

Structure Evaluation: CT X-Ray Scans

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TFPX Upgrade Mini Workshop

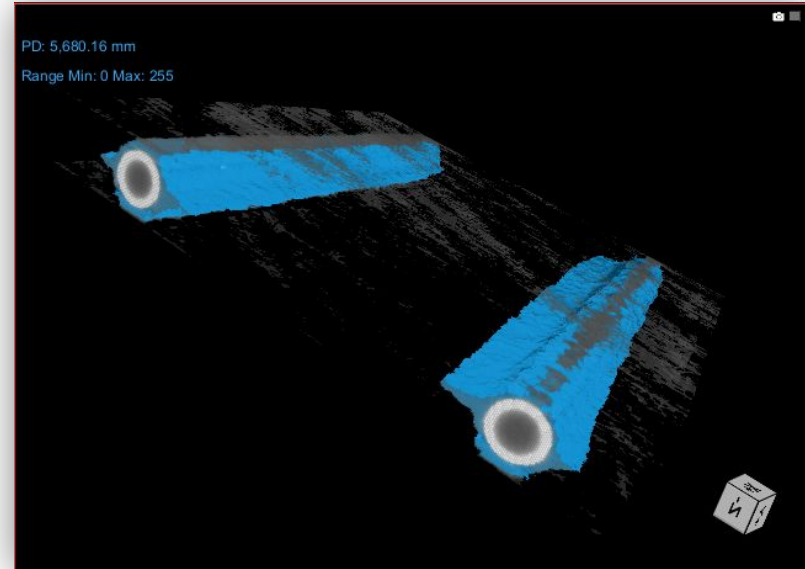
February 8, 2024

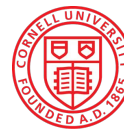




Why do we look at X-ray scans?

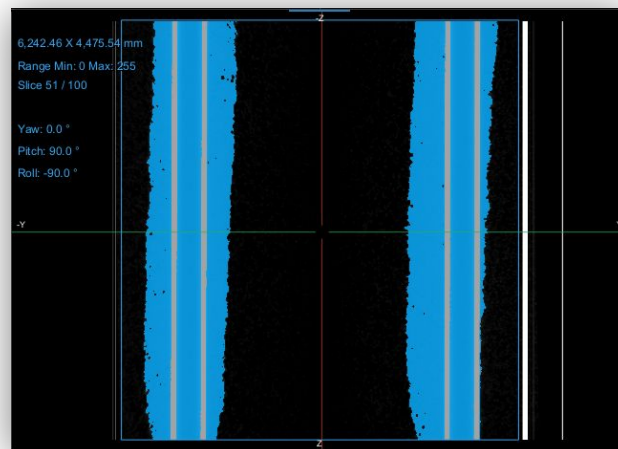
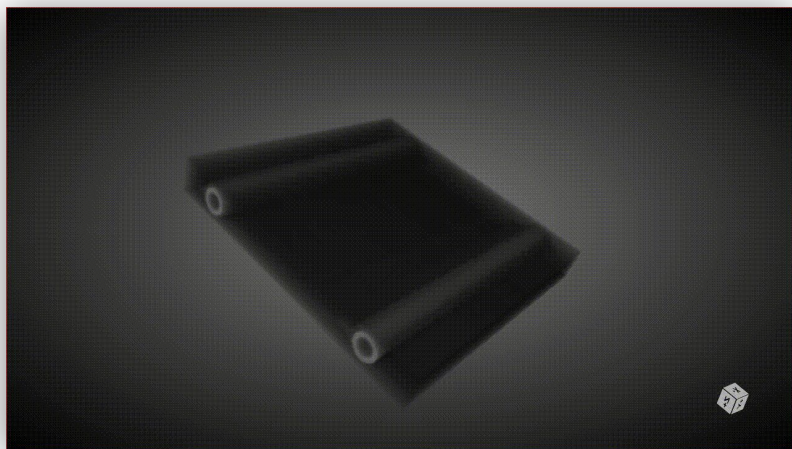
- Check for internal defects and record the reaction of a custom-made epoxy to high level radiation
- Provide visualization that is used to evaluate our manufacturing process, inform future design choices
 - Reducing the volume of epoxy
 - Switching the shape of a manifold





Epoxy Identification

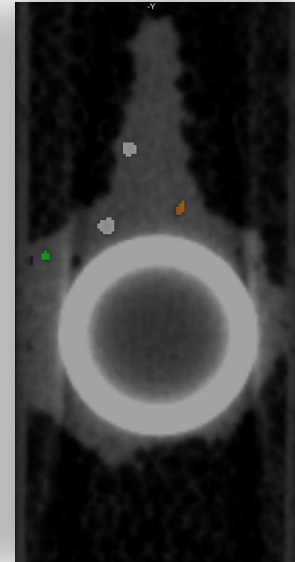
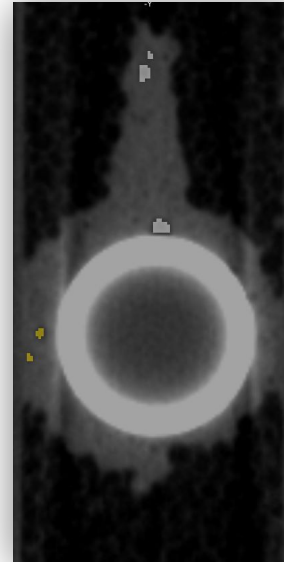
- Use image segmentation to identify ROIs in Dragonfly
- Isolate epoxy in 2D + 3D to view deposition defects

