# Disk update

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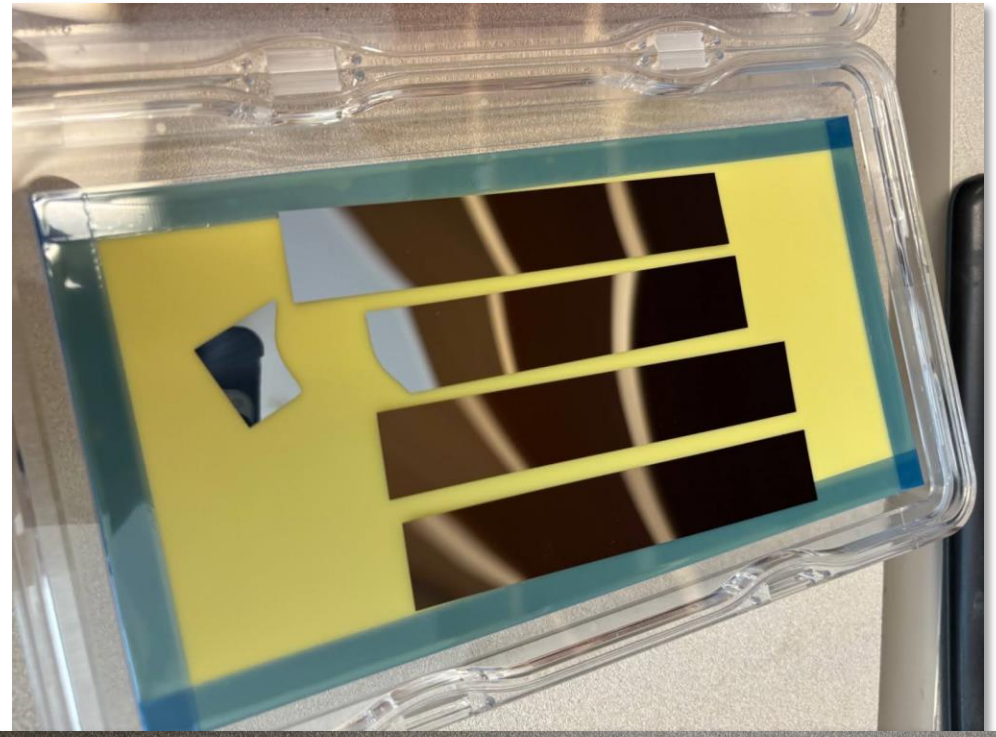
SVT Meeting 10/28/25

