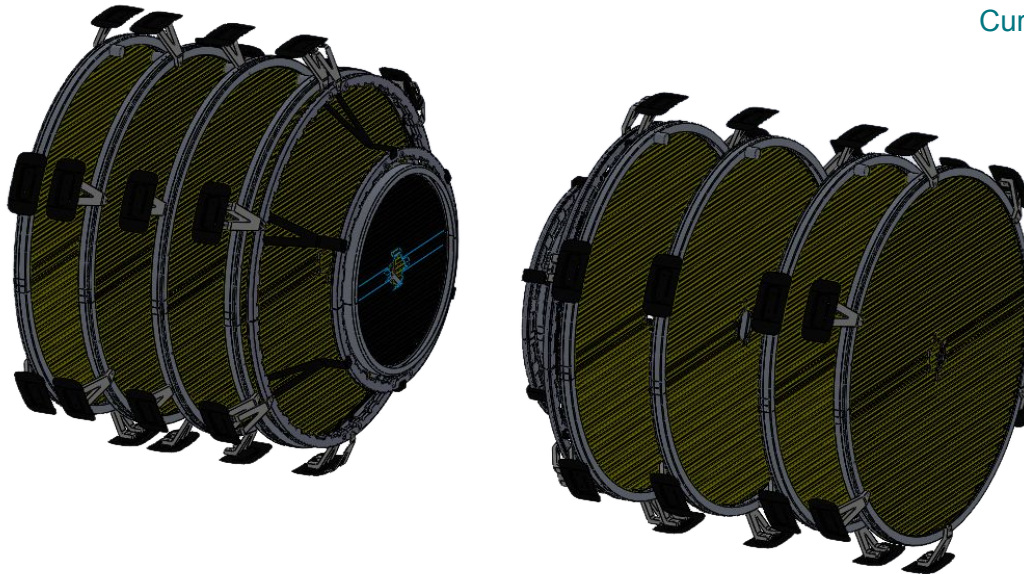
SVT Discs

There will be 10 total discs (8 large and 2 small) inside the tracker that will house the modules.

- The current working model includes
 - Corrugated carbon fiber panel where the modules will sit in front and back faces, and;
 - Rims that will support the structure and act as a cooling channel for the modules

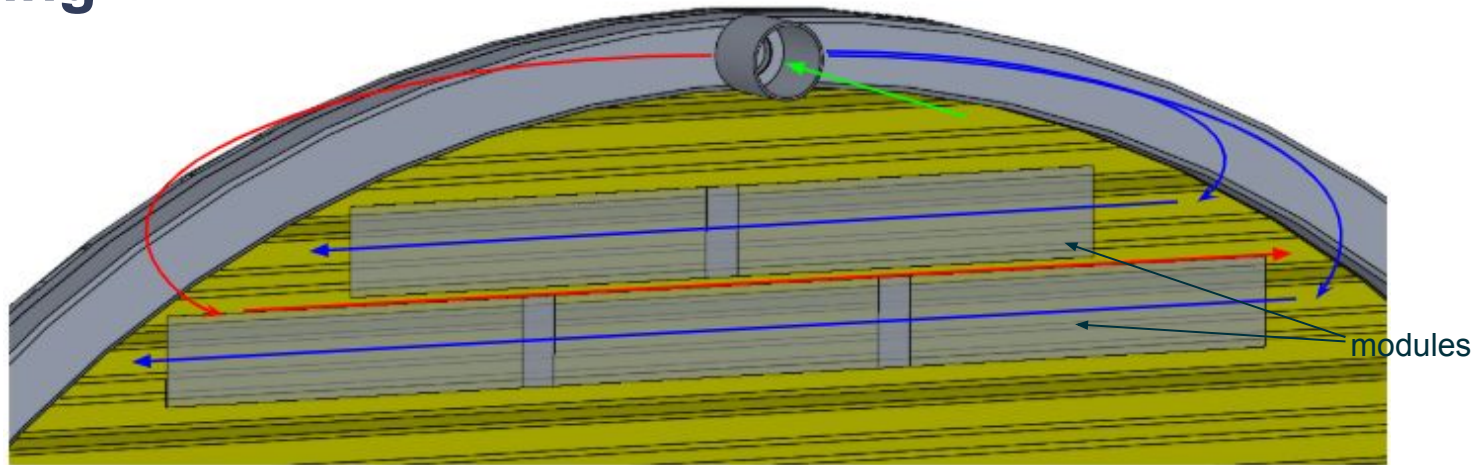


Current large disc model

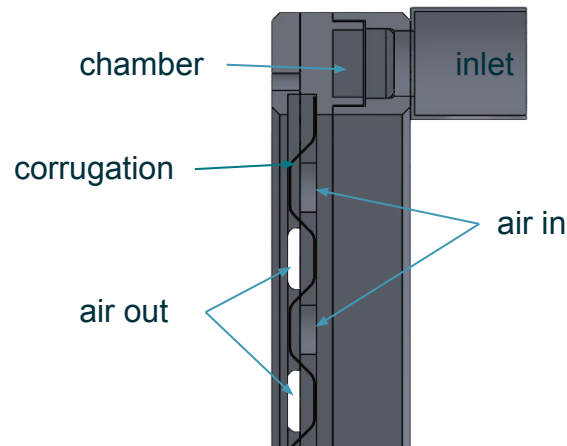


Disc configuration in the tracker, including the large and small discs

Cooling



- Air supplied into the disc (green arrow)
- The air is distributed through the channels inside the rims (blue and red arrows)
- The air will flow through the corrugation to cool the modules then exit through the outlets on the rim