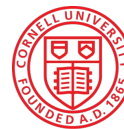


Void Identification

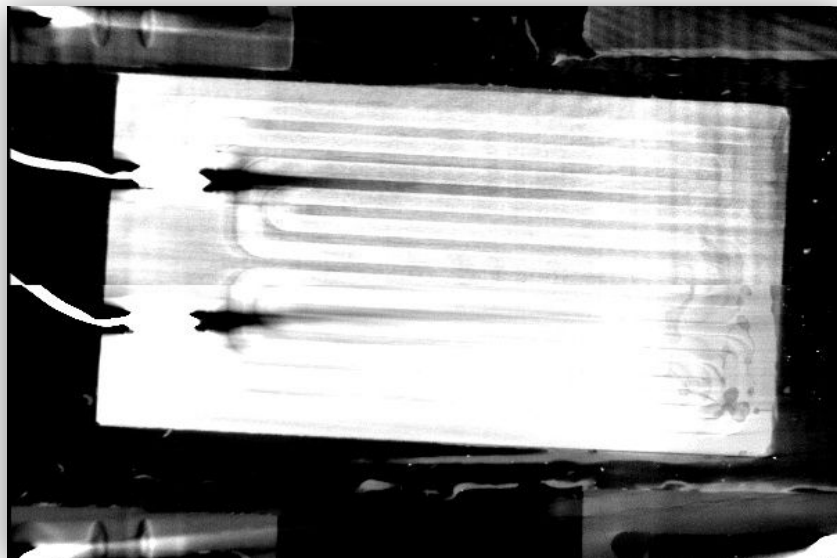
- Isolate all voids using multi-ROIs
- Identify CM location, though will need to translate to actual location

Label	Volume (mm ³)	Center Of Mass X (mm)	Center Of Mass Y (mm)	Center Of Mass Z (mm)
1.9e+03	1.9e+03	3.4e+03	3.6e+03	0.33
1.9e+03	1.9e+03	3.2e+03	3.1e+03	1e+03
1.9e+03	1.9e+03	3.4e+03	7.7e+02	1.5e+03
1.9e+03	1.9e+03	3.3e+03	3.4e+03	1.5e+03
1.9e+03	1.9e+03	3.2e+03	3.1e+03	1.3e+03
1.9e+03	1.9e+03	3.2e+03	1.2e+03	1.3e+03
1.9e+03	1.9e+03	3.2e+03	3.3e+03	8.4e+02
1.9e+03	1.9e+03	3.2e+03	3.2e+03	1.7e+03
1.9e+03	1.9e+03	3.2e+03	1.1e+03	8.3e+02
1.9e+03	1.9e+03	3.4e+03	7.5e+02	7.9e+02
1.9e+03	1.9e+03	3.2e+03	1.1e+03	4.5e+02
1.9e+03	1.9e+03	3.2e+03	3.3e+03	4.3e+02
1.9e+03	1.9e+03	3.2e+03	1e+03	1.5e+03
1.9e+03	1.9e+03	3.2e+03	3.3e+03	1.9e+03

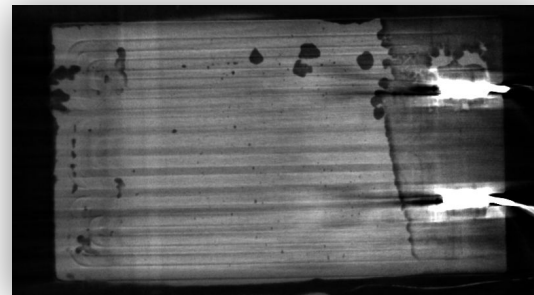




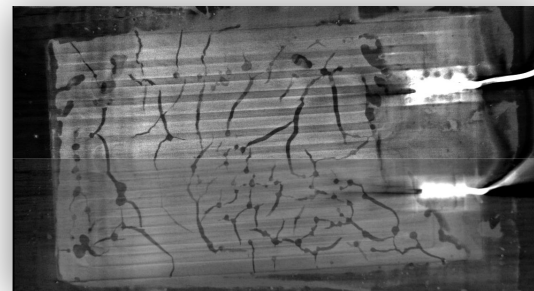
Cracks in Irradiated Samples



1.5 GRad \approx 8 yrs of radiation



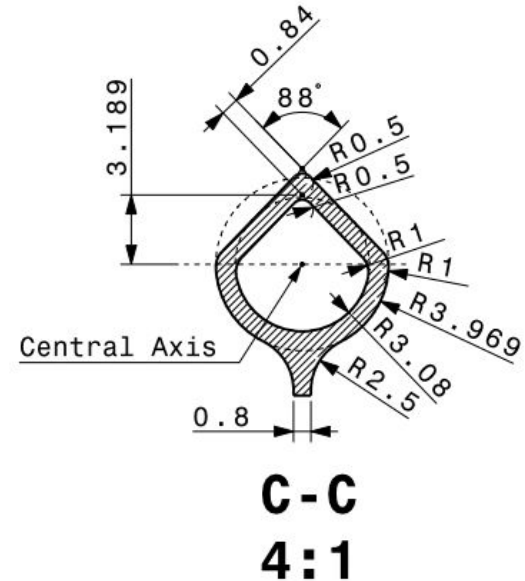
Before



After

Manifold Analysis

- Compare teardrop vs. round-shaped manifolds: small defects along the tube might disrupt airflow
- Below: round, right: teardrop



Manifold Analysis

