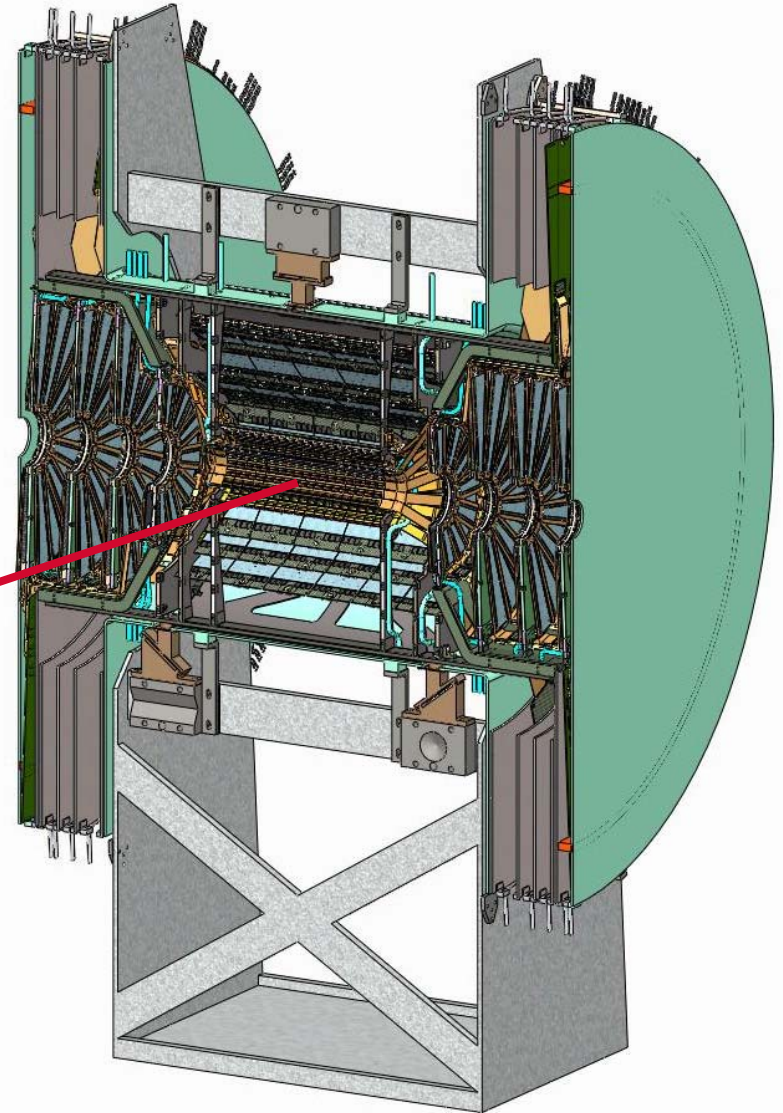
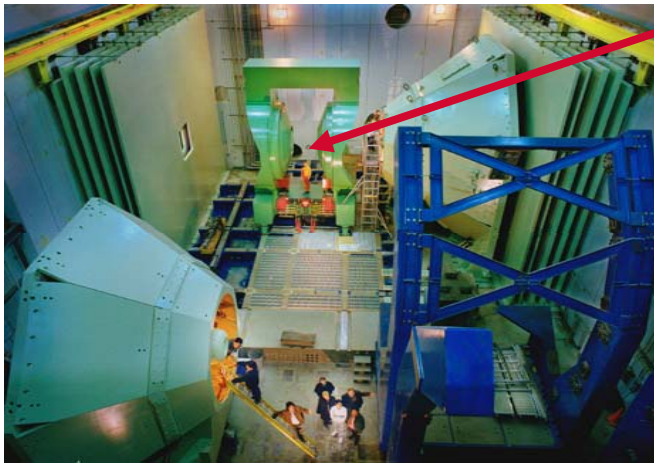


# WBS 1.8.1 Mechanical Integration

1

- Personnel:

- Walt Sondheim:  
Mechanical Project Engineer
- Don Lynch:  
PHENIX Chief Engineer
- Robert Pak:  
Integration Manager



# Outline

- Mechanical Integration:
  - VTX/FVTX assembly plan under development
  - Beam pipe procurement in progress
  - Detector support started in FY09
  - Power & water in IR progress off project
  - External cooling system to start in FY10
  - Infrastructure for dry N<sub>2</sub> system completed
- Safety:
  - 1<sup>st</sup> ESRC meeting for VTX/FVTX held on June 11<sup>th</sup>

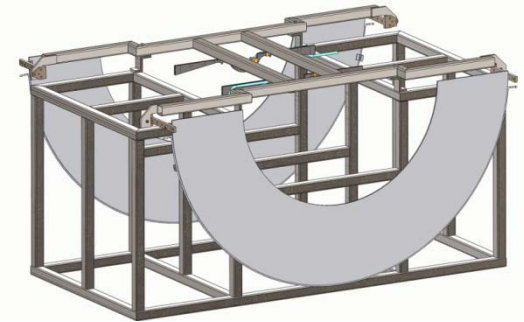
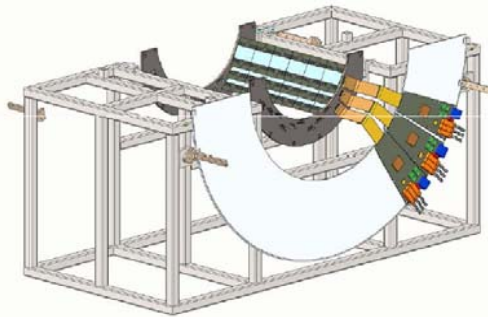
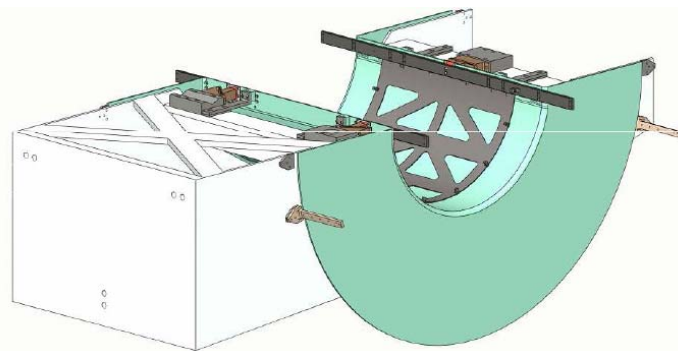
# VTX assembly procedure overview

