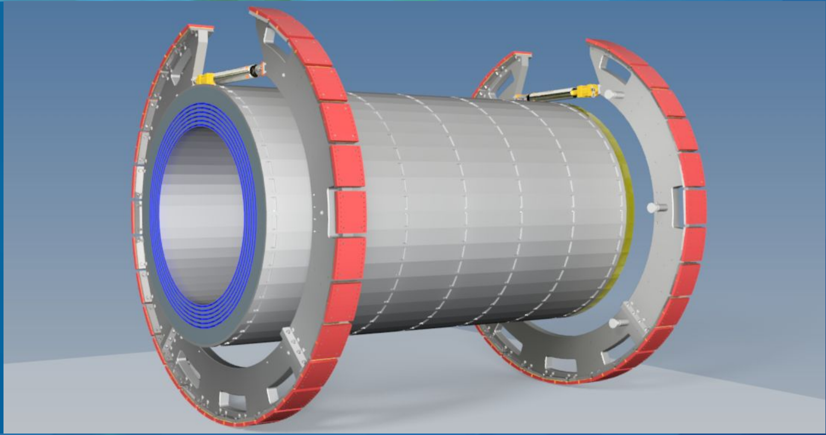
The ePIC Barrel Imaging Calorimeter

Mechanics and Sectors



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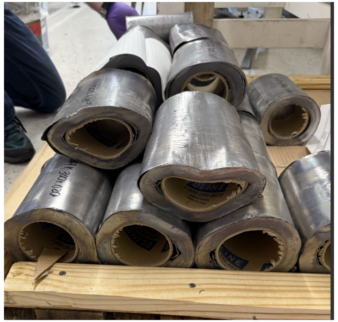
BIC General Meeting
July 25, 2025

Sectors Update

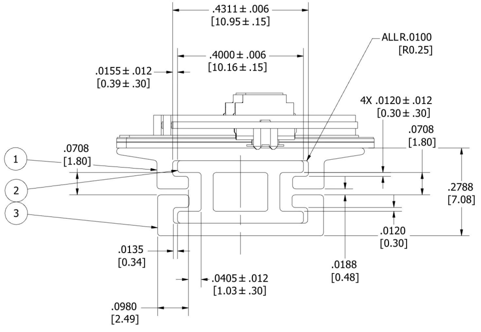
- **Lead/Swaging**
  - We tuned the swager to work reliably with GlueX surplus lead and are using it for first test articles
  - Some irregularities (minor thickness variation pattern) in swaged lead – seems not problematic and likely already present for GlueX
  - Ordered lead from vendor; but arrived 20% too thick, with crushed edges and thickness irregularities. We've returned shipment and are negotiating possible specs
    - Vendor used German supplier in the past for GlueX but not anymore due to costs/tarrifs
    - Most lead manufacturers not capable of making 0.5mm sheets - examining options
    - Enough GlueX lead to keep building test articles for now.

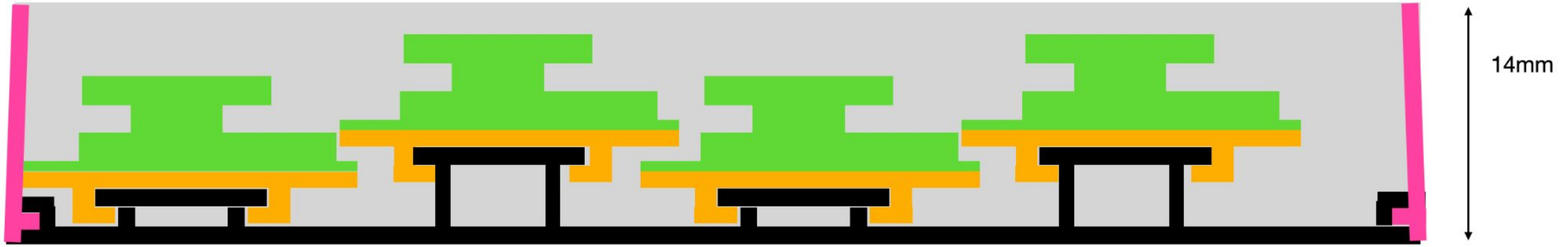


- **SFIL Test Articles**
  - Constructed first 0.5m SFIL test article (SFIL1), came out fairly well but learned some lessons
    - Machining at Argonne using Bridgeport mill
    - Still investigating options for machining longer test articles (onsite vs offsite)
  - Constructed SFIL2 test article, addressed most issues in SFIL1.
    - Investigating minor angle between top and bottom plate
    - Validating CAD drawings of lay-ups versus actual lay-up profiles
  - Next steps: focused on destructive test articles and final debugging of setup; then we will build SFIL3 with GlueX fibers due early August.
- **Looking forward**
  - Preparing production space for long test article construction in fall

Tracker Mechanics and Integration

- **Test Articles**
  - Received 20x 2m test articles (extruded aluminum); tolerances and mechanical fit working well
  - Initial measurements looking good; finalizing micrometer/flatness/squareness measurements
  - Still need to design scalable way to fix modules in place
- **Next Steps**
  - Super-stave design and integration in CF frame in development, expect first drawings by PDR