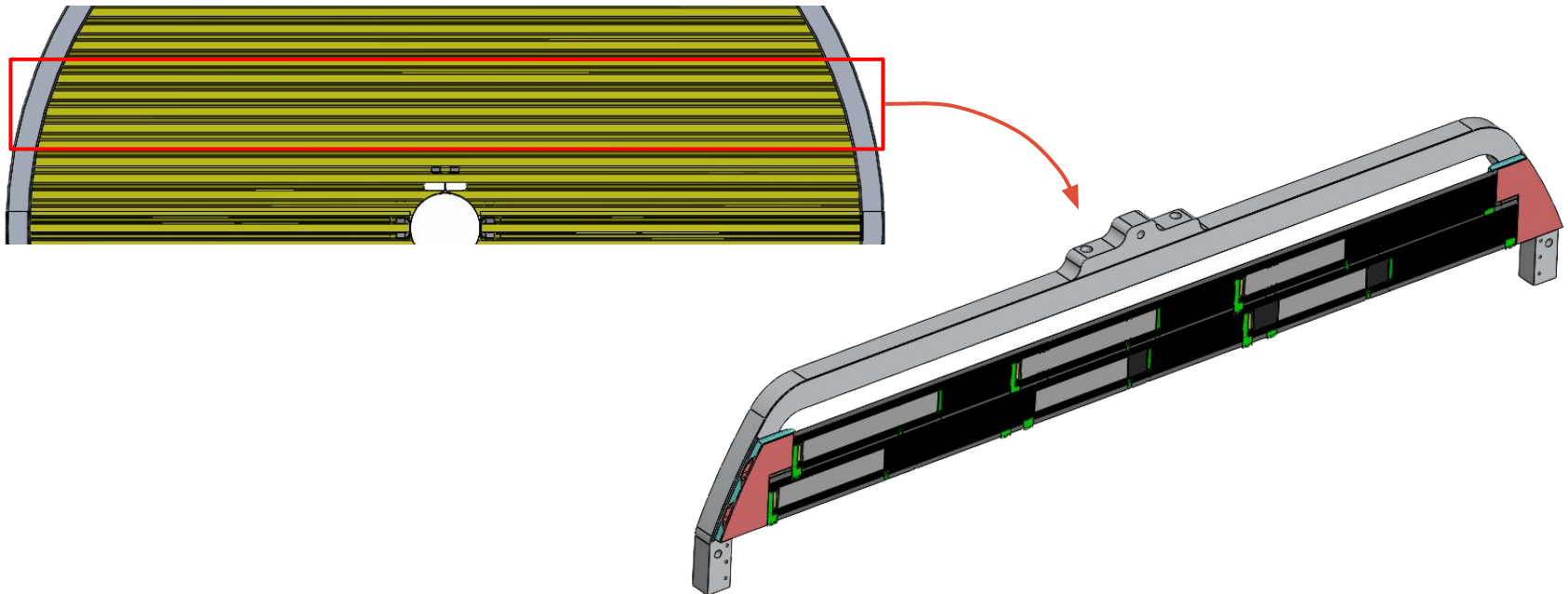
Prototype Design Goals

Now that we have a functioning design, we can start making a prototype with the following objectives:

- Prove that the functionality of the cooling system
- Ensure the manufacturability of each part
- Understand the appropriate assembly sequence, epoxy to use, and the tools required for the disc
- Understand how to install the modules to the corrugated panels

Prototype Design

- Created the prototype from the longest continuous section of the large disc
 - Because this area is the most vulnerable to insufficient cooling and air leaks
- Addressed the issues spotted in the design
- Changed the rims to adapt to the corrugation segment
- Maintained the intended module locations in the panels



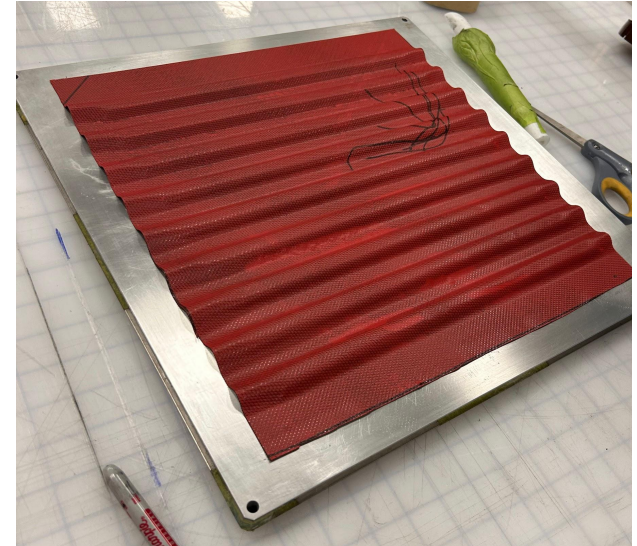
Considerations before assembling the prototype