3

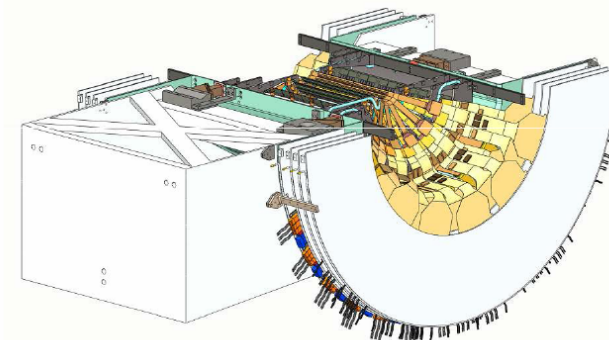
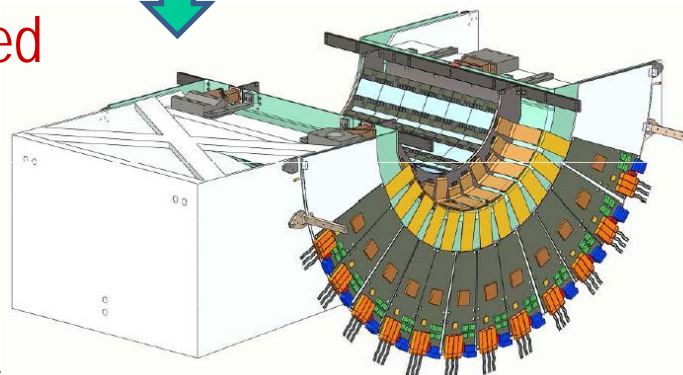
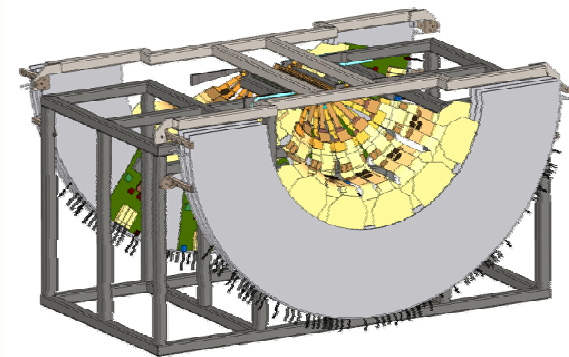
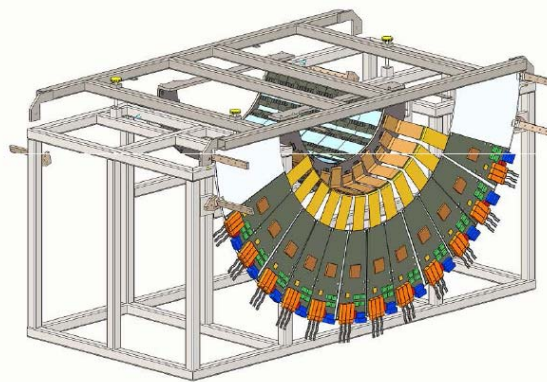
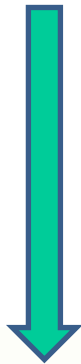
Main assembly