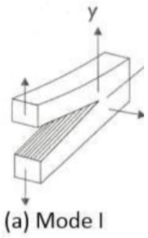


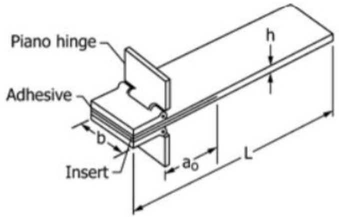


CF Work and Destructive Testing and FEA

- **Destructive Testing (Mode 1 & 2)**
  - We're fabricating flat delamination test articles this week
  - Purdue will cut and prep the samples for mode 1 (peel) and mode 2 (shear) testing.
  - Interfaces under test: lead–CF and lead–SciFi–lead.
  - We've received CFRP sheets from Purdue and selected Kapton/flash tape as separation layers
  - Testing is scheduled for early August in Purdue
  - These results are a required input for our FEA of sectors and full system due for PDR
- **Composite Frame Test Articles**
  - We're prototyping two 0.5 m CFRP drawer designs:
    - A single-piece frame, and
    - A four-piece segmented frame.
  - Purdue is fabricating both designs using aerospace-grade prepreg CF
  - We're developing integration methods of CF frame with the Pb/SciFi matrix
  - We're developing external fixtures for alignment and assessing press force impact (current system operates <15 psi).
  - We aim to deliver at least one physical 0.5 m frame for the PDR. Full-length (3 m) test articles will follow in the fall.
- **Integration**
  - Destructive test results will feed directly into frame selection, layup strategy, and FEA validation.
  - Integration design with the AstroPix tray ongoing

Destructive Testing Drawings





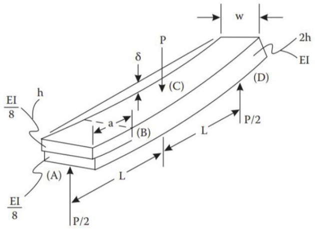
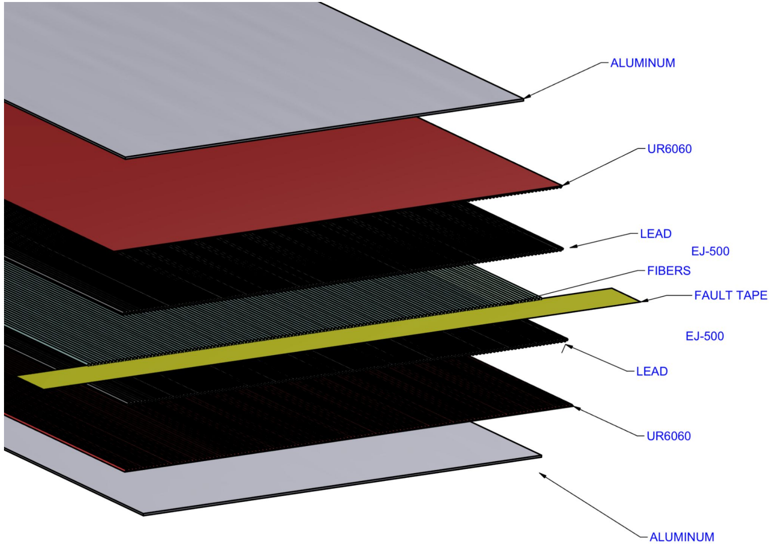
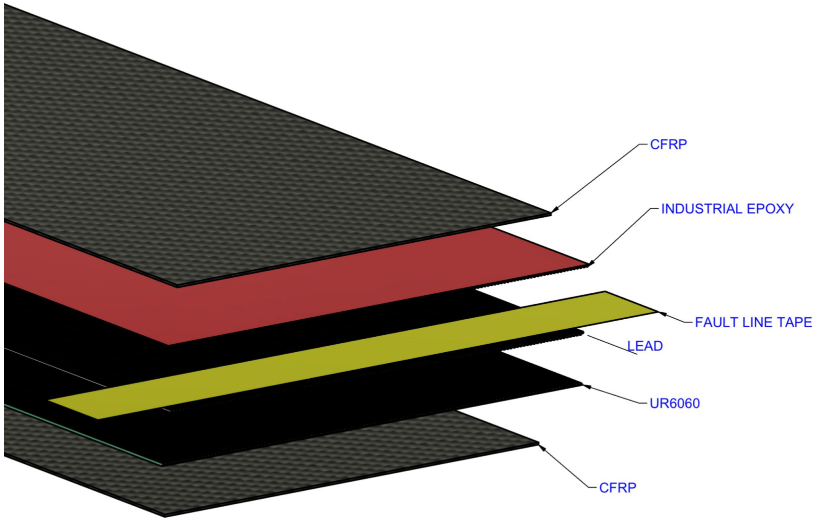


Figure 6: End Notched Flexure Test Specimen





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