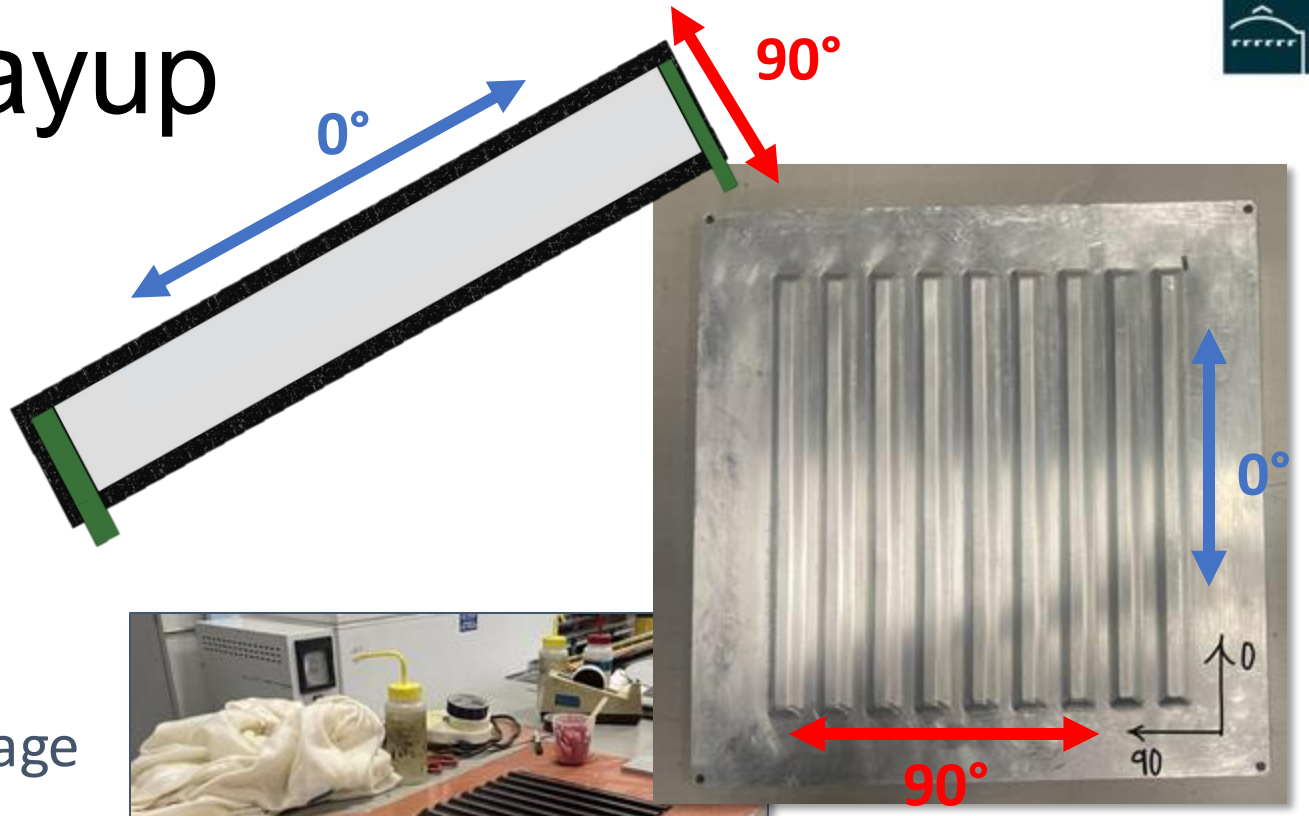
# Dummy sensors

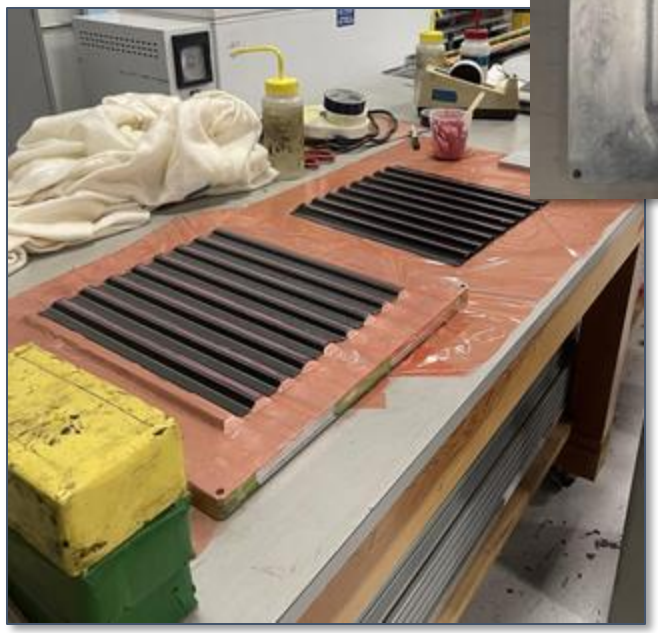
- Box used allowed sensors to move
  - 2 out of 26 arrived broken
- Previous order provided separation between dummy sensors & kept them tightly packed
- Sensors in Gelpak undamaged, but harder to remove



# Carbon composite & layup

- **K13C2U** Carbon Fiber pre-preg
- **0°: along the corrugation**
- **90°: against the corrugation**
- Two different configurations
  - **Flat sheet: 0/90/0** → thermal advantage
  - **Corrugation: 90/0/90** → mechanical advantage for corrugation



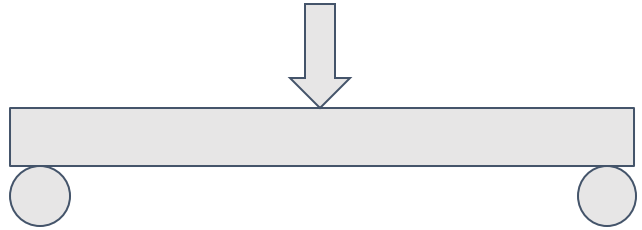
Credit: Skye Heiles

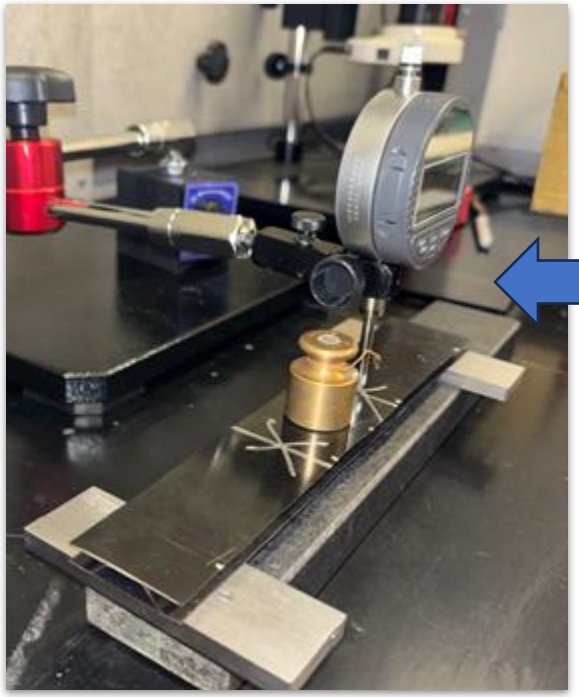
# Corrugated Test Pieces

3 “rows”, bonded to two flat sheets
~70 mm x 300 mm
Corrugation:  90/0/90
Two flat sheet (FS) variations:  90/0/90, 0/90/0