VTX L3/L4 assembly

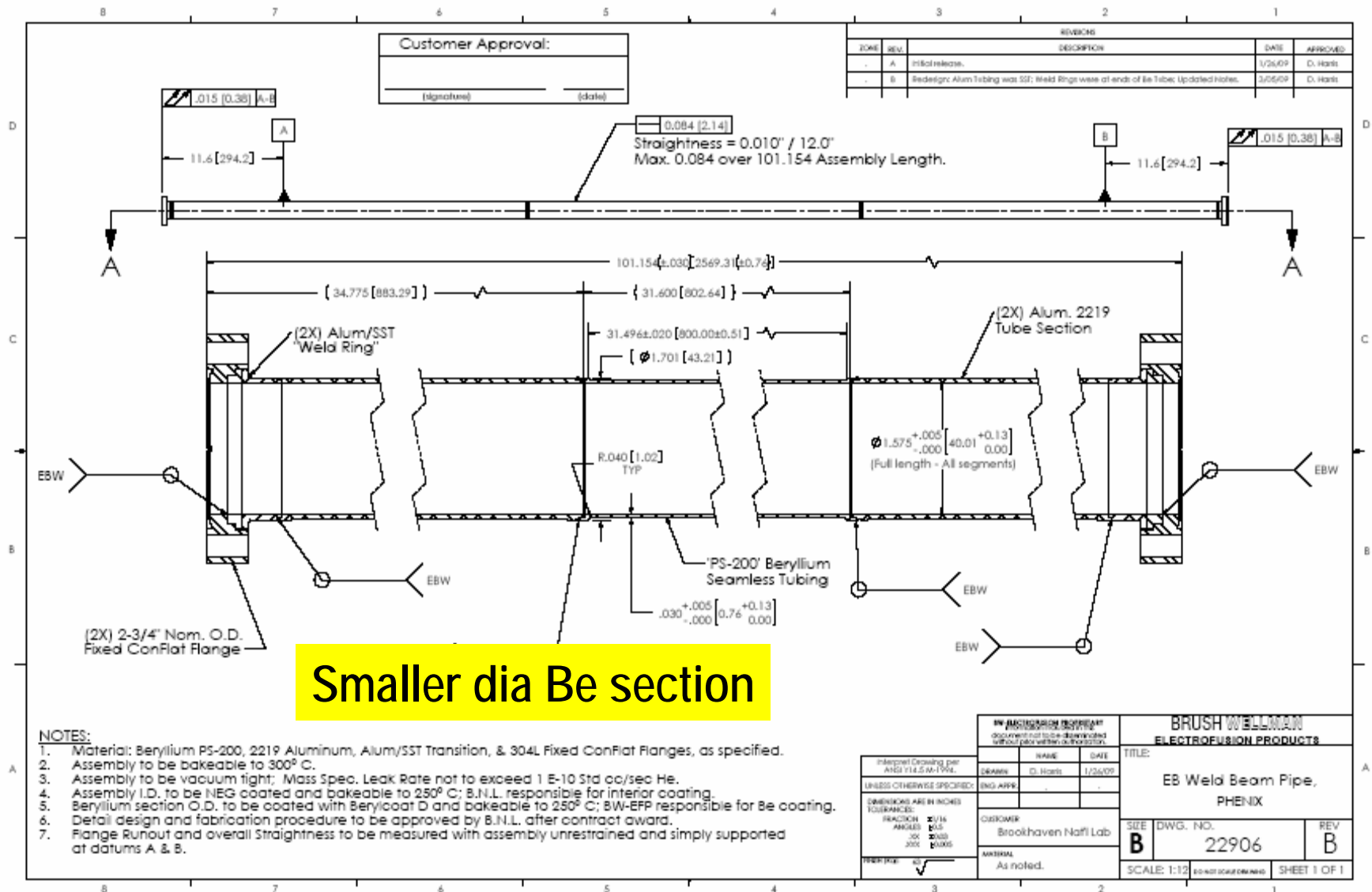
VTX L1/L2 assembly



FTVX to  
be added

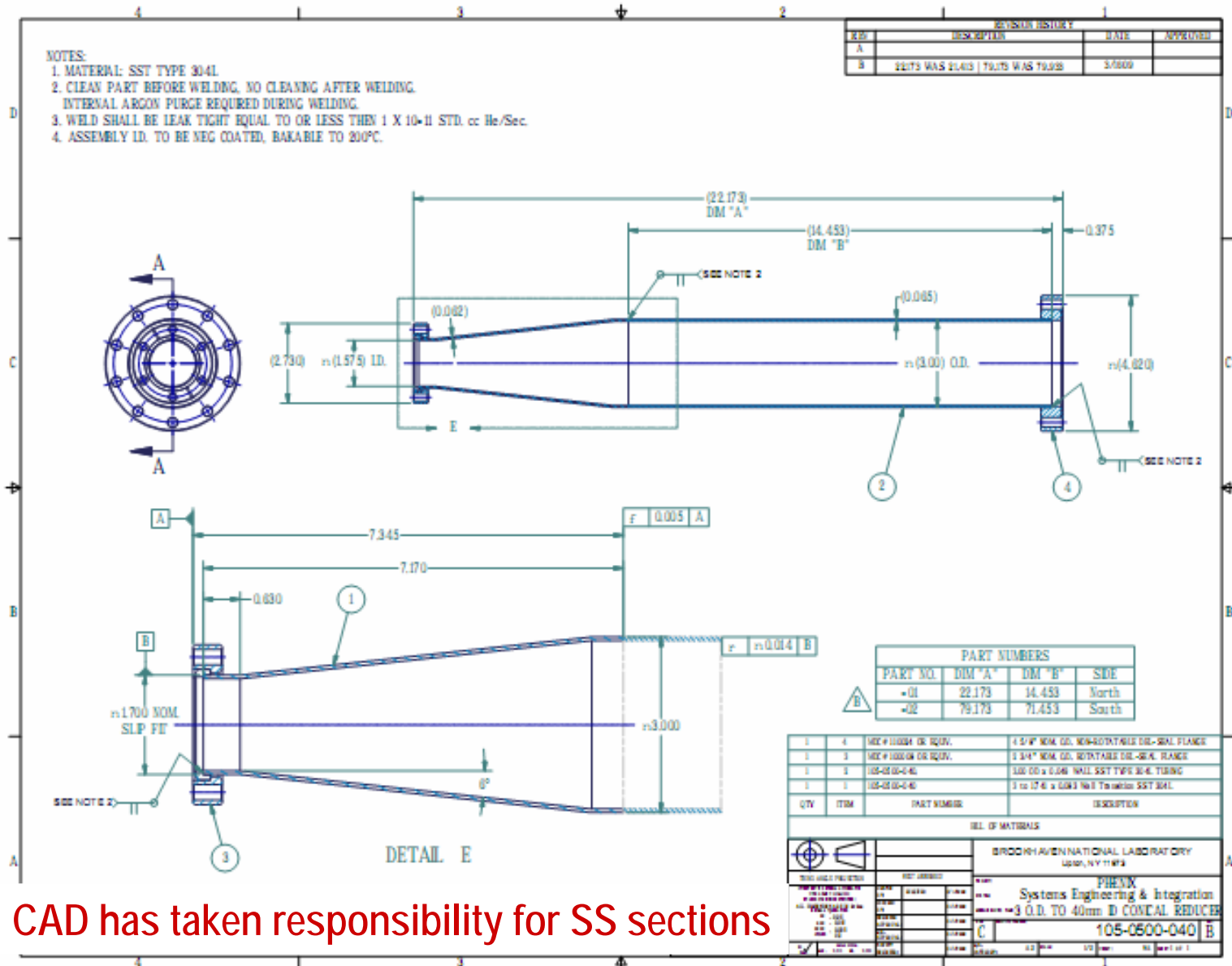


# Be beam pipe final CAP from Brush Wellman 4





# Additional stainless transitions and spools 5

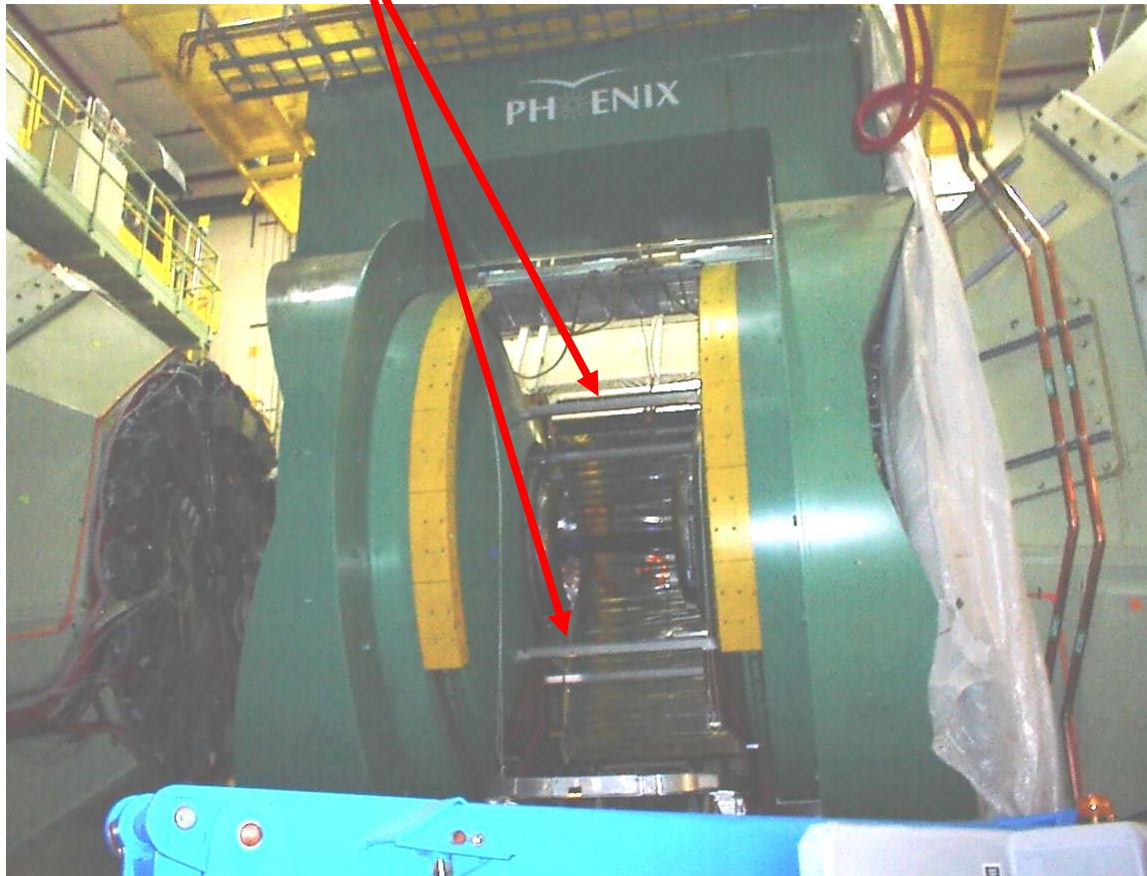


CAD has taken responsibility for SS sections

# Be beam pipe Schedule

- VTX, FVTX, PHENIX Management & CAD signed-off
- Current ETA from Brush Wellman:
  - 6 mos. to gun-drill Be tube (by mid-Nov. 2009)
  - Final assembly and QA (by end of Dec. 2009)
- Deliver to BNL and reship to Europe for NEG coating
  - CERN to handle Be section
  - SAES Getters does all the rest
- Install prior to RHIC Run-11 (summer 2010)

