

Update on Acrylic Vessel

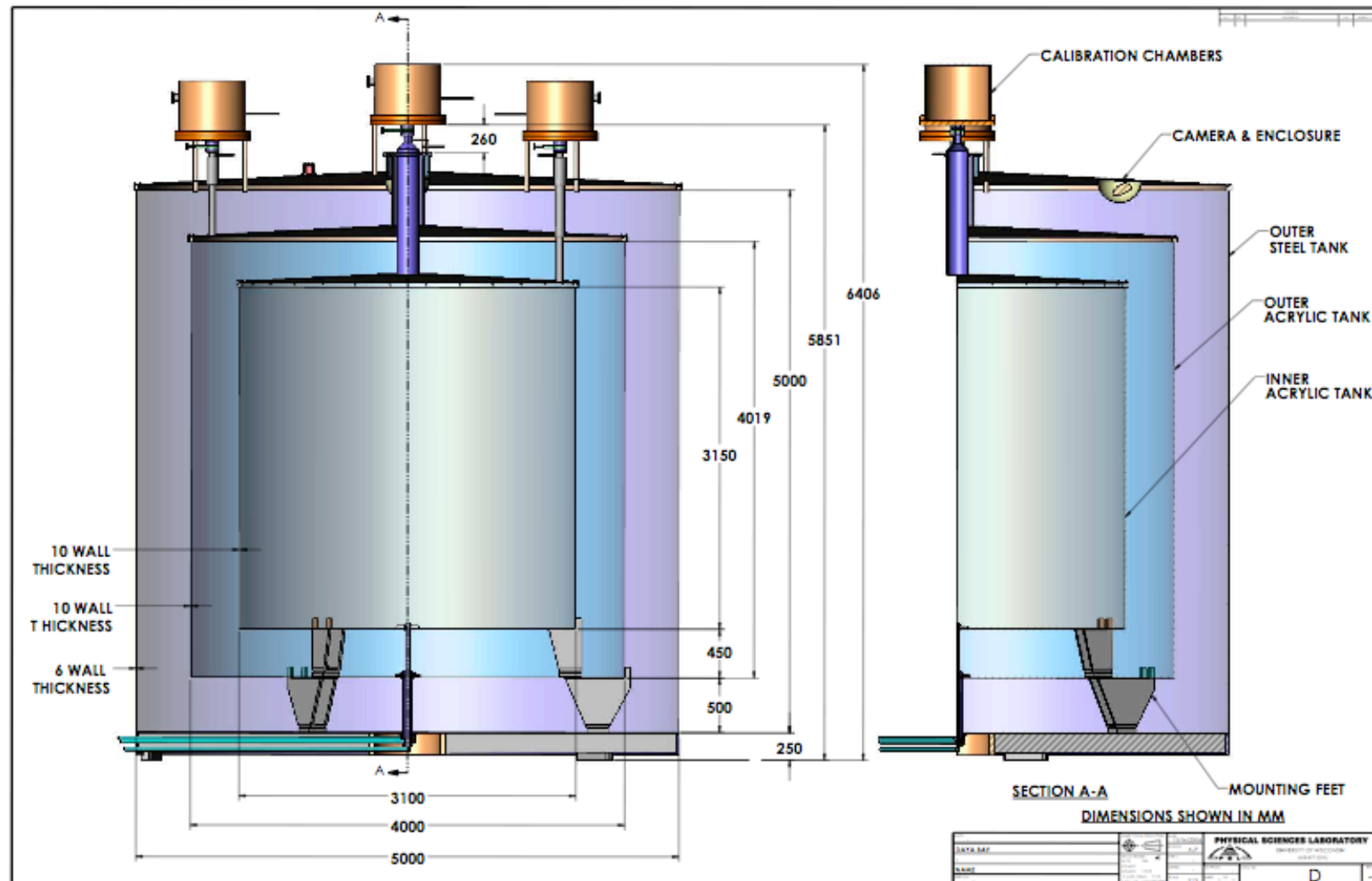
Yee Bob Hsiung
National Taiwan University

January 13, 2007
DayaBay Meeting@ HKU

Progress

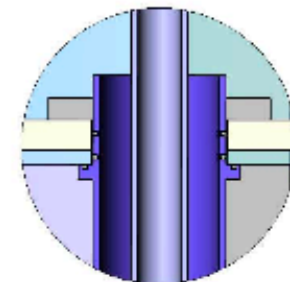
- Conceptual Nov06 AD design has been shown to Nakano to discuss Pro and Cons on various design options.
- The major difficulties will be the bottom concentric fill/drain pipes with 90-degree turns.
- The bottom stand/leg design should distribute the empty weight evenly (cross bar type design is preferred).
- A mockup 1/10th or 1/5th scaled prototype would be highly desirable.
- Crude estimate for construction schedule would be 3 months for a pair AD (6 months to build all 8 in once).