Corrugated Panels

Previously attempted to make corrugated panels using 3-layer K13C2U carbon fiber

- Difficult to handle and mixed results

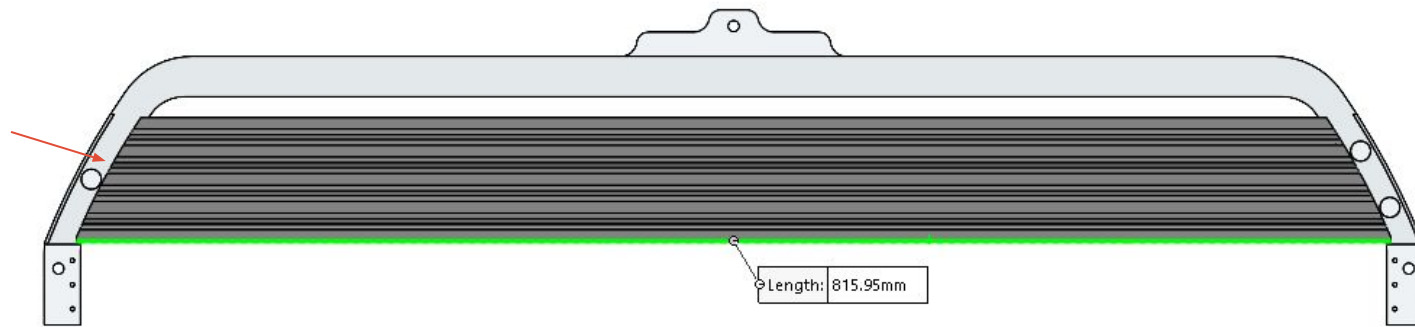
Experimented with a single-ply plain weave carbon fiber early this year, which had better results



Single-ply carbon fiber on the custom mold tool



Corrugated panel result

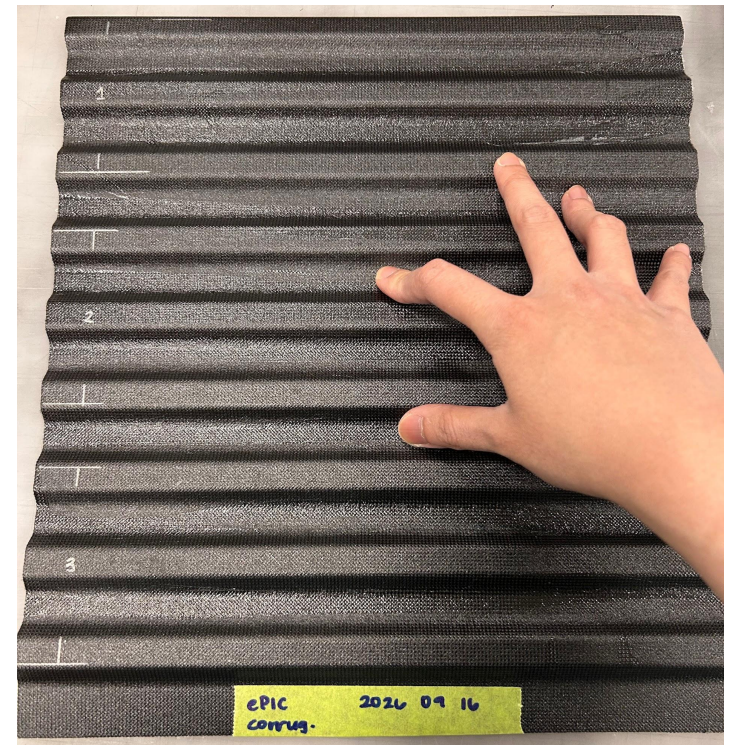


We don't have a mold tool that meets the target length of **815.95mm**

- Current mold tool dim: 279 mm x 279 mm

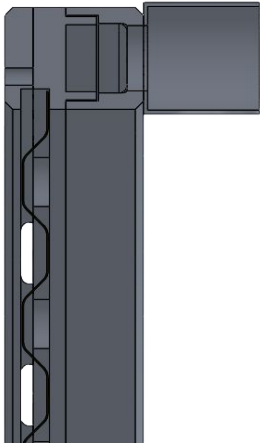
Instead, we used the existing tool to make the corrugation then cut with scissors to 3 different pieces to be glued together.