# External support installed

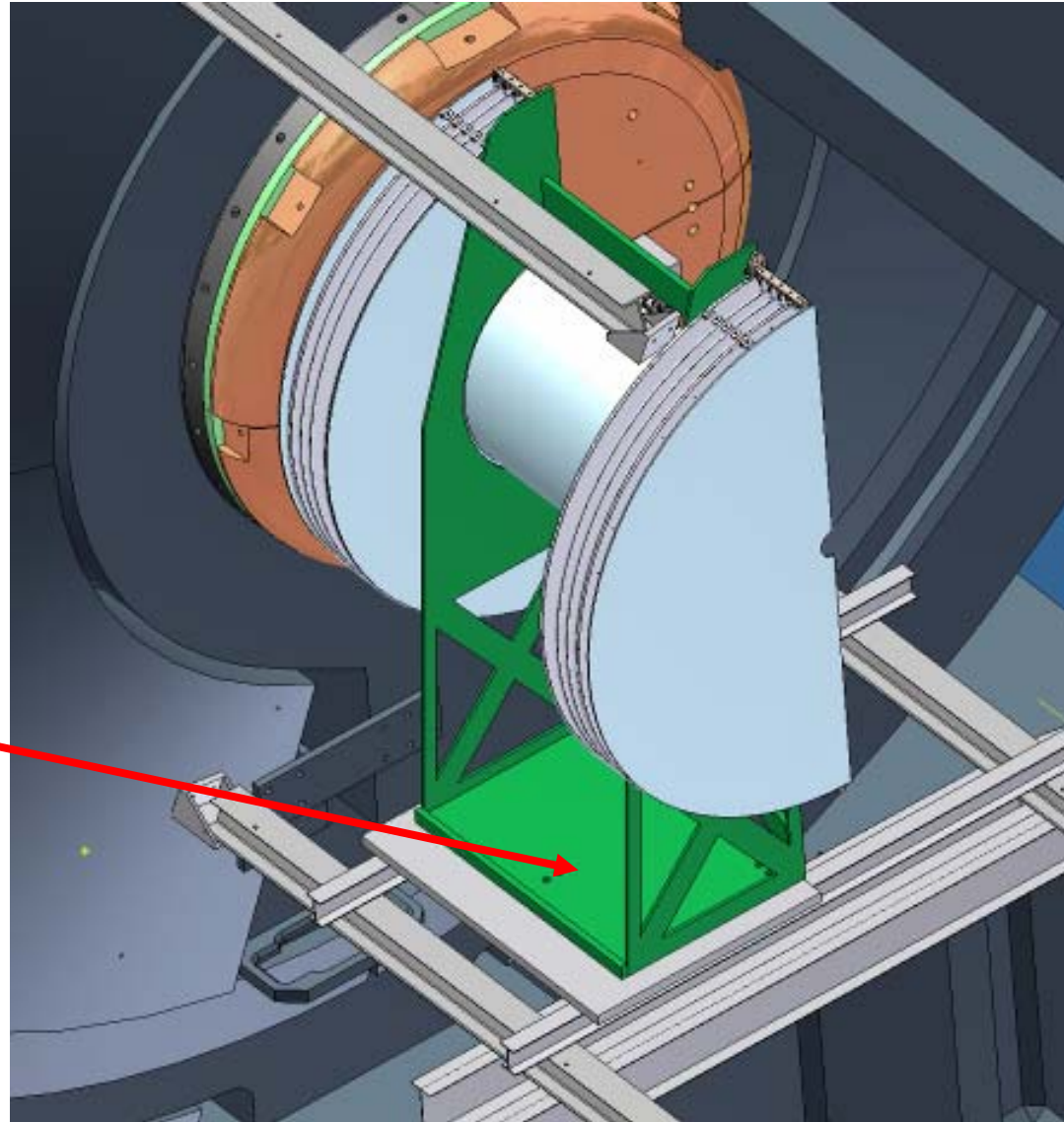


Electrically isolated from central magnet pole tips  
Measurement of magnet vibrations proved negligible



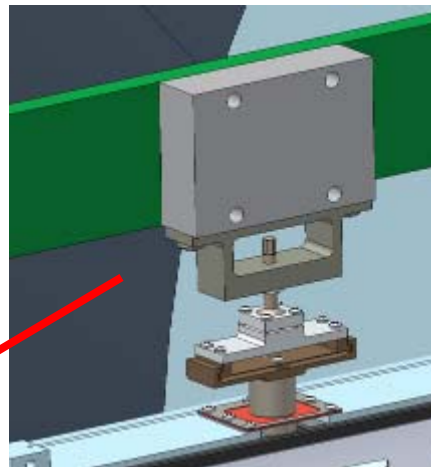
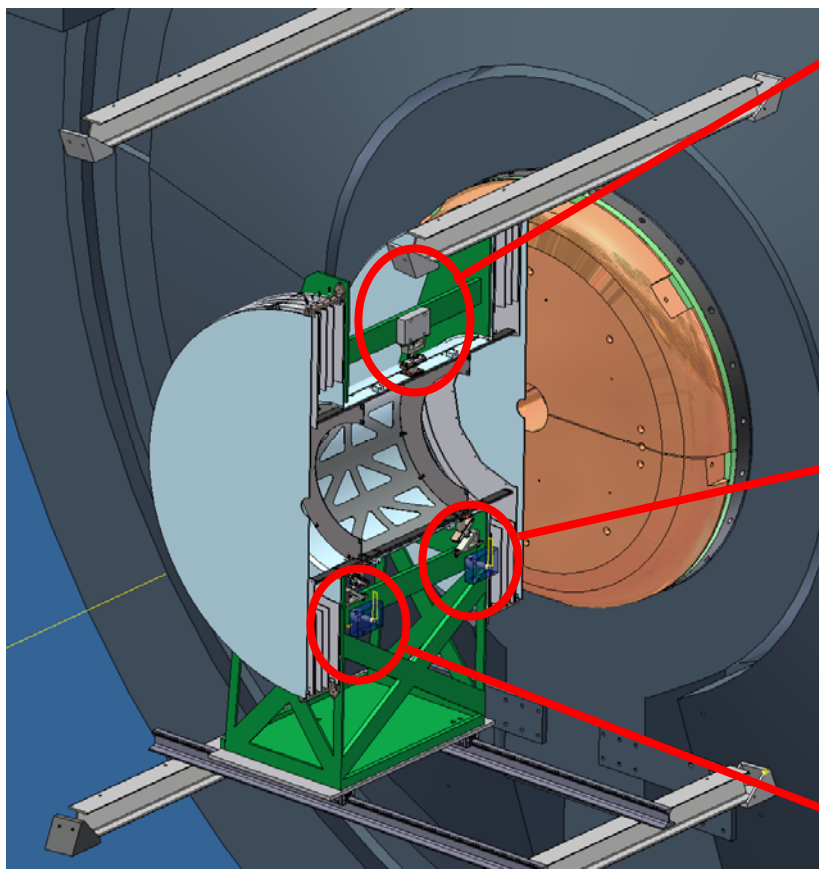
# BNL concept for support truss

