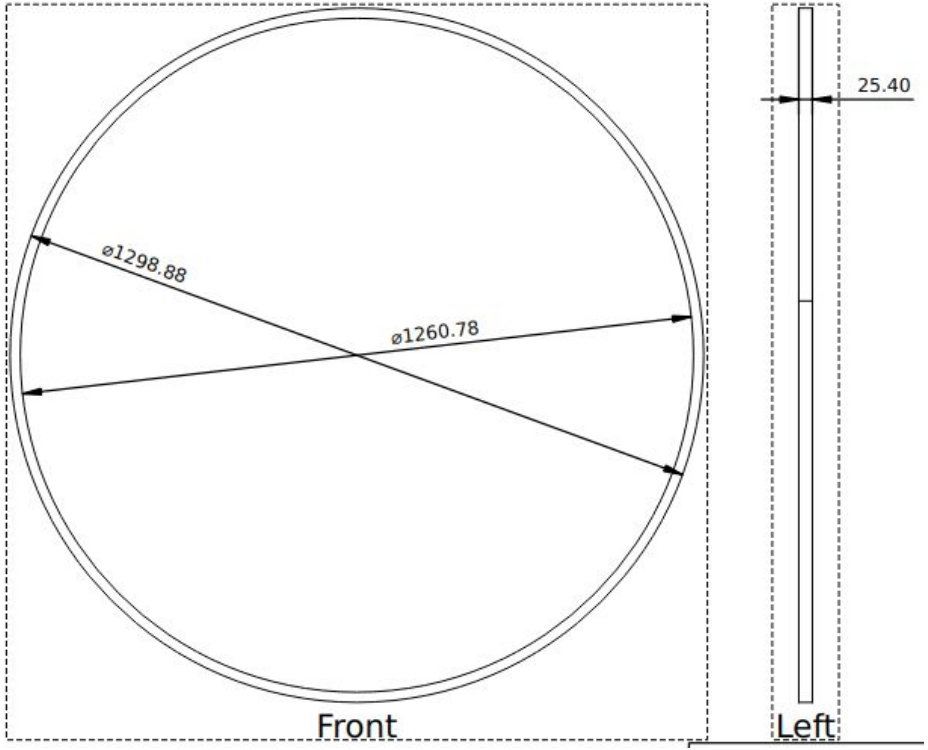
Finalized Design and Finalized Dimension on pfRICH Vessel

Jan 8, 2024

Base Numbering Design



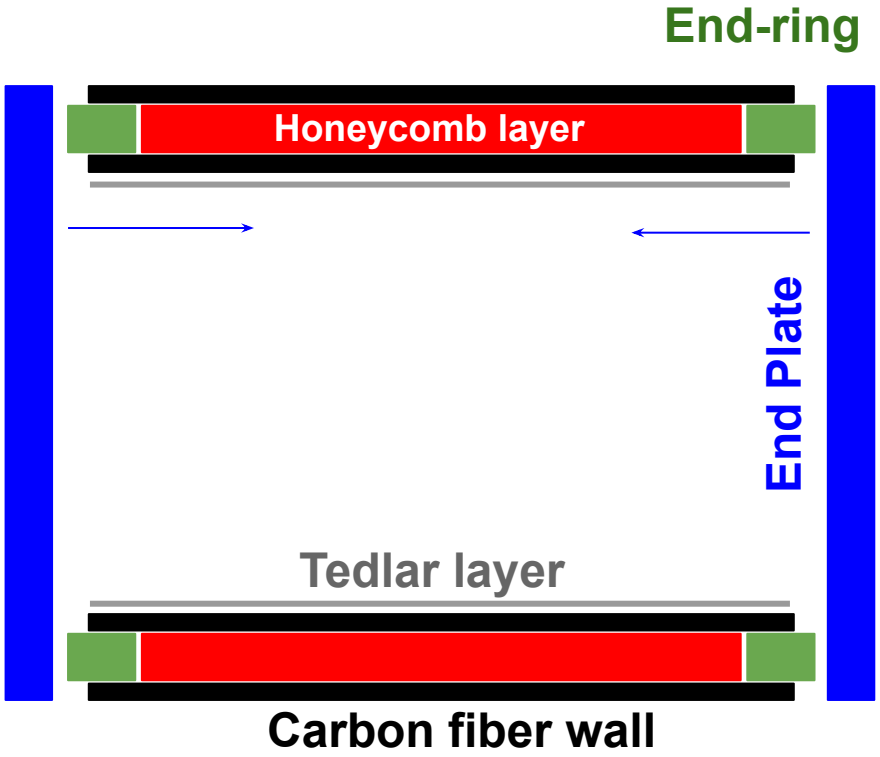
Base parameter:

- Endring Inner diameter: 126.078 cm, 49.637
- Endring thickness: 2.54 cm, 1″
- End-End vessel length: 43.095 cm, 16.967″

Material thickness:

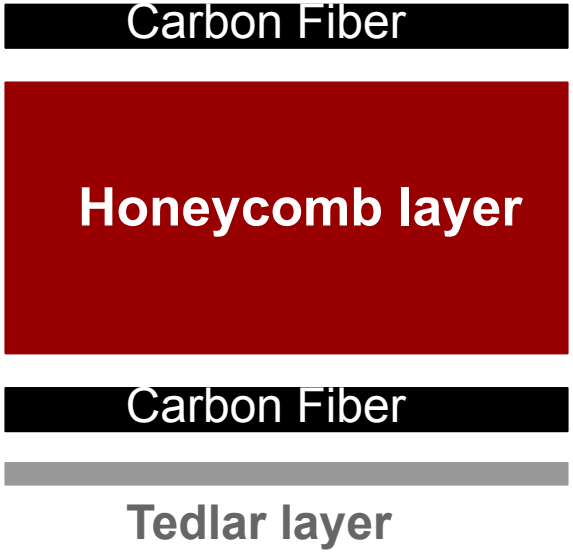
- Carbon Fiber Thickness: 0.5mm
- Honeycomb thickness: 1.905 cm, 0.75″

Vessel Length Consideration



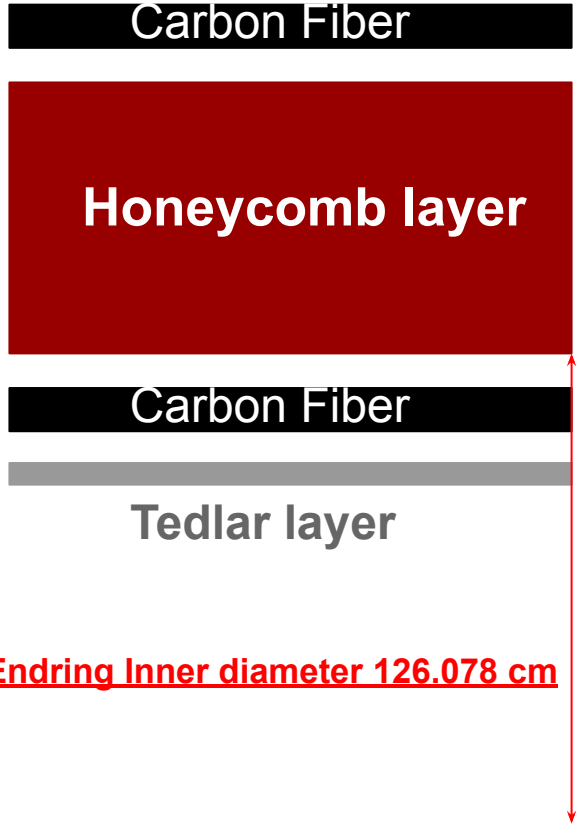
- **End-End vessel length: 43.095 cm, 16.967″**
- **Vessel need to be shorter than the overall end-end vessel length**
  - **End plate** must not touch the **vessel wall** during the installation process
- 1 mm offset is needed from both end
  - “Flushly” aligned is not possible due to variety of factors
- Vessel length: 42.895 cm, 16.888″

The Mandrel Conceptual Design Considerations



- **Endring thickness:** 0.75″
  - To clear the end-plate ring bolt holes and o-ring grooves
  - **Solution: increase the honeycomb thickness to 0.75″**
- **Gas Seal:**
  - Slight positive pressure
  - **Solution: carbon fiber seam will be sealed by narrow carbon fiber strips and epoxy**
- **Light seal:**
  - Carbon fiber is not light tight at all
  - **Solution: Introducing a Tedlar light seal layer**
- **Outer shell integrity**
  - TPC (0.25mm) walled was dented and scratch during installation
  - **Solution: TPC wall thickness to 0.5mm**