- 10 mm overlap in between the 3 pieces

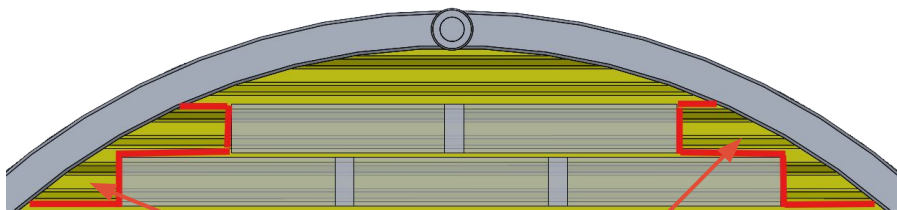


Air Cooling Inserts + New Rim Design

Original design

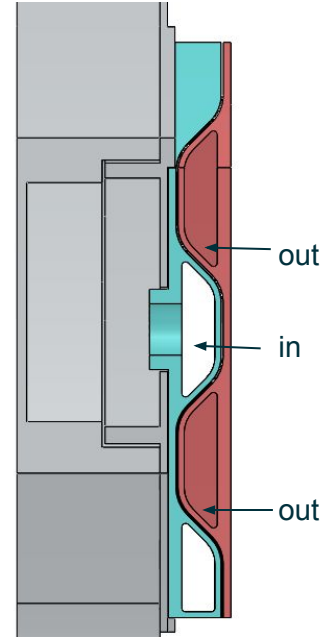


Air comes in through the inlet → chamber → corrugation → out of the disc



open areas

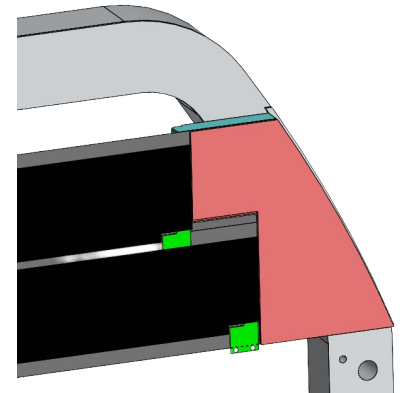
New design

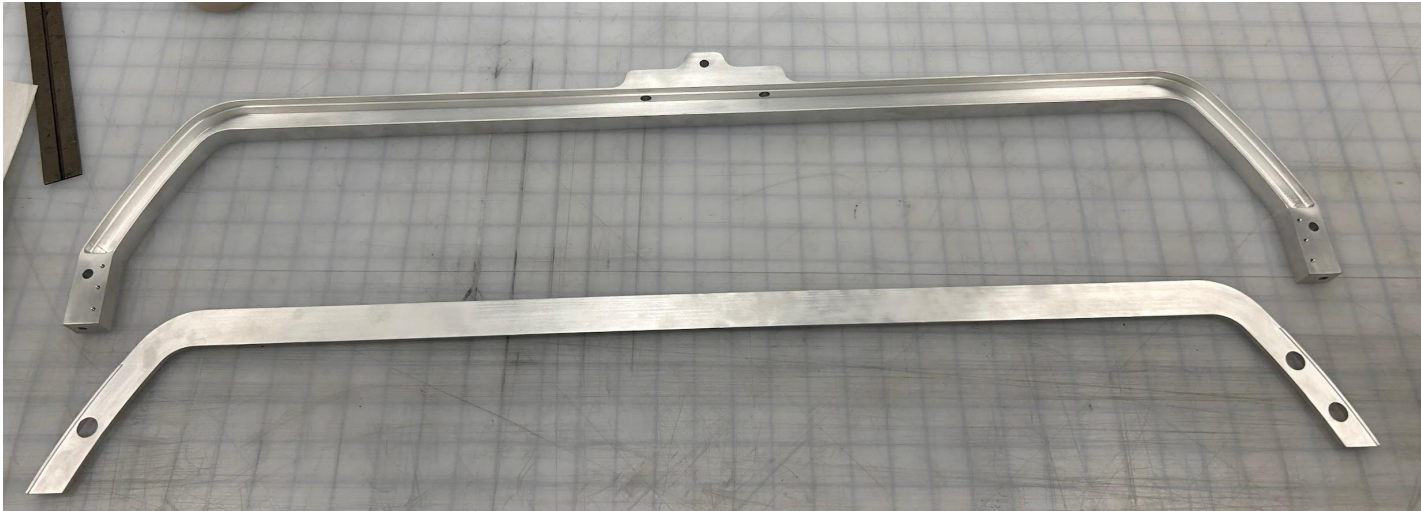


Maintains the same concept, except now there are inserts (blue and red) where the air would flow through

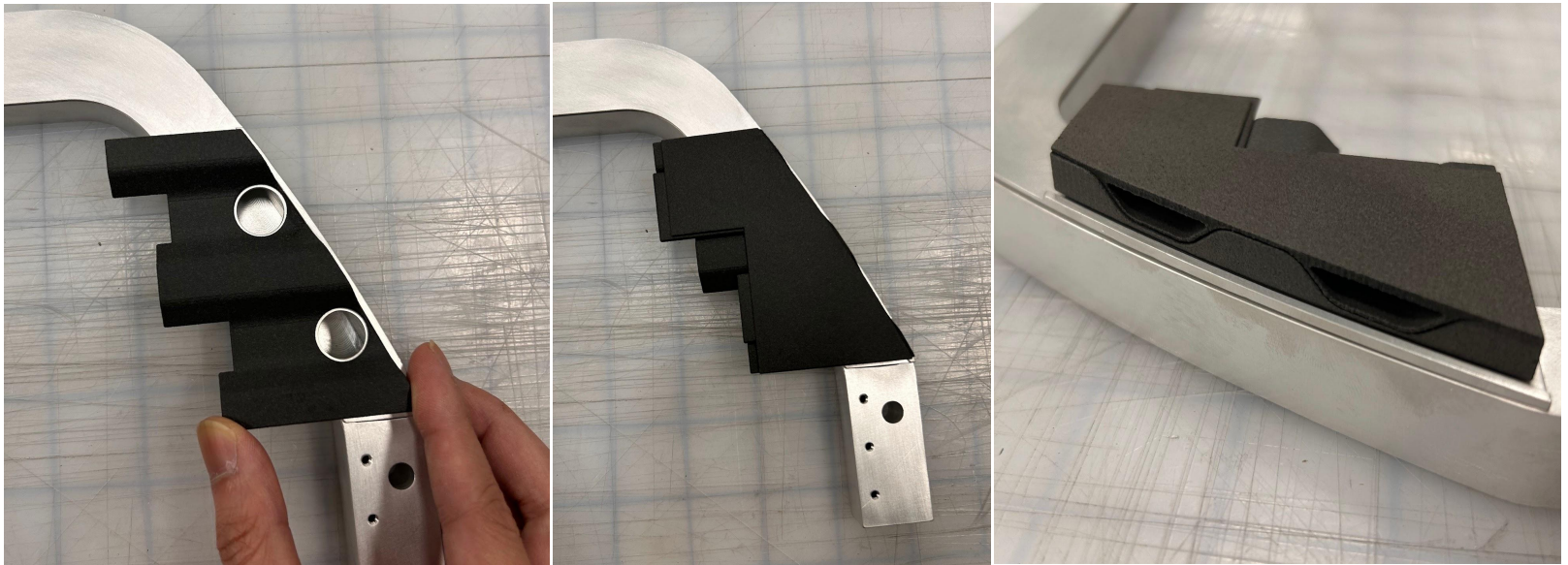
Corrugation is now sandwiched in between the inserts

