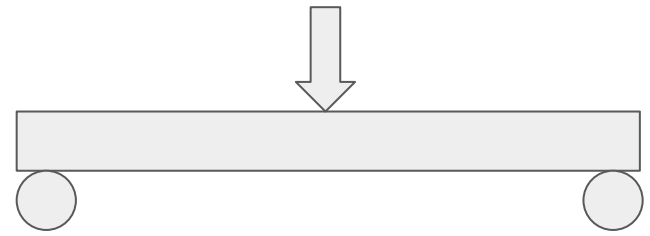


Flexural tests

LBL EIC meeting

10/14/25

Flexural testing



3 point bend test

Force (mass) vs displacement

Can be translated to **flexural stress (force/area)** and **strain (dimensionless)**

Flexural stress: internal stress in object, compression & tension, higher stress → more bending the material can withstand before breaking

Flexural strain: stiffness & resistance to deformation. Stiffer material → higher strain

Flexural modulus: ratio of stress to strain. Higher values indicate better stiffness & resistance to bending. Lower values are more flexible

Corrugated Test Pieces

1. 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

2. Single row, bonded to two flat sheets
~ 40 mm x 200 mm

Corrugation: 90/0/90, FS: 0/90/0



Manual tests

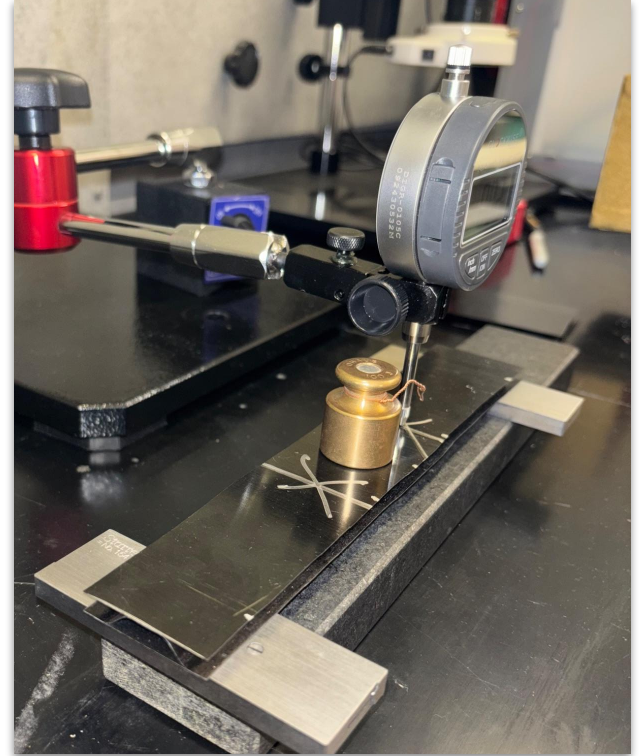
Using weights to apply force and a dial gauge to measure displacement

Subject to range and sensitivity of the dial gauge

Measuring displacement away from center due to the weight placement

Results shown for mass placed on “hump” of the corrugation

Also done for mass on the “valley”, but more difficult to measure due some deformation lingering



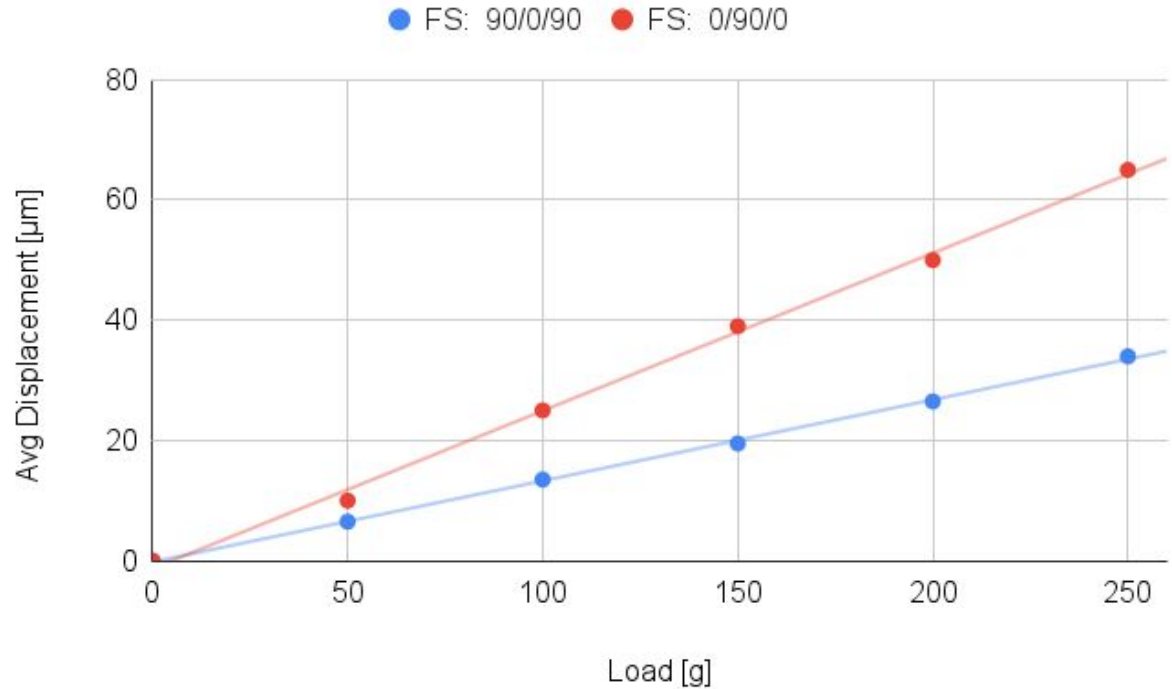
Manual test results

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.