- Single support structure attached at 3 points to west detector sled
- 6 degrees of adjustment
- East mirror images west



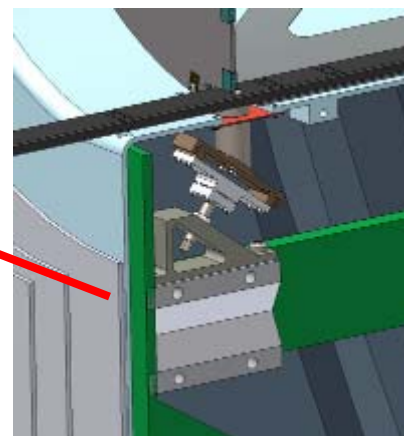
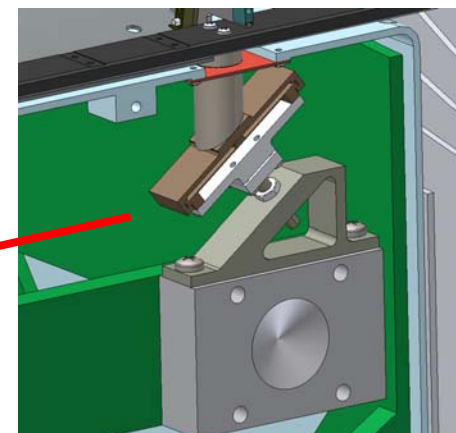