The inserts also cover the gaps in between the module and the rim





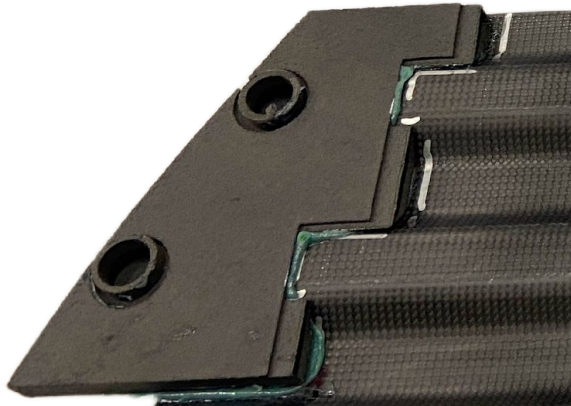
Prototype aluminum rims



The inserts were SLS 3D-printed in nylon-12 GF because of the complexity of the design

Epoxy Selection for the Structure

- Epoxy cannot enter the spaces where we wouldn't want it to go, such as the air chamber
- Hysol 9309 vs Hysol 9396
 - 9309 is too thin
 - 9396 viscosity can be controlled with fumed silica ✓
- Hysol 9396 with fumed silica has been selected to glue the structure together
 - Picked a epoxy to thickening agent ratio of 13:1 (same consistency as peanut butter)

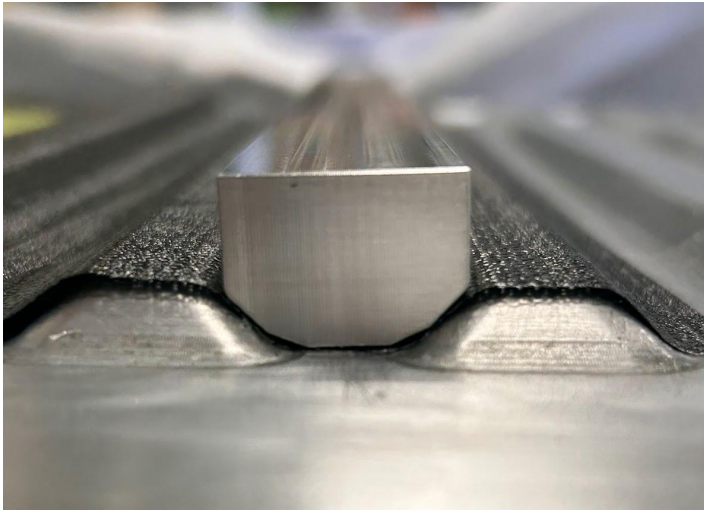


Hysol 9396



Hysol 9309

Tooling



Aluminum bar

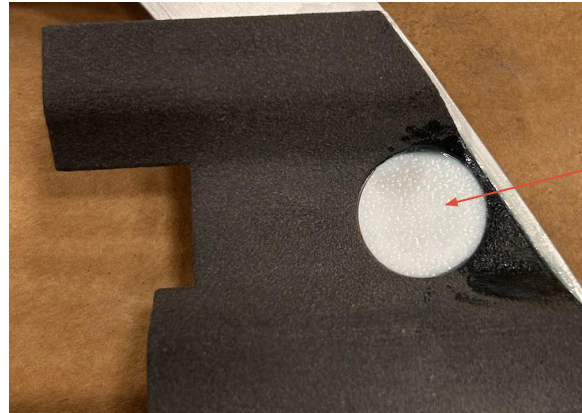
- Adds weight on the corrugation as the epoxy cures
 - When attaching the corrugation pieces together
 - When gluing the inserts
- Ensure alignment