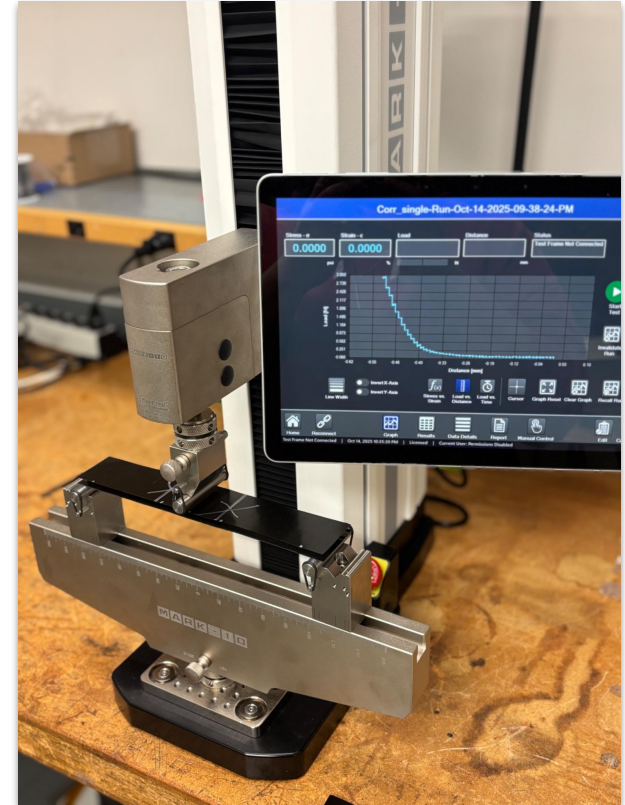
New testing machine

Mark-10 IntelliMESUR

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

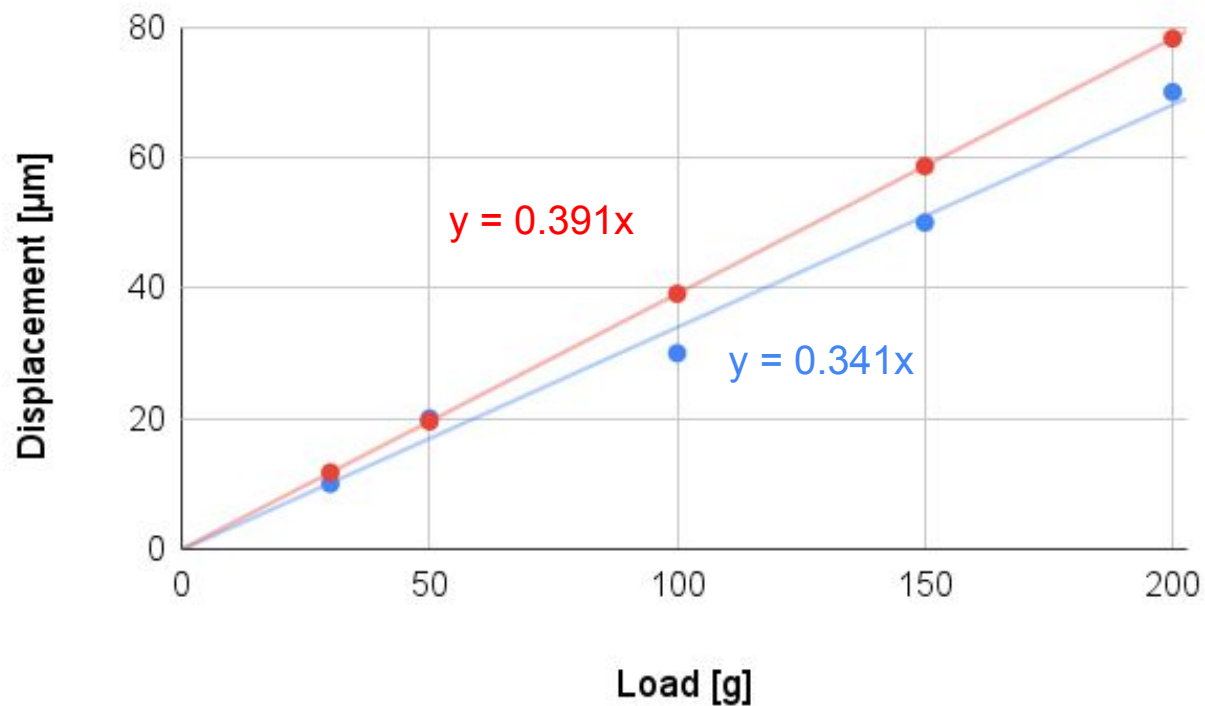
Took measurements for both FS and on both sides of each test piece

3 corrugation test piece may be too wide for machine. Results shown for single corrugation test piece



Single Corrugation Measurements

Red: Machine
Blue: By hand



Next steps

Look into 3 corrugation measurements on the machine

Measure on the “valley” of the corrugation

Measure piece that is “against” the corrugation

Calculate stress & strain → test machine can do this automatically

Compare to Skye’s FEA results → described in the next talk

