**Pressure Vessel for EIC RICH Meeting Minutes**

**Date**: September 29th 2022 by Zoom meeting

**Attendees:** Paul Orfin, Cody Taylor, Elke Aschenauer, Silvia DallaTorre, Roberto Preghenella, Marco Contalbrigo, Pietro Antonioli

Review of dRICH requirements

1. Cody shared an updated analysis presentation reviewing the results of a pressure vessel concept using “orange slice” geometry
   1. Internal rib sections reduce the overall deflection significantly, but stresses remain high due to flat endcap designs implemented to maximize available space within the vessel
      1. Analysis needs to be updated to reflect actual design with regards to the beam tube passing through the vessel with an air gap (~3cm). Won’t impact results significantly.
   2. Different materials were presented (304 SST, Al 6061-T6, Ti Grade 5 & 12)
      1. Titanium is better functionally, but cost is a major factor to consider
      2. Aluminum is the lightest/cheapest option, but the material thickness may impact intended operation. Need to simulate impact of material thickness.
      3. Discussion led to the consideration of composite materials. Benefits include enhanced stiffness/weight ratios and reduced use of material budget
   3. Slides were shared of a design using carbon fiber/honeycomb structures
      1. Carbon fiber used is DuPont Nomex 410
      2. Similar design for composite structure by J-Lab was 100,000 euro
   4. Elke pointed out that we can control the temperature of the gas to stabilize mirrors.
2. Detector Sensors
   1. Elke pointed out that we can control the temperature of the gas to stabilize mirrors.
   2. Routine maintenance will be required
3. Vessel structure
   1. What standard are we using (ASME, PED, etc…)?
   2. Consider construction of entire vessel by adding one completed slice at a time.
   3. Need to begin looking at frame support and self-weight effects.
4. Next meeting will be scheduled approximately 1 month (11/1).

Action Items:

1. Physics (Silvia, Elke) will provide more design/operational requirements
2. BNL Cryogenic engineering (Cody, Paul) will model and analyze pressure vessel with gravity included.
3. BNL to review other design variations will be investigated (honeycomb, rib geometry, modular design).
4. Investigation of a composite pressure vessel design by BNL and Marco to further design options
   1. Investigate collaboration on composites from work Marco already started.
5. BNL to schedule separate meetings to discuss support structure with Rahul
6. Fabrication methods of the vessel and slices to be determined based on results of action above at a separate meeting.

Reference:

[DRICH - ATHENA collaboration (bnl.gov)](https://wiki.bnl.gov/athena/index.php/DRICH)