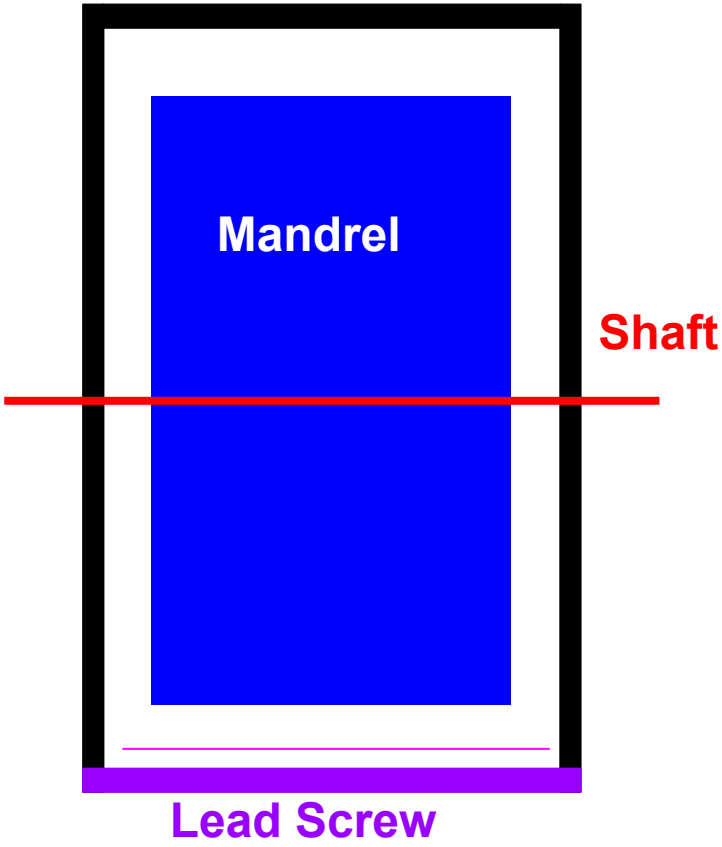
The Finalized Mandrel Conceptual Design



- **Outer Carbon Fiber:** 155.8874″ x 16.8878″ x 0.5 mm
- **Honeycomb:** 158.2955″ x 14.9665″ x 0.75″
- **Inner Carbon Fiber:** 160.7135″ x 16.8878″ x 0.5 mm
- Tedlar

Calculation sheet:
https://docs.google.com/spreadsheets/d/1sPBi0fOEgi1lucfDykpt7AqS0SJ7Og-EQ1LunGMxEH0/edit?usp=sharing

The Finalized Mandrel Table Design



- **Shaft:** 48″
- **Lead Screw:** 36″
- **Mandrel table dimension: 5 x 3 feet**
- **Magnet strip: 32″**

Summary Table for all parts

	Dimension (L x W x T)	Quantity	Lead Time
Inner Carbon Fiber Sheets	77.9437″ x 16.8878″ x 0.5 mm	2 pieces	10 Weeks
Outer Carbon Fiber Sheets	80.3567″ x 16.8878″ x 0.5 mm	2 pieces	10 Weeks
HoneyComb	158.2955″ x 14.9665″ x 0.75 (uncut)	1 large sheet 8 x 4 feet	10 Weeks
Machinable Foam	8 feet x 4 feet x 3 inch (uncuts)	$5k minimum order	4 weeks
Magnet strip	32″	1	3 Weeks
SS Shaft	48″	1	1 Week
Lead Screw Stage	36″	1	2 Week
Tedlar	77.9437″ x 16.8878″	From JLab	1 Week

Full Detail:
https://docs.google.com/spreadsheets/d/1T0OGeNm6lanWSYRFsQ-ePm4RoynQz437qJQ3CJ5E4MY/edit?usp=sharing

Upcoming test and questions to address

- **How do we attach the Tedlar layer to the inner carbon fiber?**
  - Carbon fiber with adhesive pre-attached
  - Test will be conducted
- **Is 0.5 mm Carbon fiber too rigid for form the cylinder?**
  - Test will be conducted
- **Do we need (have time) the suction system?**

Mirror Purchasing List

Item	Quantity	Specification
Chiller	1	15L capacity, Low flow, 1100 W cooling power, https://www.teyuchiller.com/water-chiller-units-cwfl-1500-with-environmental-refrigerant-for-fiber-lasers_p16.html
UVE-Reflector	4	#PF05-03-F01, 0.5inch
Control Sample	14	#PF05-03, blanks, for samples per mirror