Nov06 AD design

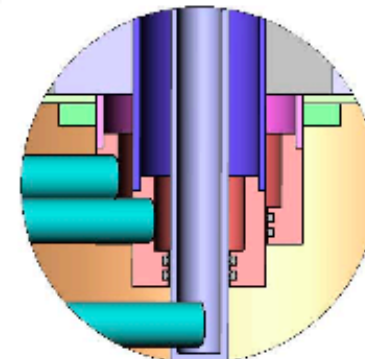


Fill/Drain Tubes

DETAIL B



DETAIL C



DETAIL D

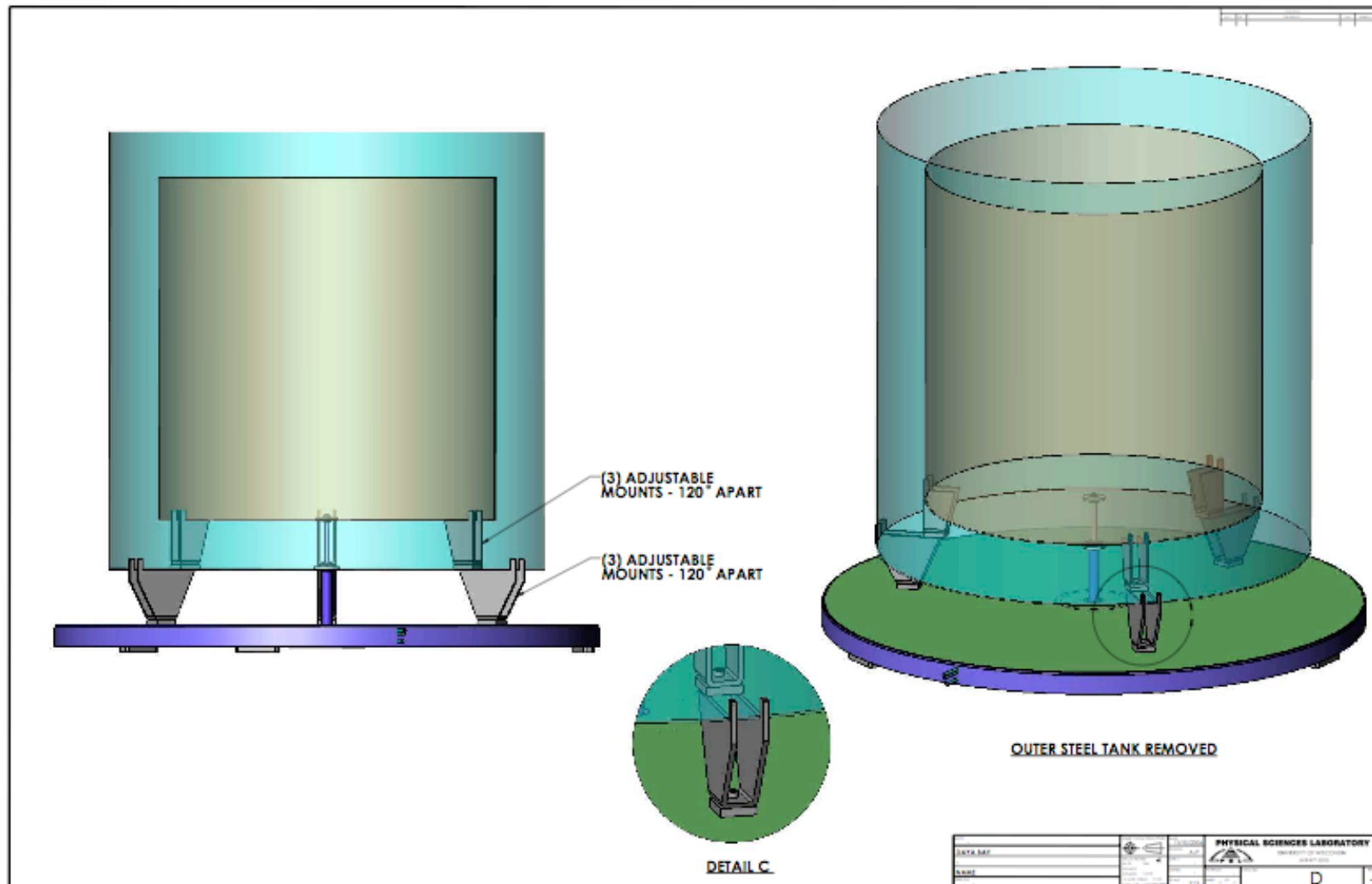
Diagram illustrating the cross-section of a wellhead assembly, showing dimensions and components:

- Dimensions: 110 ID, 60 ID, 79, 50, 149, 29 ID, 80 ID.
- Components: (3) 25 ID FILL TUBES, O-RINGS.
- Area: FILL TUBE AREA.