Kinematic mounts for mating  
east and west detector halves



2 DOF (Y & Z)

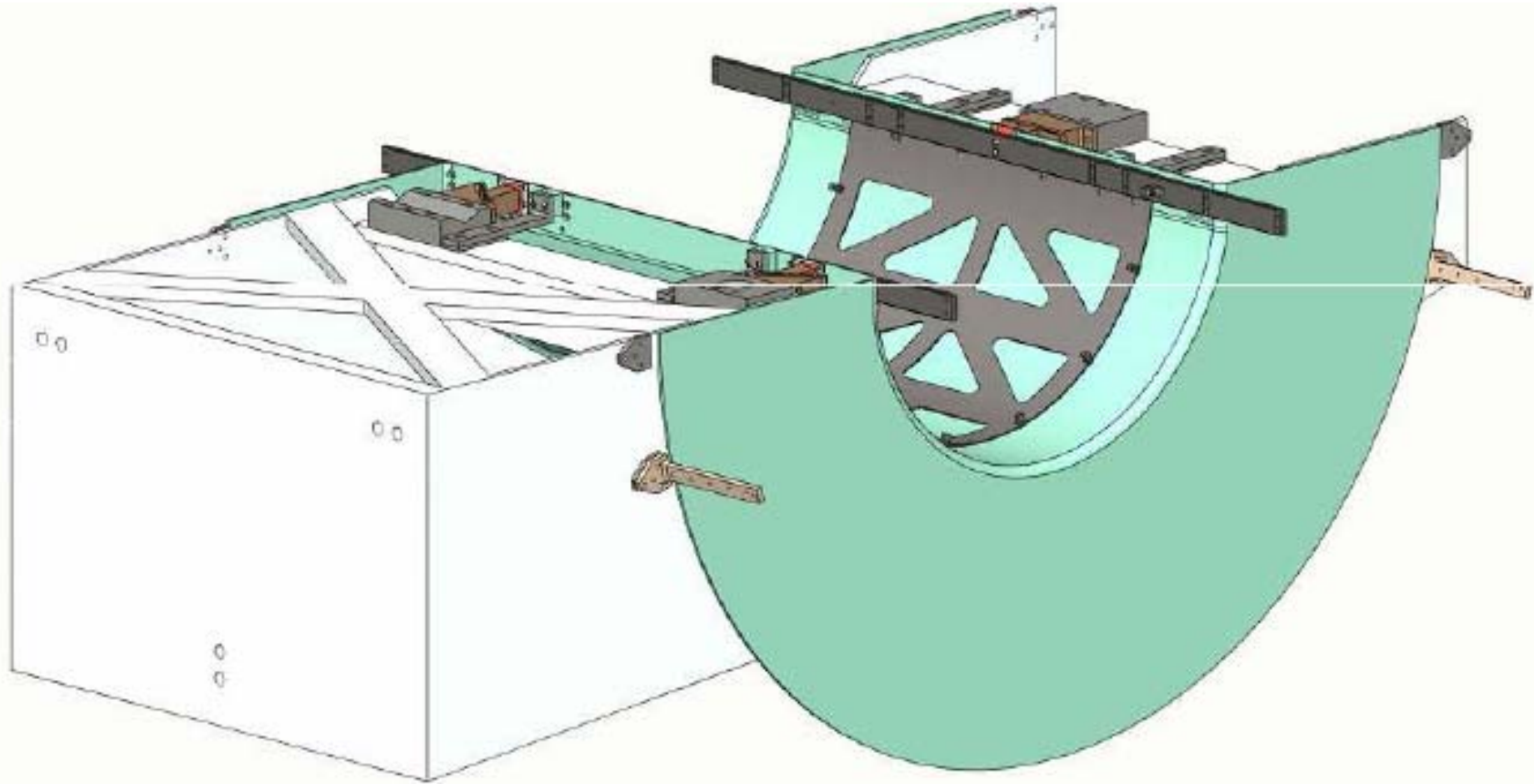
0 DOF



6 interface points  
w/ HYTEC

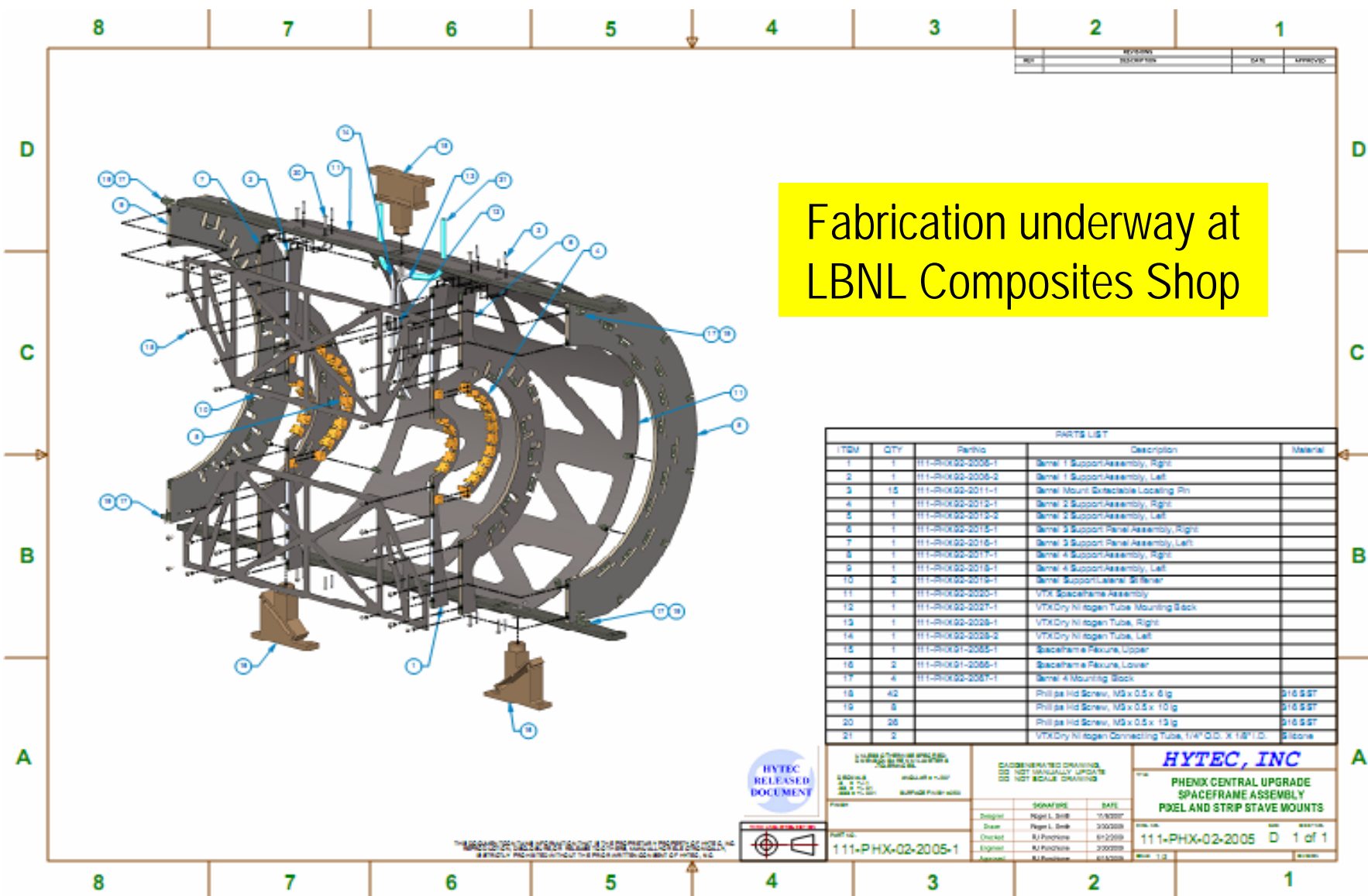
1 DOF (Z)

# Space frame installed into support truss<sup>10</sup>



# Final Space Frame Drawings

11



# Isolation Mounts



upper

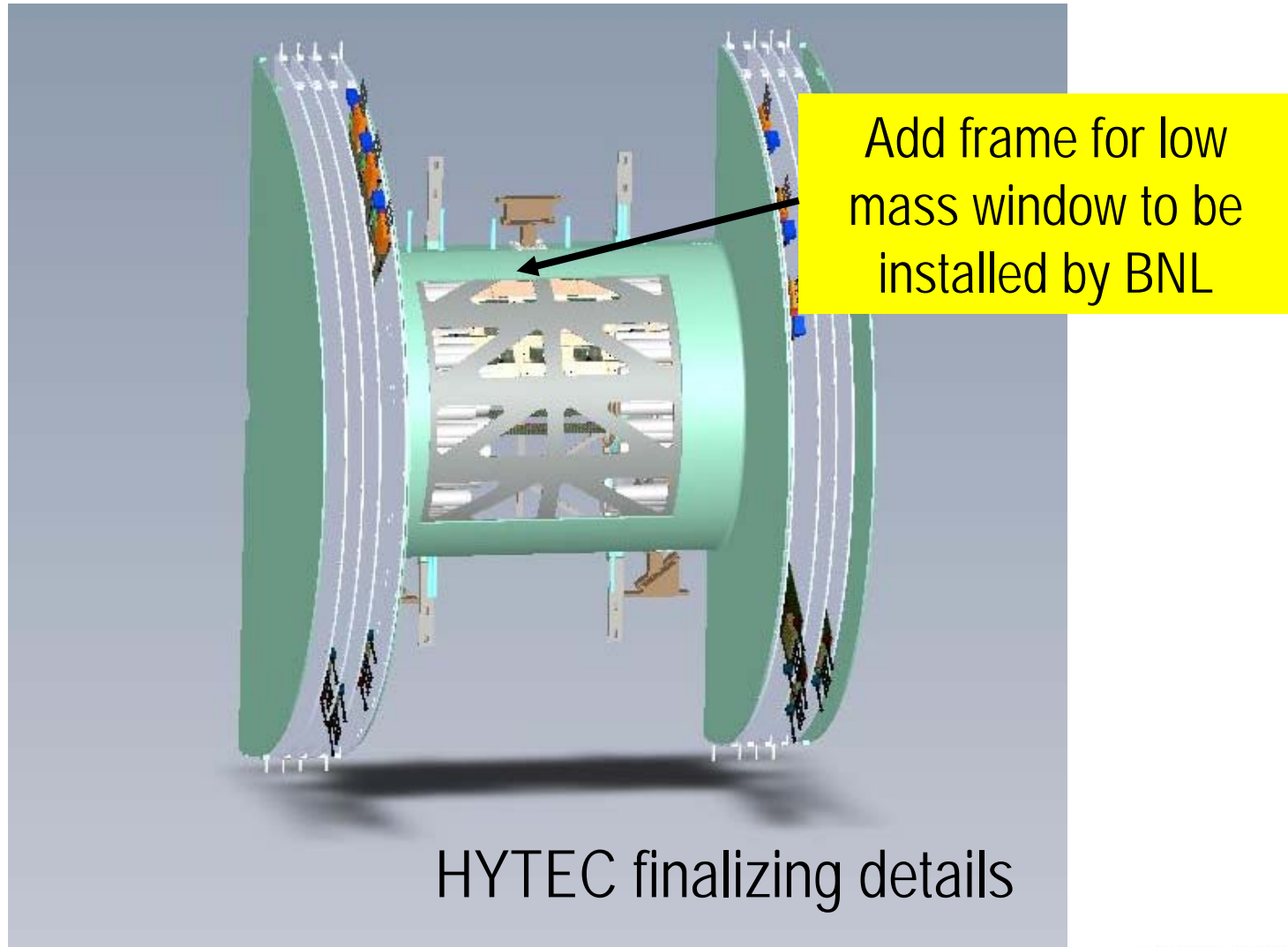


lower

- Isolation mounts penetrate gas enclosure to support space frame
- Fabrication complete, only anodizing and QA remain