Single row, bonded to two flat sheets
~ 40 mm x 200 mm
Corrugation:  90/0/90, FS: 0/90/0


# 3-point bend tests





Manual:

Using weights to apply force and a dial gauge to measure displacement

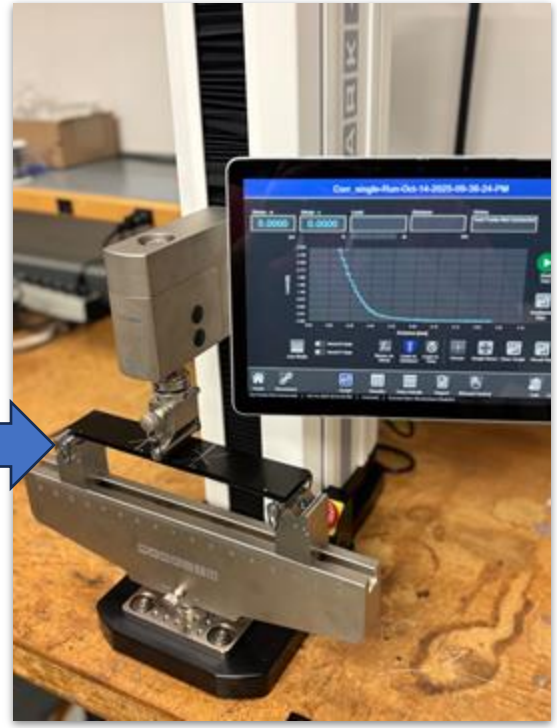
Subject to range and sensitivity of the dial gauge

Measuring displacement away from center due to the weight placement

Testing machine:

Mark-10 IntelliMESUR

3 point bend tests → moves downward & measures the force applied



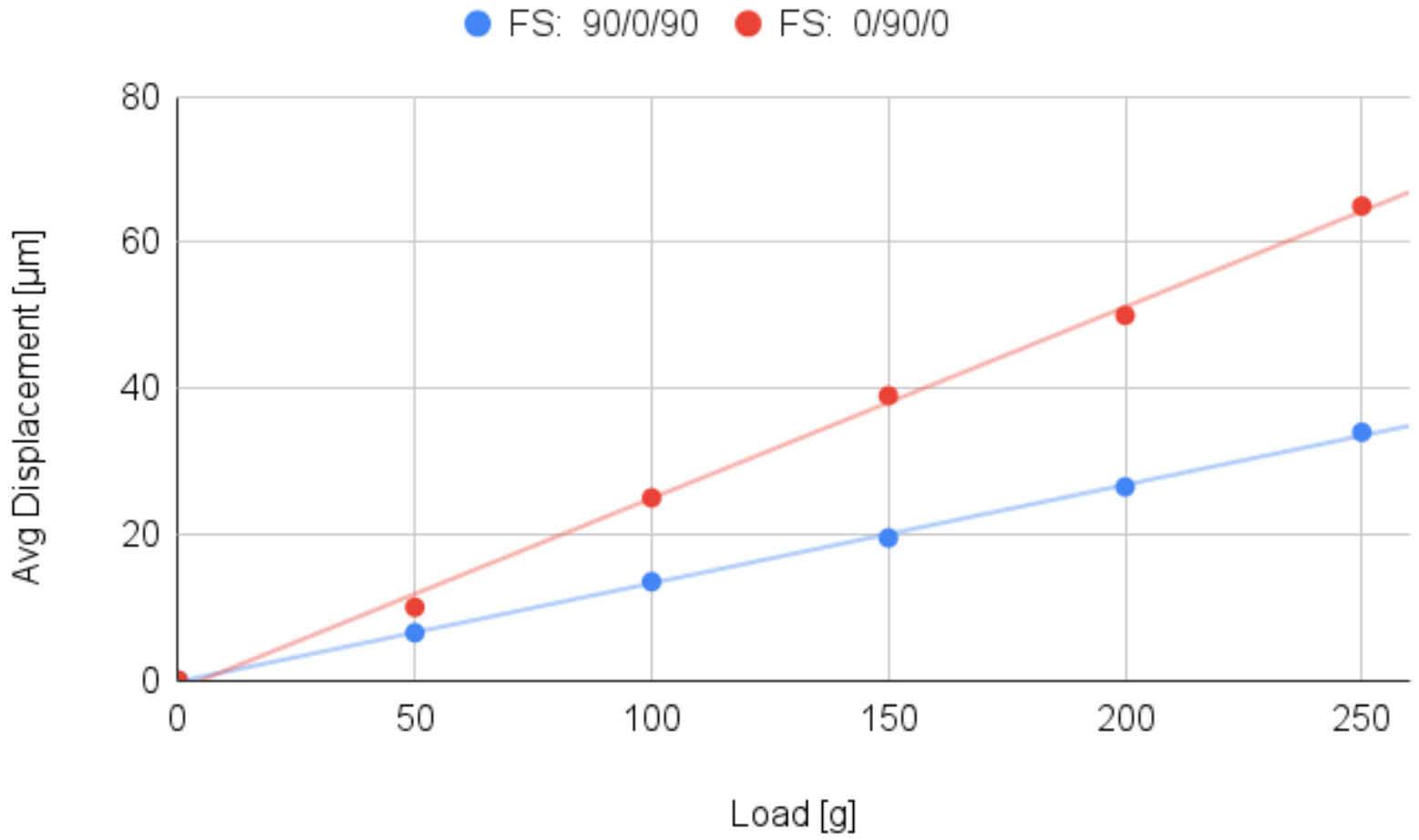
# Layup comparison

3 corrugation pieces

Results shown for both FS

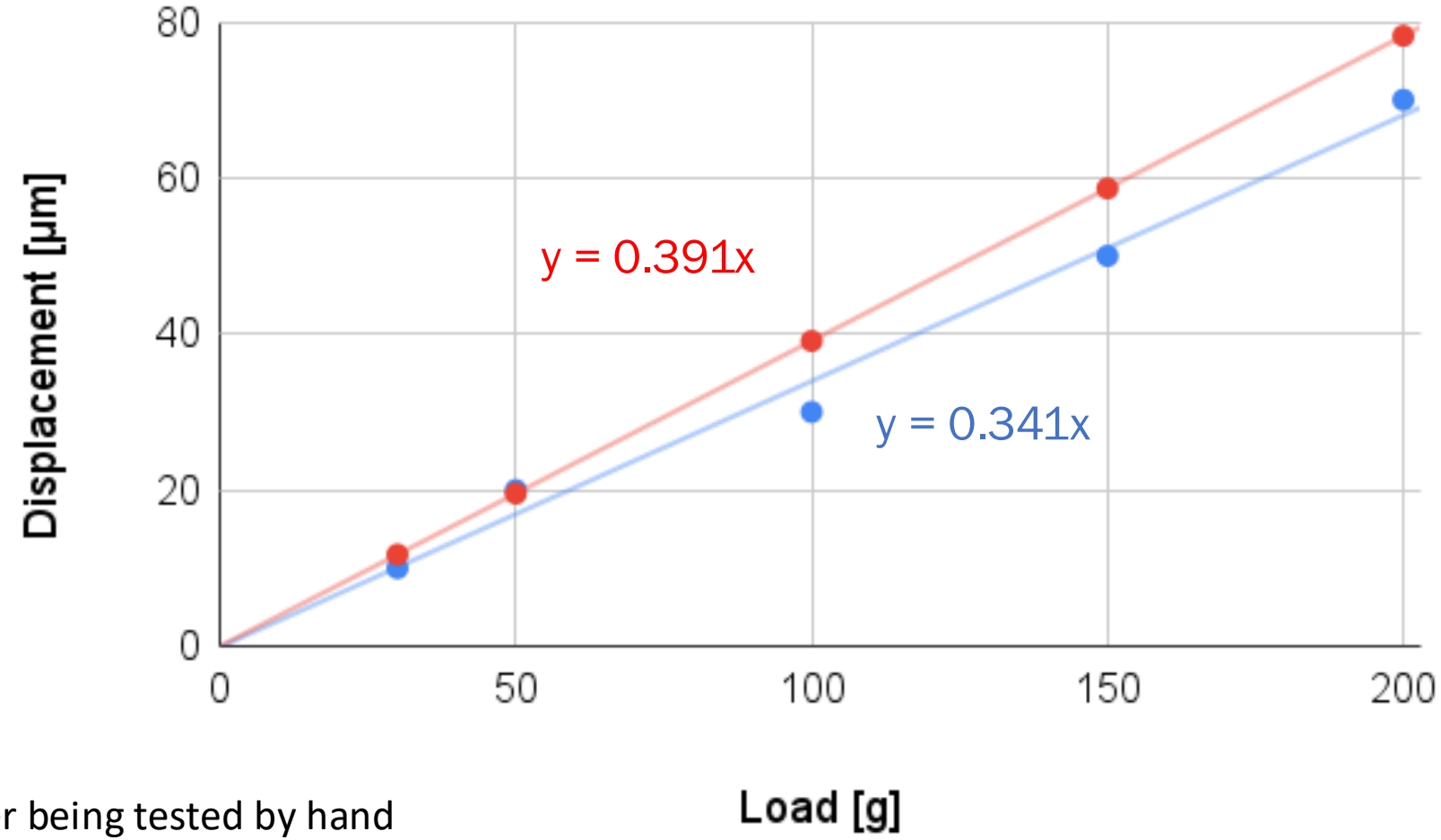
CF has a higher modulus for loads parallel to the fibers.