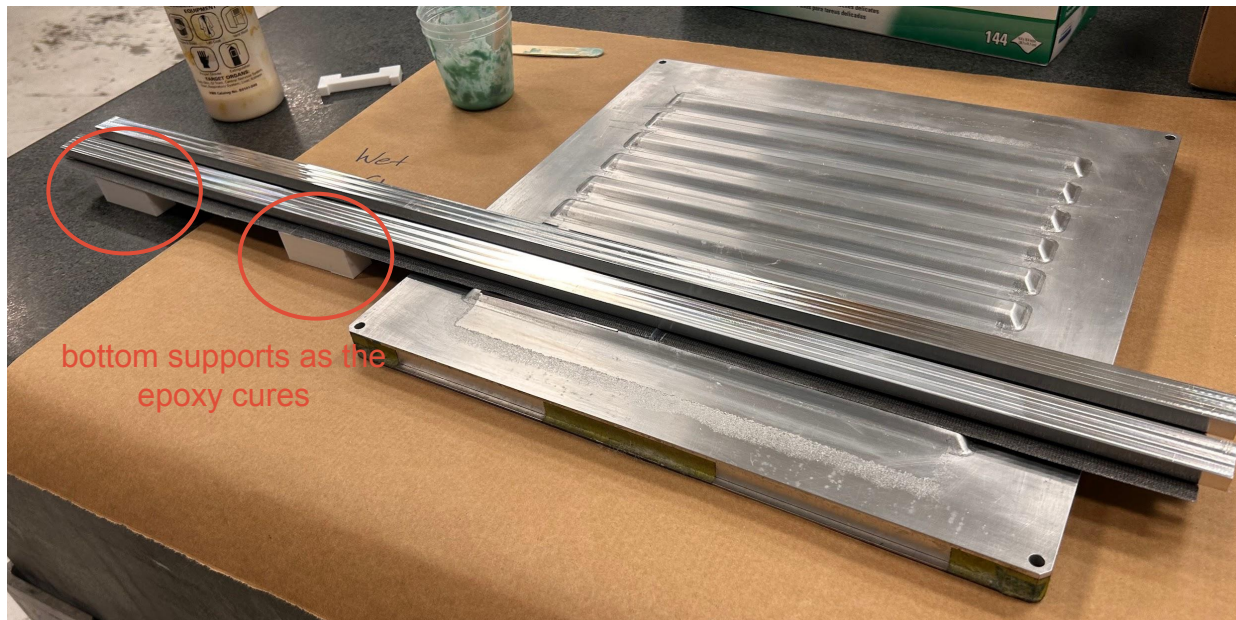
Extends to be slightly longer than the prototype corrugation panel

3D-printed misc tools

- Supports, plugs, etc.



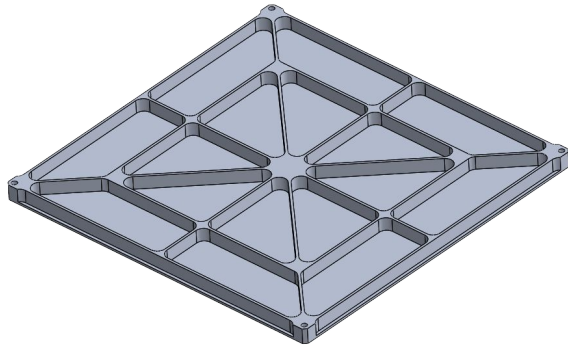
plug to properly align the insert and the rim



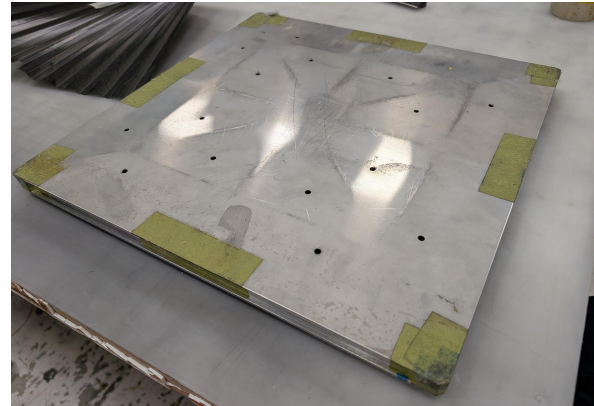
bottom supports as the epoxy cures

Corrugation mold tool

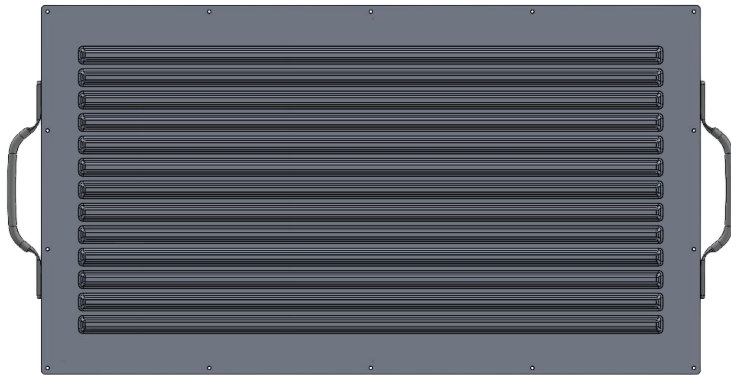
- Developing a new tool for the actual discs