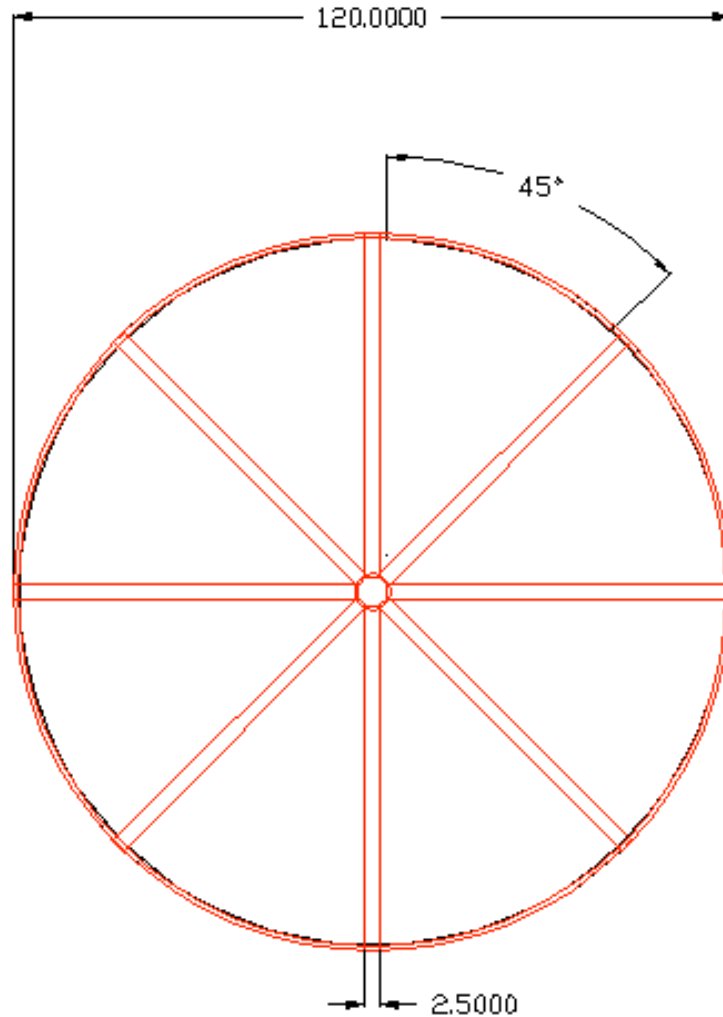
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If we choose this design, serious R&D prototyping should be done!

Cross Bar is preferred over Stand/Leg design!

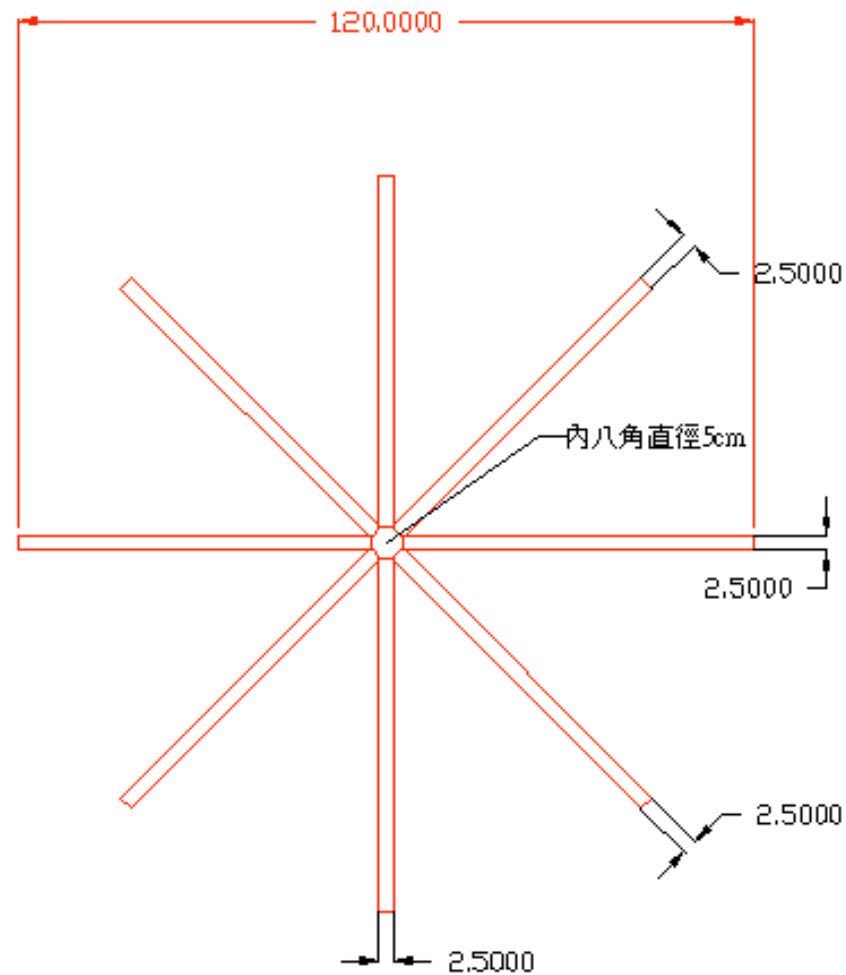


Cross Bar design for 1m prototype



俯視圖

How to center or position the vessel?