As expected, 0/90/0 has a larger displacement response to the weight.



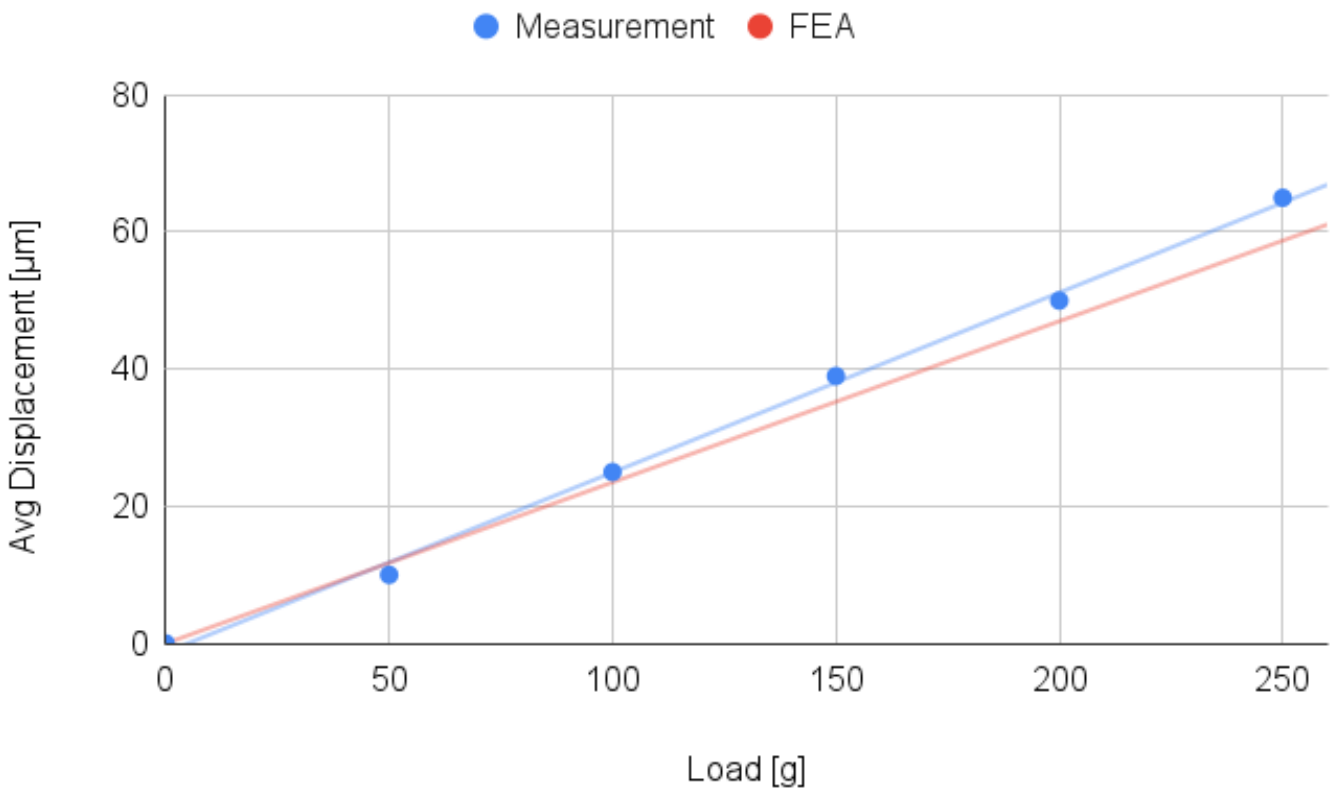
# Single Corrugation Measurements

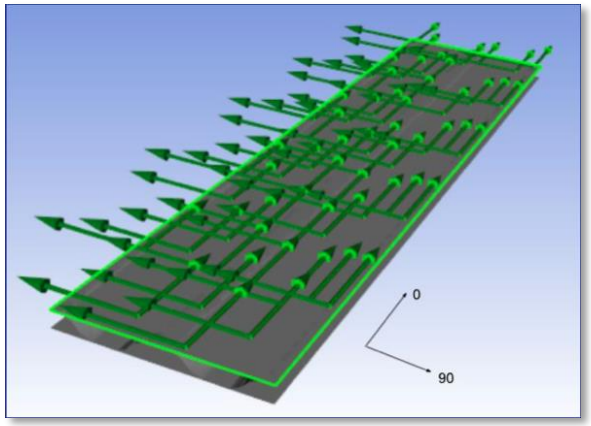
Red: Machine
Blue: By hand

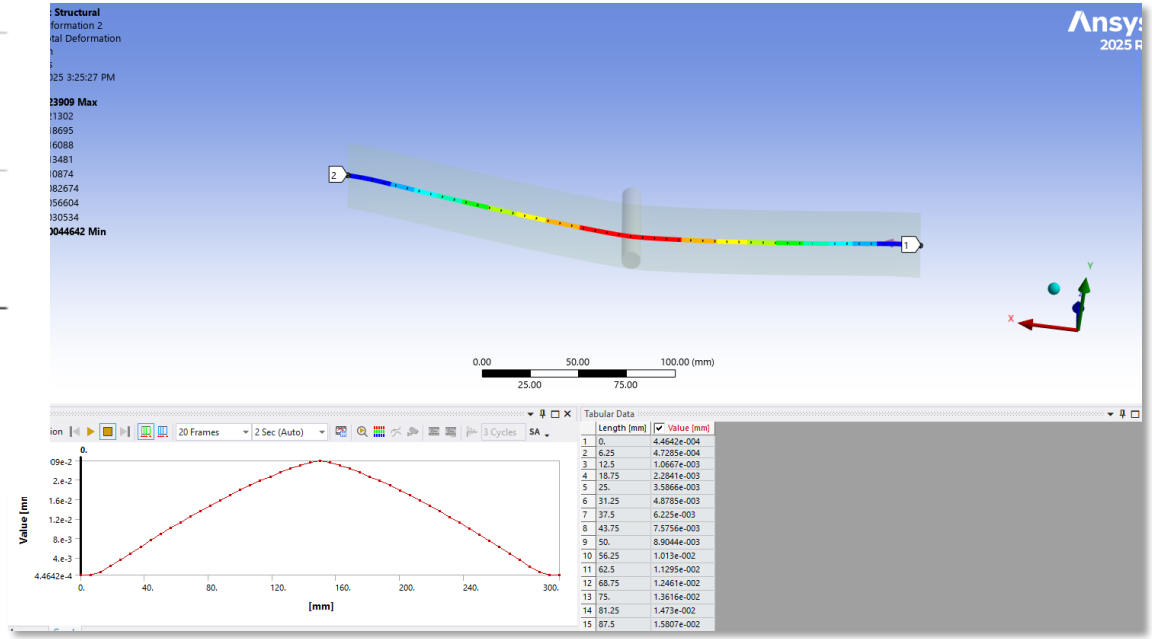



Tested on machine after being tested by hand
Can account for the larger displacement