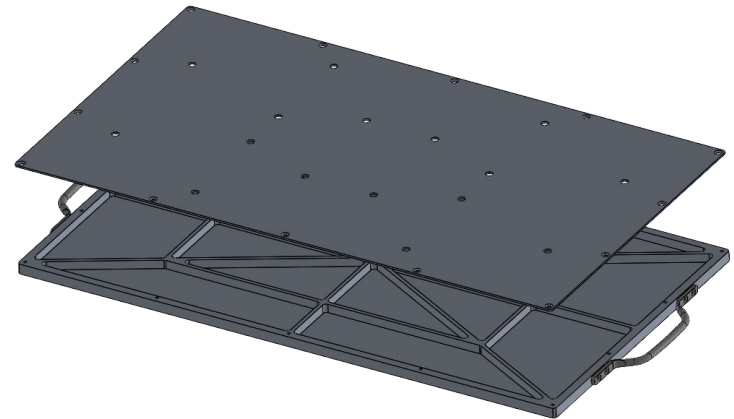
Bottom view of the small mold tool



Technicians added a bottom plate to prevent bridging with the vacuum bag



Actual disc mold tool design



Added a bottom plate

Current/Future Work

Assembly

- Assembly time: ~5 days



Early assembly stages



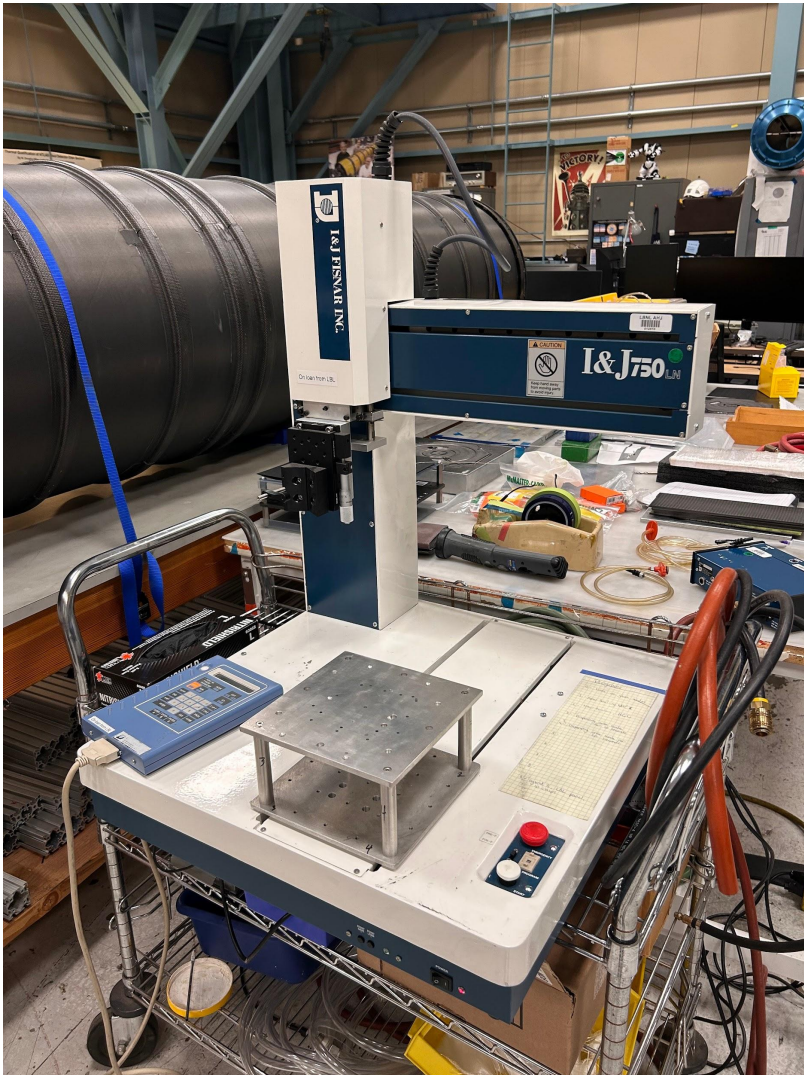
Current stage

Epoxy selection for module installation

- Which epoxy consistency and how to dispense?
 - The epoxy cannot touch sensitive areas of the modules
 - Width has been set to ~2mm
 - Keep track of the mass
- Early attempts used plastic shim stock as a stencil, then add polycarbonate
 - Tends to be wasteful
 - Take off some of the glue during removal of the stencil



Unglued spots



Switched to a pneumatic glue bot

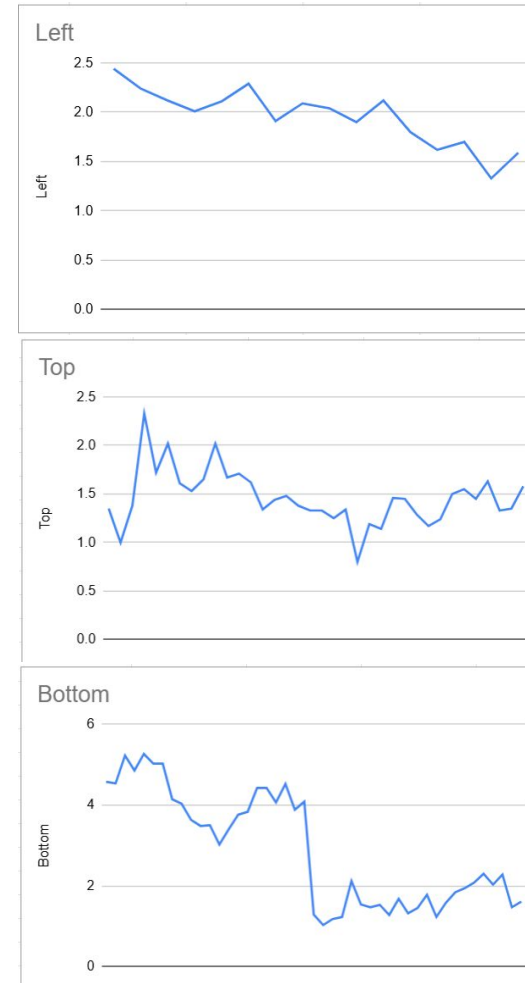
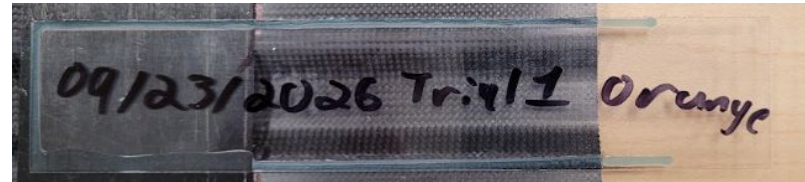
Comes with several parameters to address:
syringe tip size, glue viscosity, pressure, speed