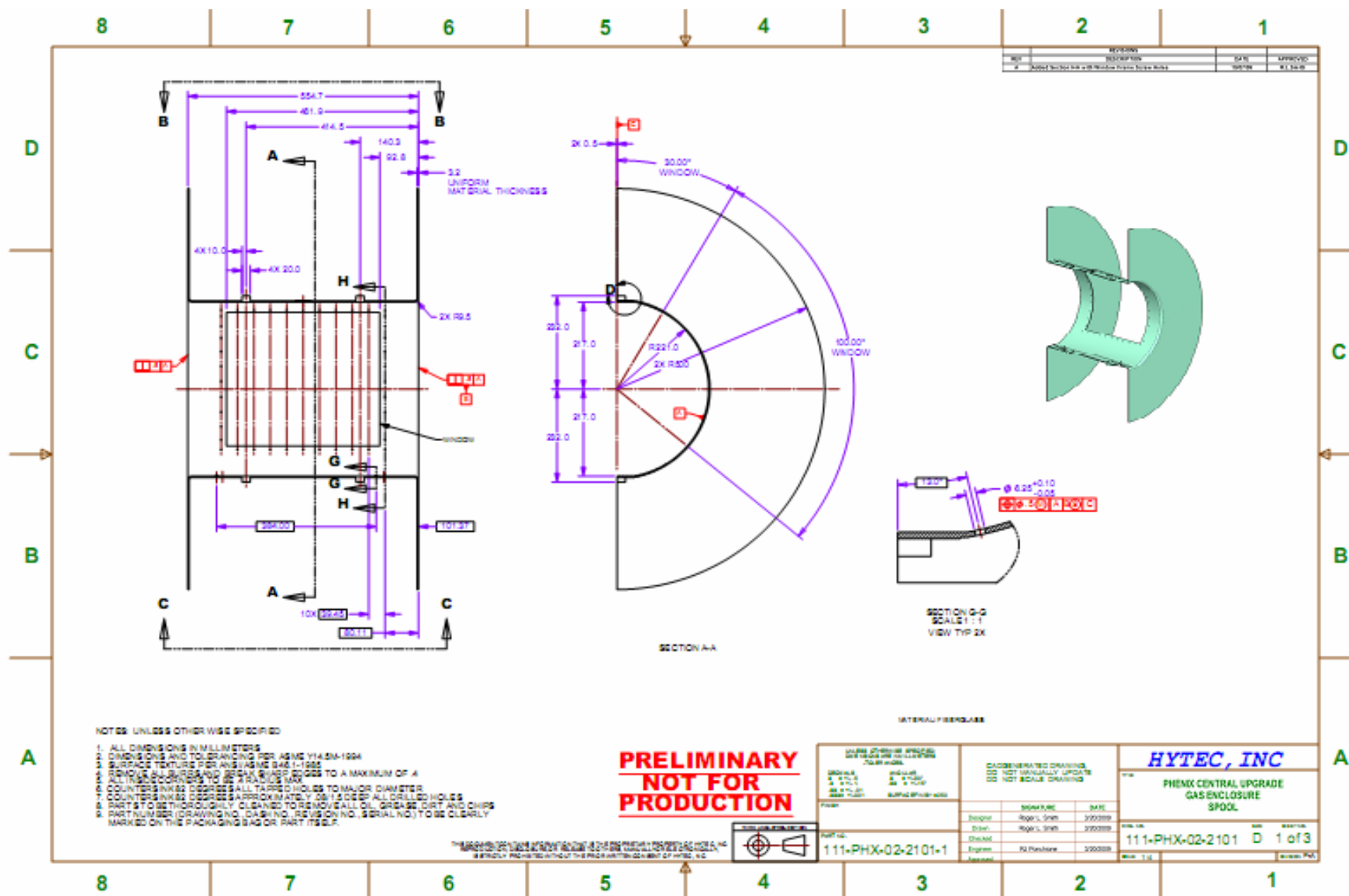


# Central arm acceptance aperture in the Gas Enclosure



# Gas Enclosure Drawings

14



# Survey plan in PHENIX IR

15



Mounts for theodolites to be installed

Provide stable location above beamline to shoot targets for CAD survey

# Platform Utilities

Photos from D. Lynch

Platform water manifolds and cable trays



Platform electrical distribution and disconnect



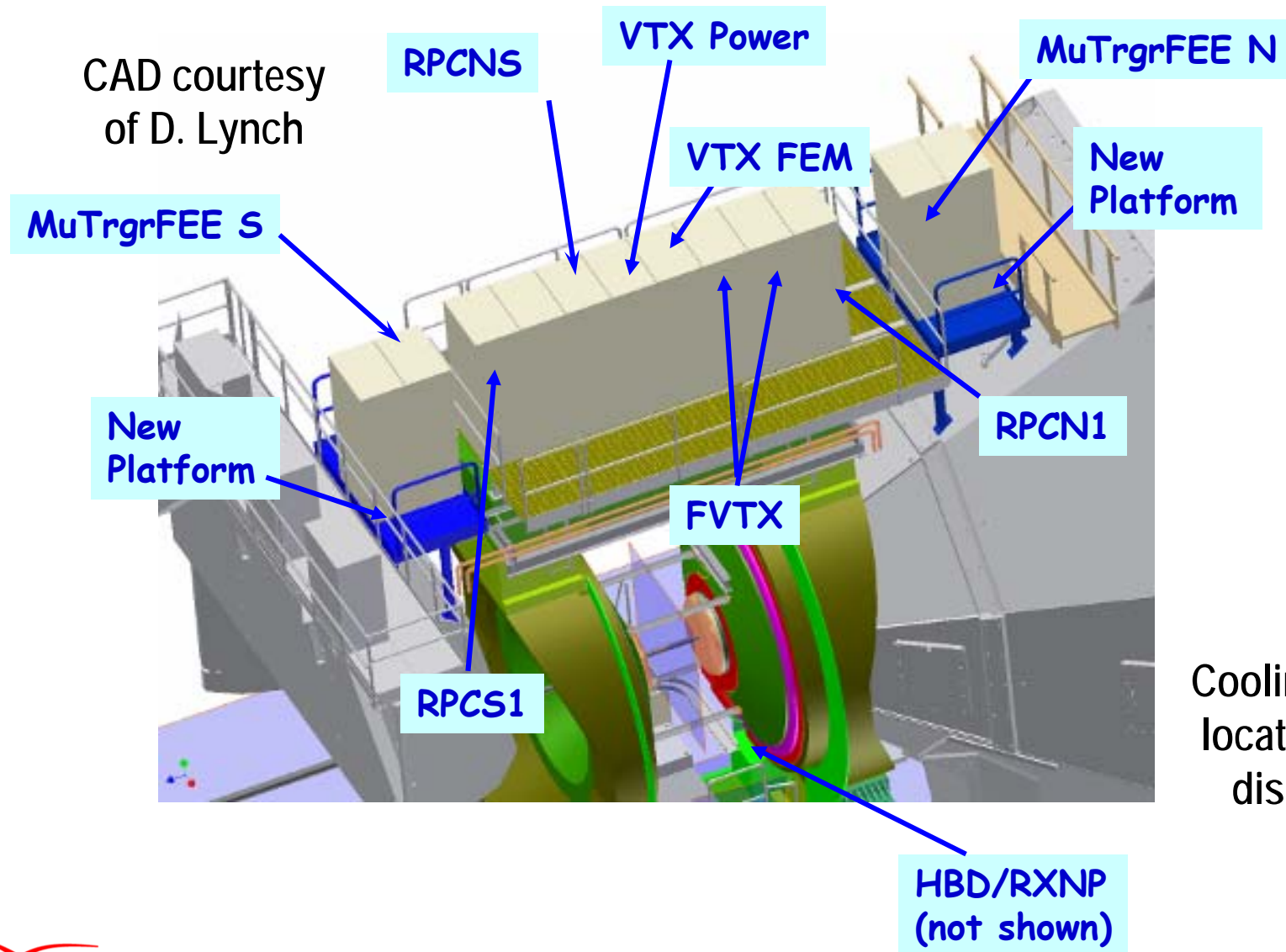
Platform water supply & return flexible connections