# FEA comparison



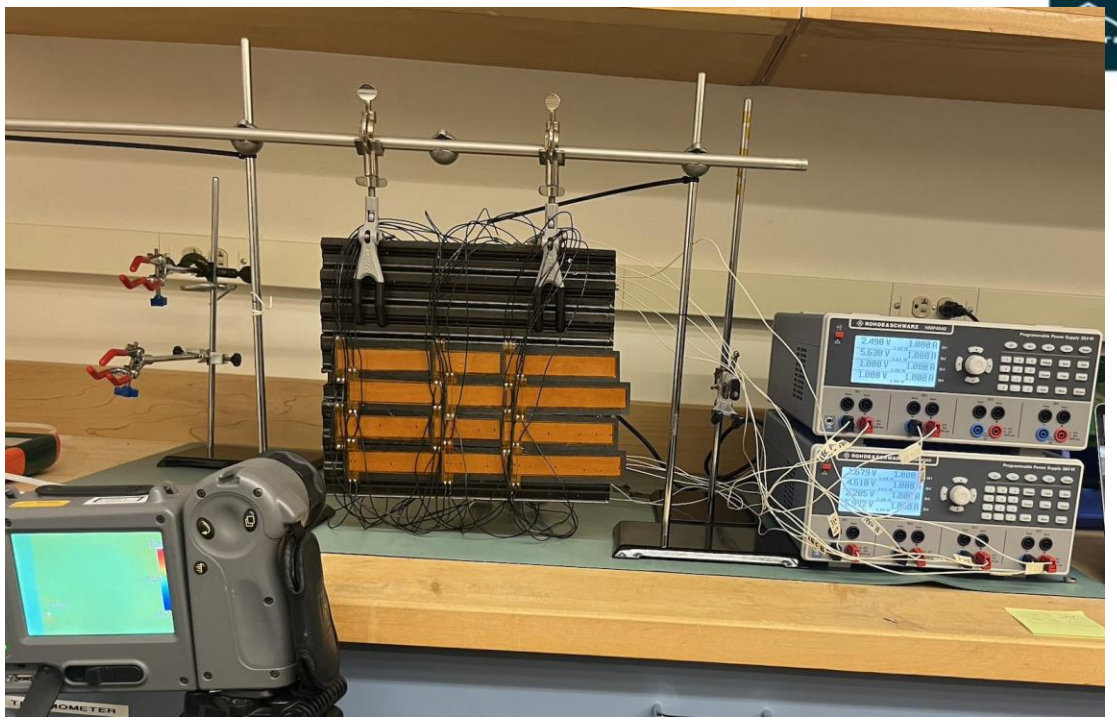




**Work by Skye Heiles**

# Thermal neighbors setup

- Points of interest
  - Neighboring rows on same side
  - Neighboring rows on opposite sides
  - Power changes
  - Forced convection