俯視圖(2)

Center Cone @ bottom for positioning?

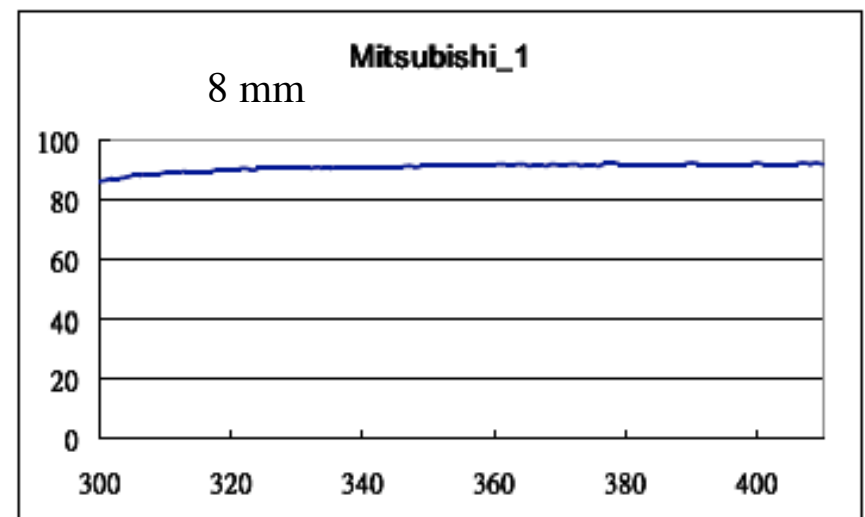
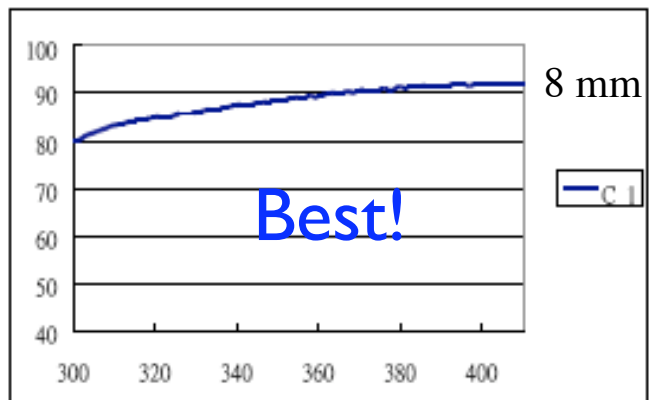
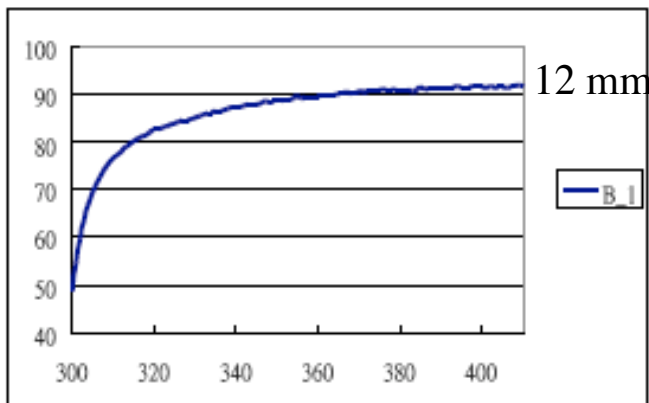
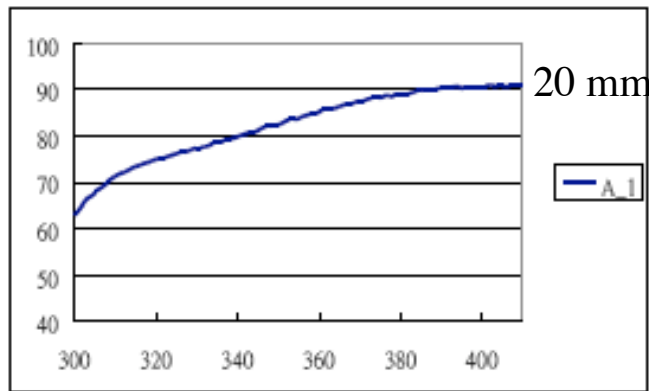
Progress - cont.