Sample test

- Hysol 9396+0.5g of fumed silica (thickener)
 - maple syrup consistency
- 23 gauge syringe tip
- 70 psi
- 1 mm/s

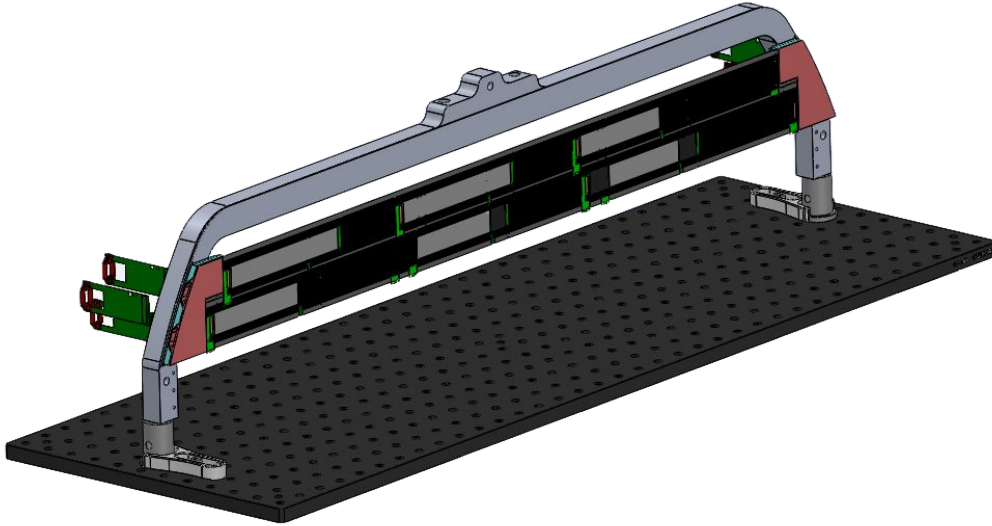
Method

- Glue was directly dispensed to the polycarbonate
- A piece of ~0.3mm-thick carbon fiber was placed to simulate overlapping modules
- Polycarbonate was placed on top of the flat carbon fiber and the corrugated carbon fiber
- Measured the weight and the width of the glue

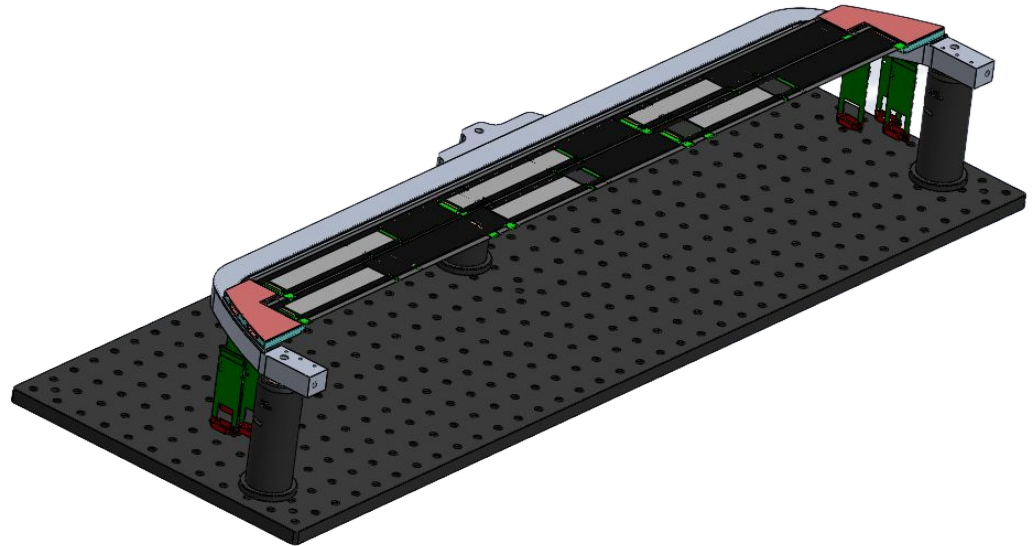


Thermal and Vibration Tests

Thermal test set-up



Vibration test set-up



Thank You

Questions?