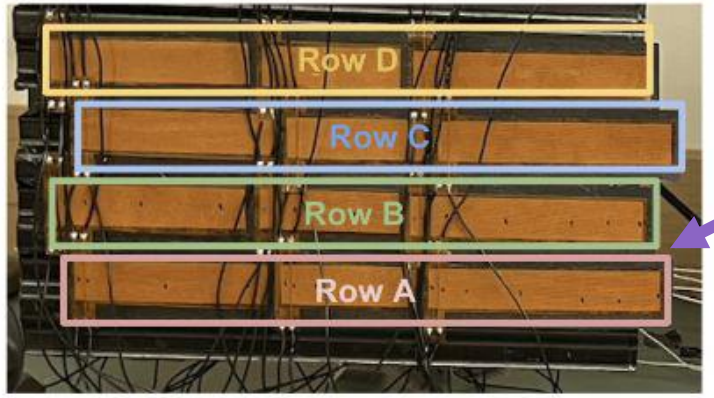


**New Power Numbers**

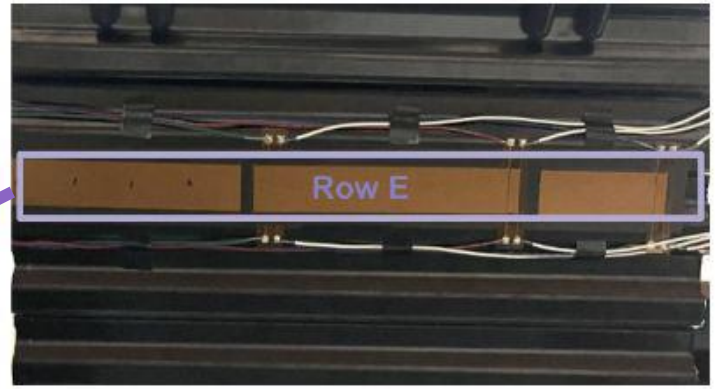
**LEC: 0.24 W/cm$^2$**

**RSU: 0.05 W/cm$^2$**

4 rows in front

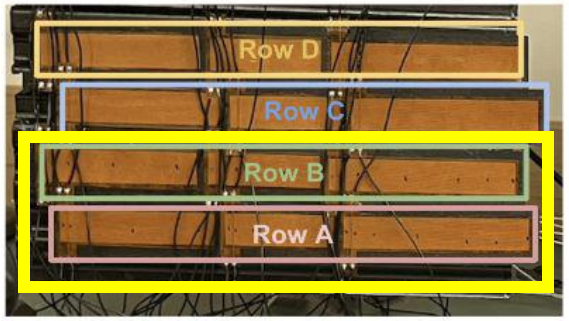



1 row in back




**Work by Katie Gray**

# Thermal results





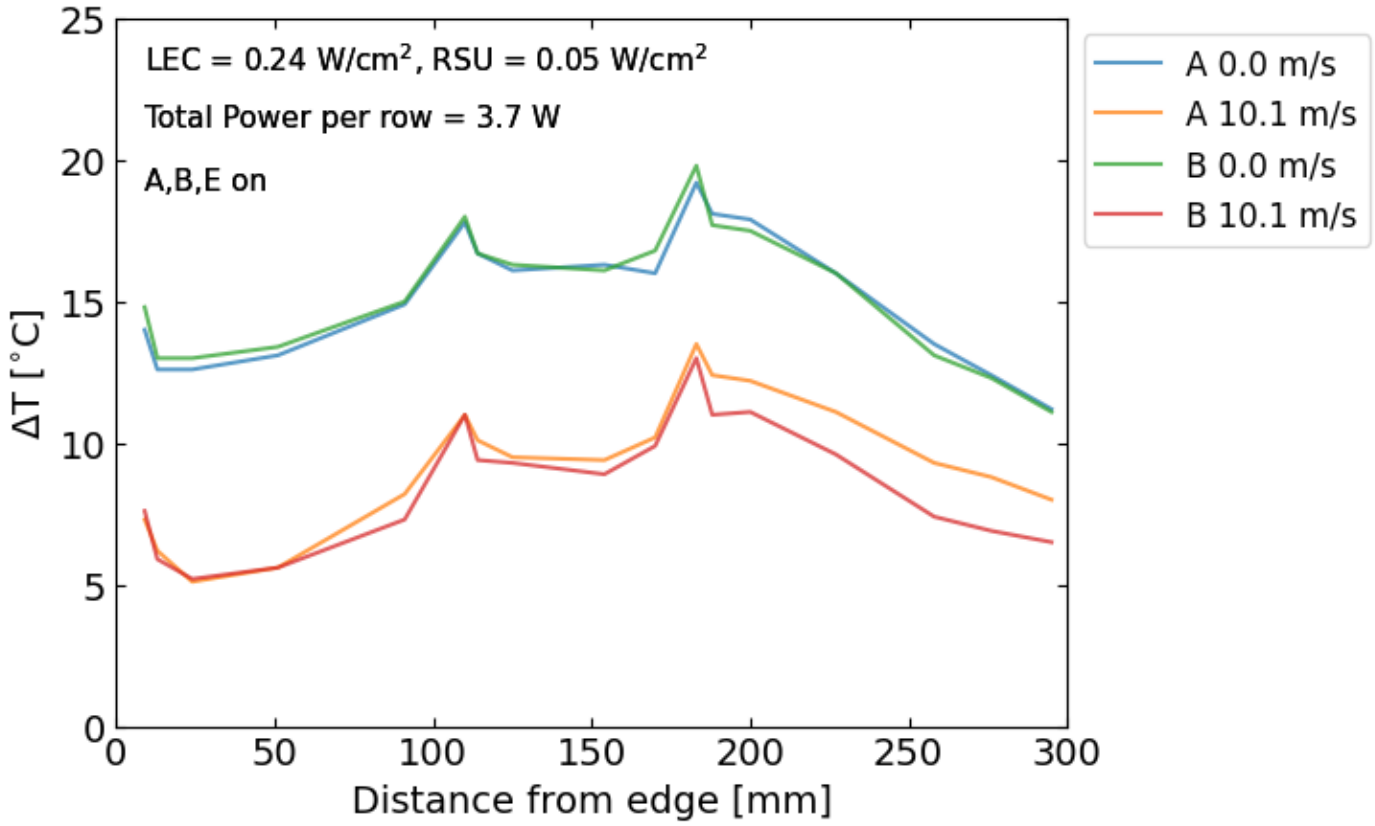
[”New” power numbers]

30% reduction in ΔT for LEC peaks

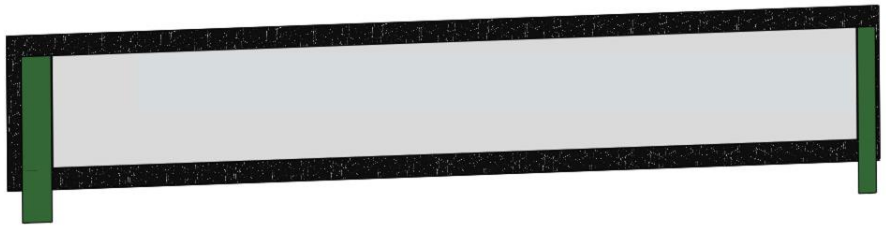
No major change in RSU temp

- power density stayed the same

Caveat:  No AncASIC



# Summary/Next steps



- Module design being finalized
  - New information about bridge FPCS, power, & corrugation pitch all factor into the length & width of the carbon fiber flat sheet
- Module tooling
  - First iteration is under re-design based on new information about the FPCs
  - Basing off of knowledge from HFT and ITS2
- Other work in progress:
  - Connection points from disks to PST
  - Disk rim design with air manifold
  - Routing of air inlets & exhausts
  - Cable & fiber routing

# Material measurements

| Piece | Exp. Density [g/cm$^2$] | Meas. Density [g/cm$^2$] | % Difference (exp. to meas.) | Meas. % $X/X_0$ |
|---|---|---|---|---|
| Corrugation | 0.023 | 0.024 | +4.3 | 0.06 |
| Flat sheet | 0.023 | 0.026 | +13 | 0.06 |
| Panel (fs + glue + corr + glue + fs) | 0.072 | 0.078 | +8 | 0.18 |

- Flat sheet not bleeding as much/enough resin? **Currently being checked**
- If we consider silicon at 0.09% $X/X_0$ (with overlaps), FPC at 0.03% $X/X_0$ (averaged over pitch) → total $X/X_0$ is **≥0.3% $X/X_0$**
  - Need to save ≥0.05%: Likely place is cut outs in the flat sheets → need to be tested for mechanical strength and effect on the thermal performance