- 3 acrylic samples from local Taiwan suppliers have been tested of their light transmission rate. All meet our light transmission criteria ($>50\%$ @ 300nm and $>92\%$ @400nm and above). One supplier can even meet the UVT quality.
- Aberdeen Tunnel 1 meter prototype is in progress. Design has been given to Nakano with initial cost estimate. Contract has not gone out the door yet, maybe by end of January.

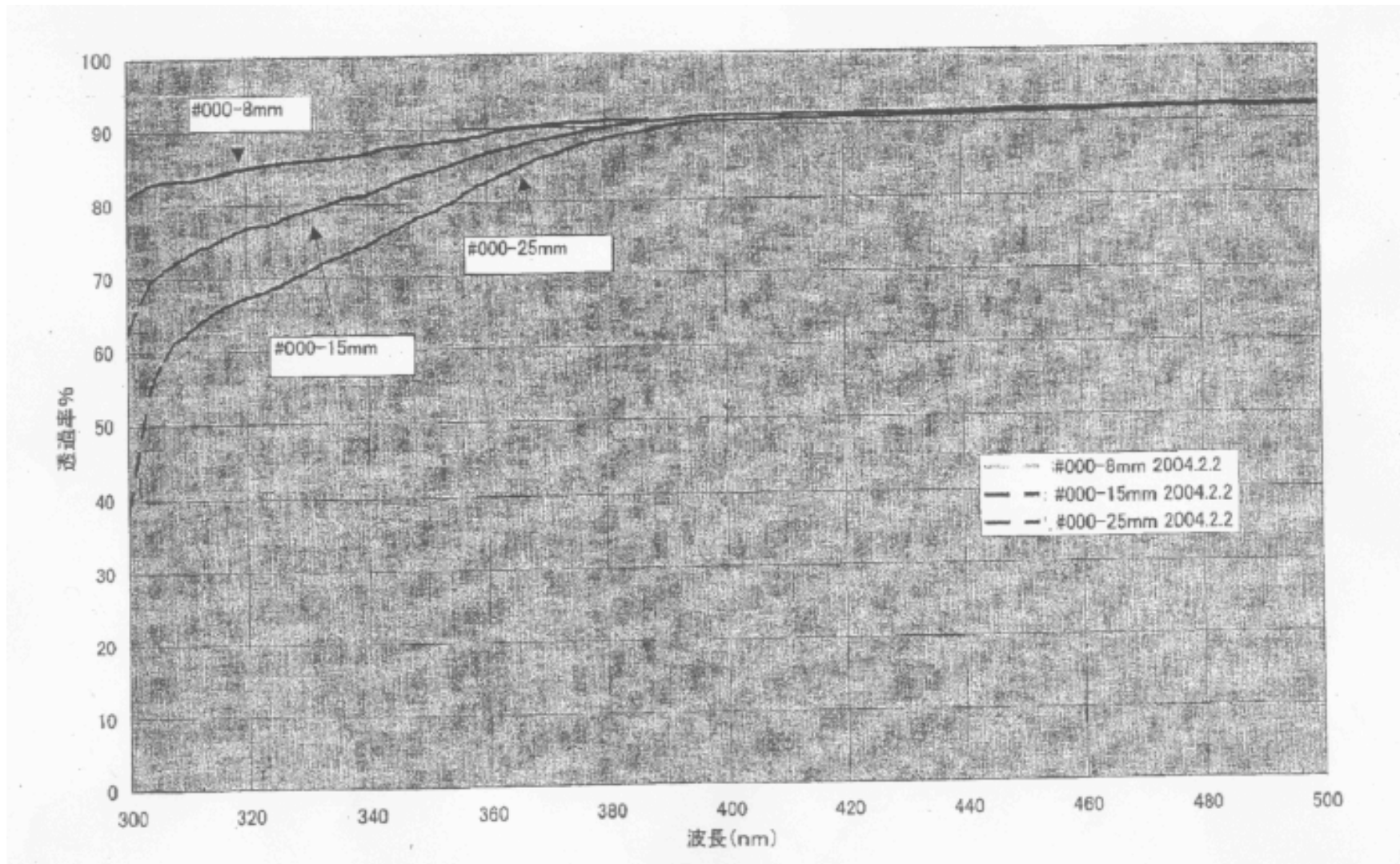
Light Transmission measurement of regular acrylic amples from 3 local vendors used by Nakano

All pass our requirement!