Off project



# Electronics rack lay-out



# External Cooling System

- Closed single-phase system operating in the turbulent regime
  - Design work starts FY10 (after RHIC shutdown is over)
- Coolant candidates (3M products):
  - Novec 7000  $\text{C}_3\text{F}_7\text{OCH}_3$  and Novec 7200  $\text{C}_4\text{F}_9\text{OC}_2\text{H}_5$ 

• Boiling point:	34°C	76°C
• Vapor pressure:	$64.6 \times 10^3$	$15.7 \times 10^3$
• Density ( $\text{kg/m}^3$ )	1400	1420
• Specific Heat ( $\text{J/kg-C}$ )	1300	1220
- Issue of breakdown under irradiation raised at DOE Review

# Coolant Irradiation Study

$6.7 \times 10^{11} \text{ N}_{\text{eq}}/\text{cm}^2$  integrated  
dose from LANSCE

## F<sup>-</sup> Ion Extraction Test Report

10/21/2008

Dele Fayemi

3M Electronics Markets Materials Division

Tel: (651) 737-8115

Email: dfayemi@mmm.com

## Summary

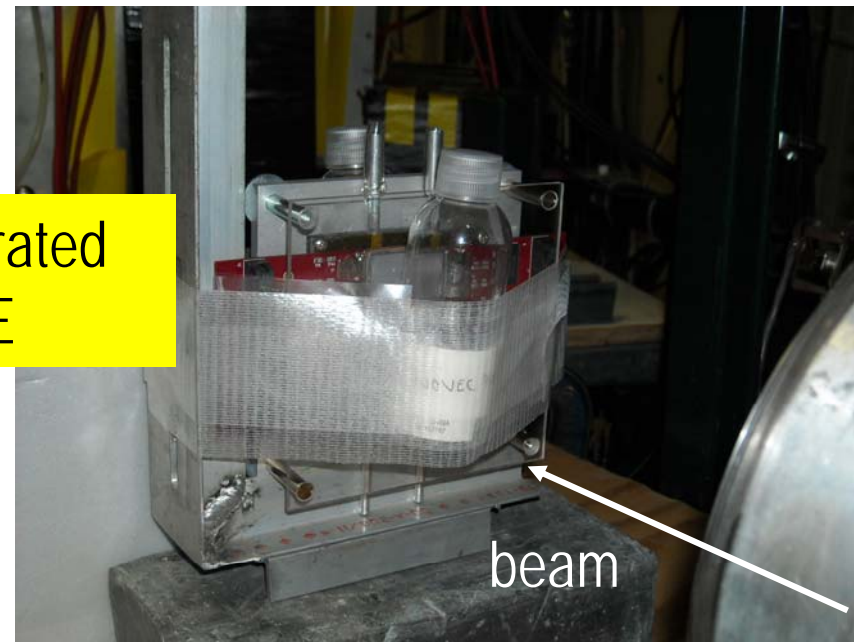
Samples of 3M Novec 7000 and 7200 subjected to neutron irradiation received from Los Alamos National Laboratory were tested to determine if degradation had occurred. Decomposition was quantified through fluoride ion measurements as described in the 3M test method: "Fluoride ion extraction – indication of thermal decomposition". The irradiated fluid samples showed slightly elevated, but insignificant fluoride ion levels when compared to control samples.

## Test Results

The results of the test are given in table 1.

Table 1

Sample	Average F <sup>-</sup> ppm
HFE-7000	0.0113
HFE-7000 in-beam	0.0320
HFE-7200	0.0071
HFE-7200 in-beam	0.0312



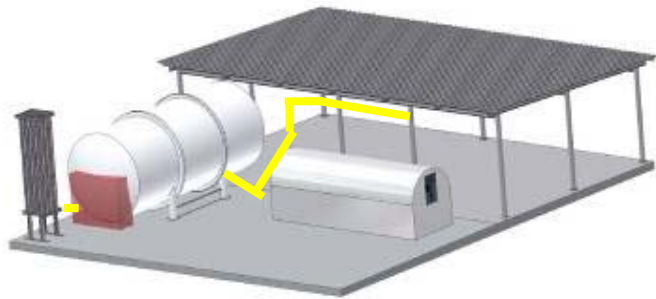
Issue resolved

## Interpretation

The in-beam samples recorded average free fluoride ion concentration of ~0.03 ppm. Though these are elevated fluoride ion levels compared to the virgin samples, these concentrations are much less than 1 ppm and indicate insignificant degradation

# Dry N<sub>2</sub> System

LN<sub>2</sub> Storage Dewar for Dry Nitrogen System shared by **BBC/VTX/FVTX**



Bleed the boil-off  
5200 gal. capacity



Off project



# Safety

- 1<sup>st</sup> Experimental Safety Review Committee meeting for VTX/FVTX held on June 11<sup>th</sup>
  - Included mechanical and electrical aspects
  - Participation from PHENIX and CAD safety experts
  - Talks from Eric, Walt & RP w/ backup from techs
- In preparation, separate paperwork completed for VTX & FVTX
  - Design Review Questionnaire (14 page document)
  - CAD Hazard Identification Tool on the internet
- ESRC report from CAD forthcoming
- Operational readiness review to occur prior to final installation in PHENIX IR

# Summary

- Mechanical Integration:
  - VTX/FVTX assembly plan under development
  - Beam pipe to be installed summer 2010
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