Mitsubishi Rayon's UV transparent acrylic sample



UVT acrylic sheet from Mitsubishi Rayon Co. light transmission rate



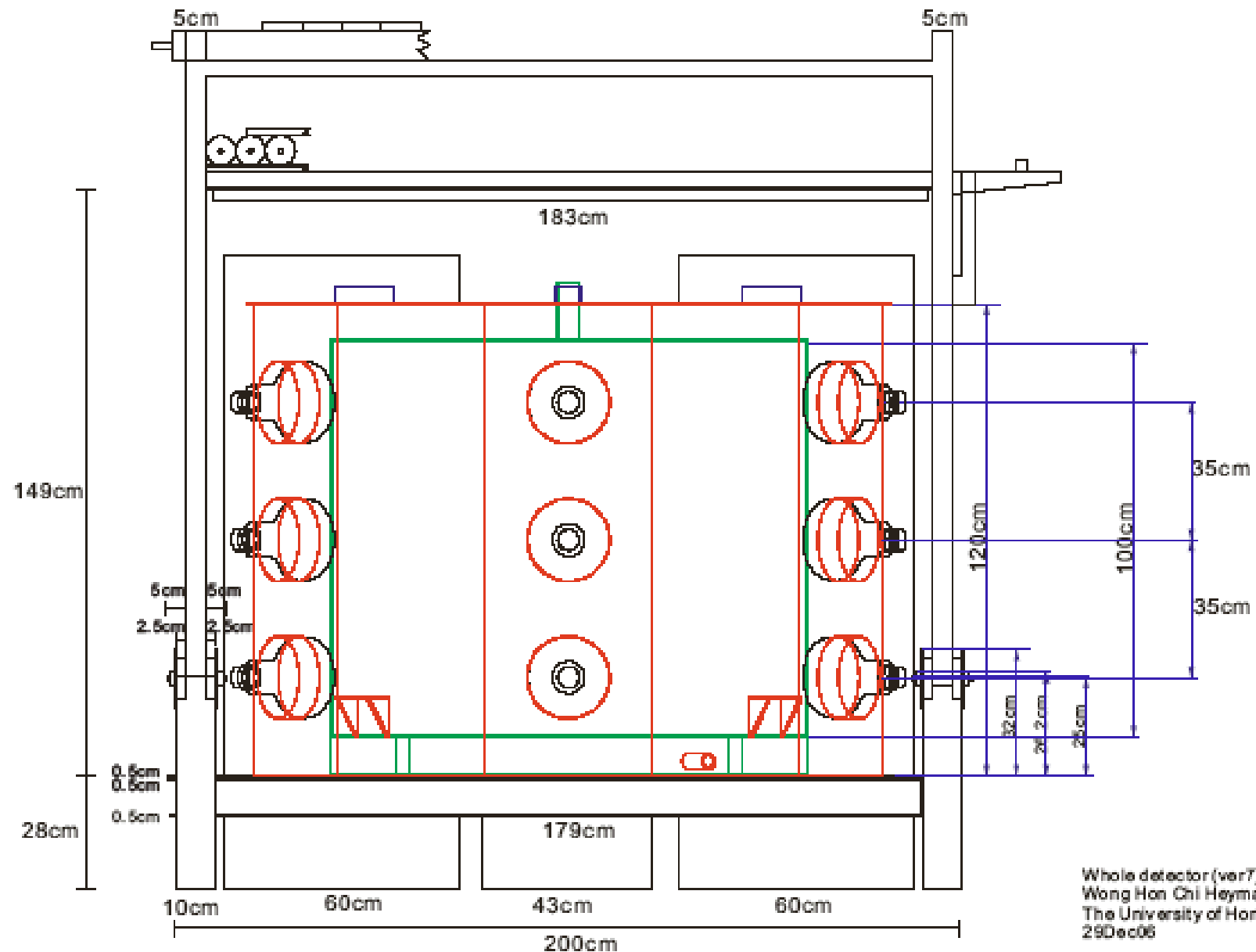
Open issues

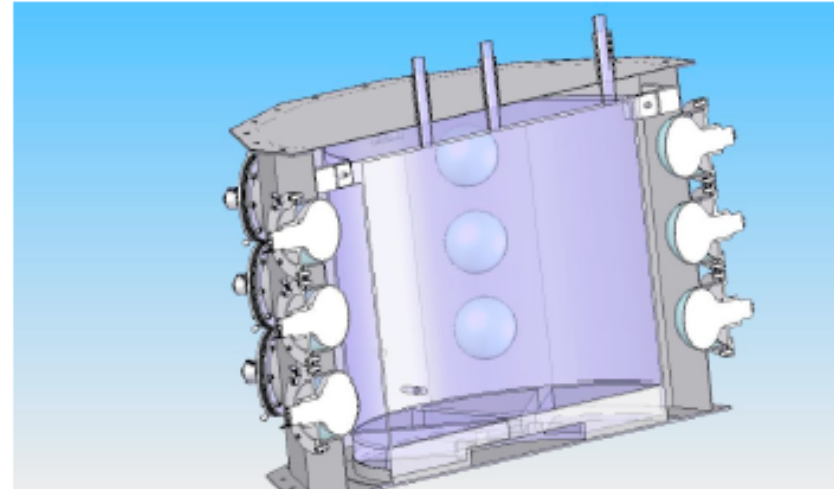
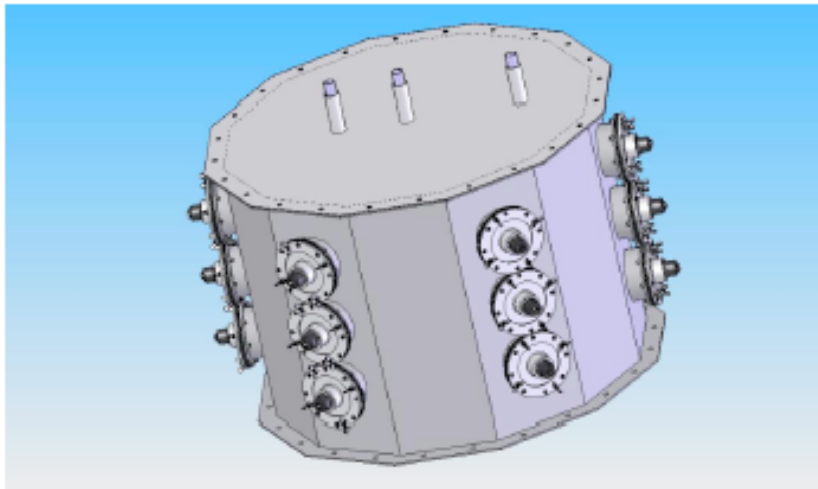
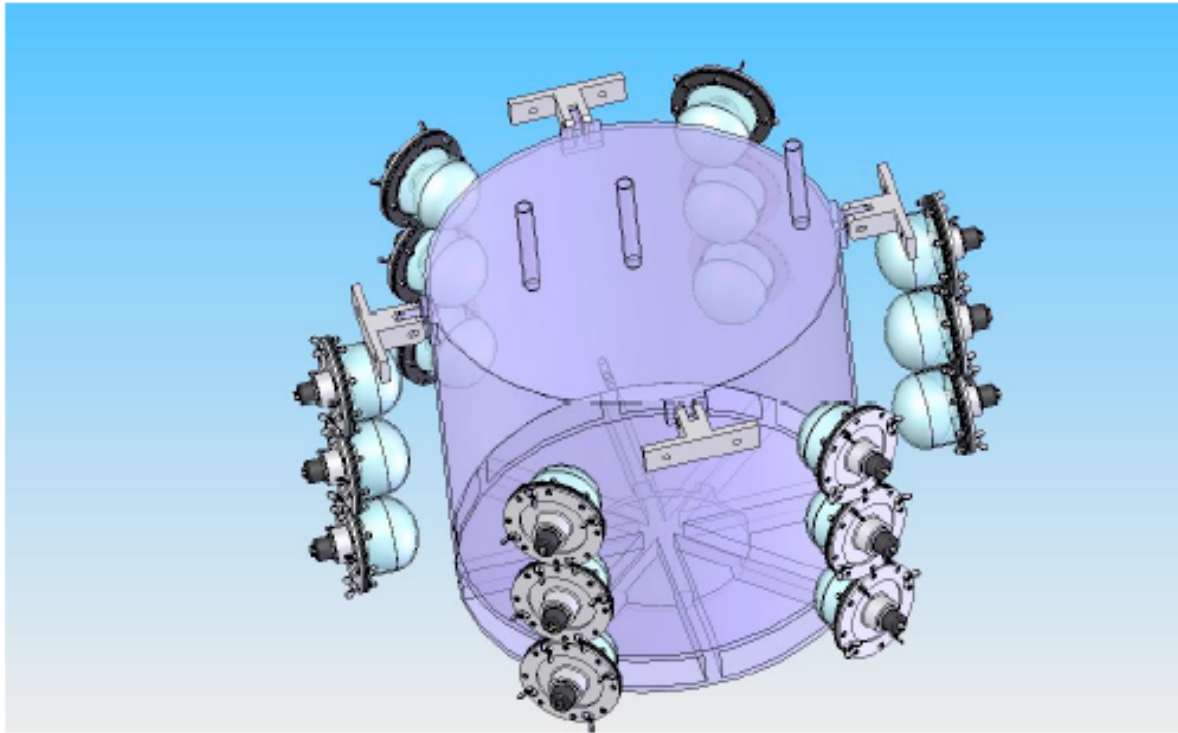
- scaled mockup prototype?
- Fill/Drain pipes at bottom or top?
- bottom stand/leg/cross bar design with center alignment method?
- how to fix target vessel in position relative to gamma catcher vessel? (not just bottom)
- cleanliness requirement?
- chimney penetration, interface to calibration port and overflow design?

R&Ds

- Aberdeen tunnel one meter prototype (no fill/drain tubes, 3 chimney tubes @top)
- mockup of top lid and chimney penetrations
- mock up of stand/leg/cross bar and positioning method
- light transmission test on glue section, sample pieces from each vessel
- long term compatibility test with LS

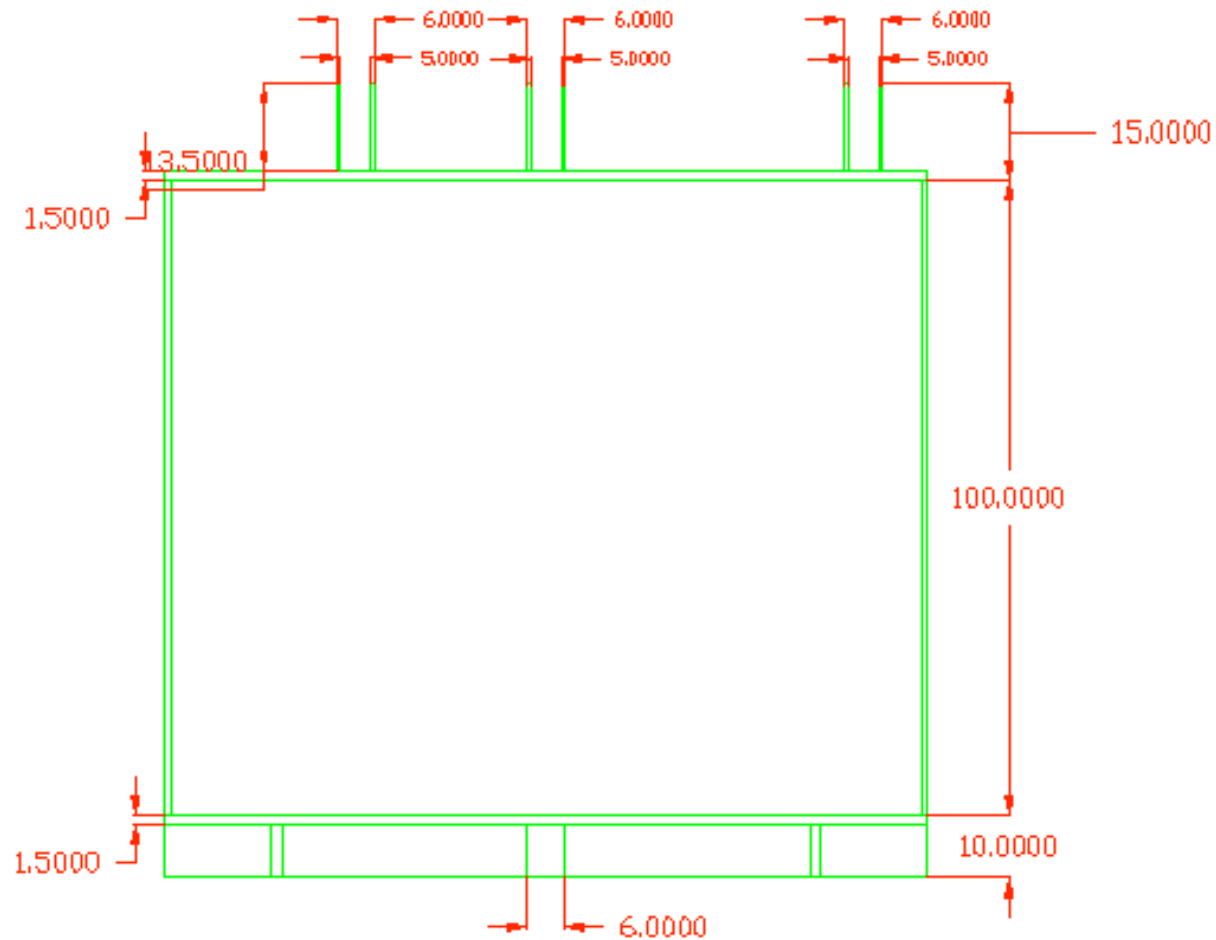
Aberdeen 1 m prototype design by Heymans Wong (HKU)





3D drawings provided by Prof. Chang (NUU) and PMT window design

Drawings provided by Nakano for 1 m prototype



Plan and schedule

- R&D and prototyping till 9/2007 including mockup 1/10th or 1/5th scaled complete vessel.
- Order 1st pair of acrylic AD vessels by 9/2007 assuming funding secured from both NTU and NSC, and engineering design finalized.
- Finish fabrication of 1st pair and begin vessel checkup and shipping preparation by 1/2008.
- Deliver 1st pair by 3/2008 to DayaBay site for AD assembly and calibration etc.