PHENIX

TECHNICAL SUPPORT 2010

PHENIX WEEKLY PLANNING

4/1/2010

Don Lynch

Ongoing Tasks for Run 10

TECHNICAL SUPPORT 2010

Task	Start Date	End Date
Install rack components in RPC3 N racks	in progress	6/1/2010
Attach cables to RPC3 N racks and to Detector ½ octants	in progress	6/1/2010
Send mass flowmeters out for recalibration (DC/PC, MuID, TOF.W)	In Progress	?
AH Crane 110 switch for lockout	In Progress	6/30/09

PHENIX Startup Checklist Status

Item	Responsibility	Status
Item 1: ESRC relevant items completed		
Wood Stairs	Phillips	Post Start
Update Work procedures	Cirnigliaro,Lynch	Almost Done
Item 4: HBD Mock Up	Lynch	After Run 10
Item 11: Fire Pull Box	Philips	Post Start
Item 12: Dumb Waiter	Lynch	Done??

This Week

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VTX Support frame design is in progress

No scheduled maintenance access:

RPC3S ½ octant reference survey done

VTX Cooling analyses: Done except for big wheels

Absorber design concept done. Final drawings in progress

Prep for 2010 shutdown

Future upgrades support

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Next Week:

- No Next scheduled maint. Wed. 4/7
  - Tasks ? (none defined yet)
- Run 10 tech support as necessary
- 2010 summer shutdown prep continues
- Future upgrade support as necessary
- VTX assembly fixtures procurement & fabrication
- VTX support structure design
- VTX thermal design calculations
- RPC absorber design

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2010 Tasks

2010 Tasks	Start Date	End Date
Run 10	In progress	6/1
VTX Installation Plan (Final)	In progress	5/31
RPC3S Installation Plan (Final)	In progress	5/31
Receive New Beampipe	Done	Done
Design Beam pipe supports	Done	Done
Update RPC3 N design for RPC3 S	Done	Done
Design support structure, alignment scheme for VTX	In progress	3/31
Specify and procure electronics racks and support equipment for VTX	In progress	5/31
Fabricate beam pipe supports	In progress	5/1
Beampipe NEG coating (CERN)	3/15	5/1
Fabricate/procure parts for RPC3 S installation	In progress	5/1
Fabricate/procure parts for VTX installation	In progress	6/1
End of run 10	6/23	6/23
End of Run Party	~6/25	~6/25
Prep IR for shutdown	6/1	7/1
Complete unfinished business for MuTrgr FEE & RPC3 North	6/23	8/1
Install Beam pipe	7/1	9/1
Install VTX	8/1	11/1
Install RPC3 South	6/23	11/1
2010 Shutdown Other Tasks	6/23	12/1

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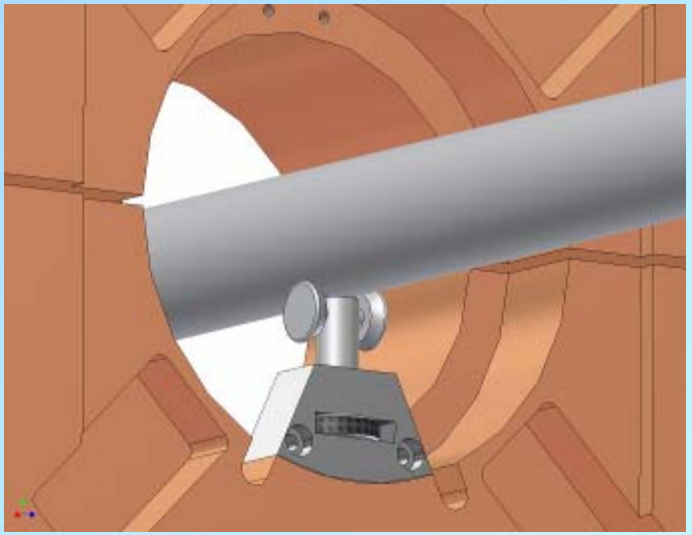
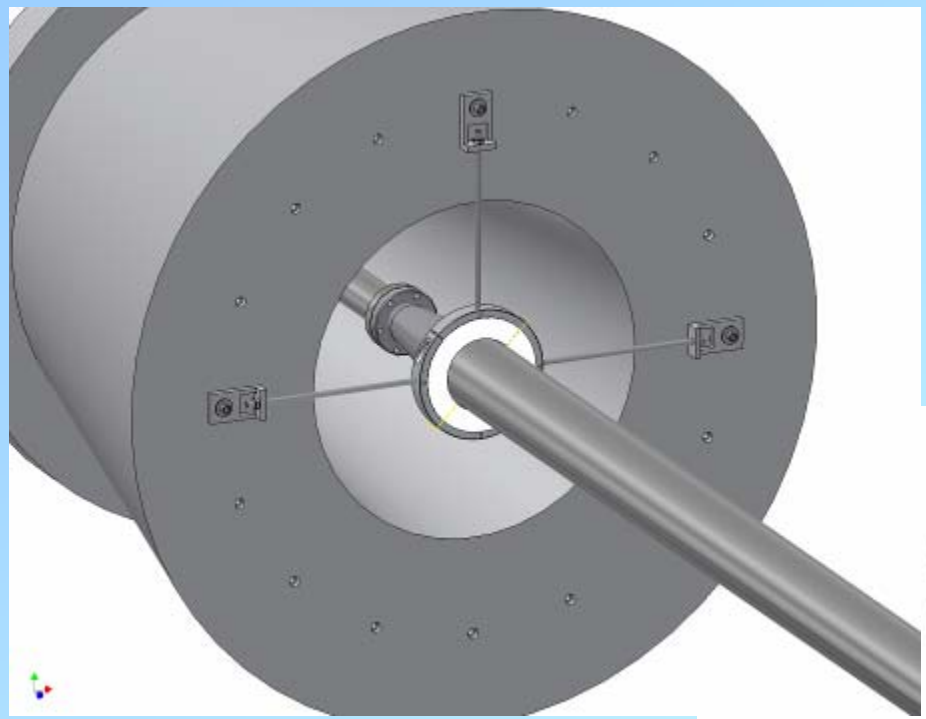
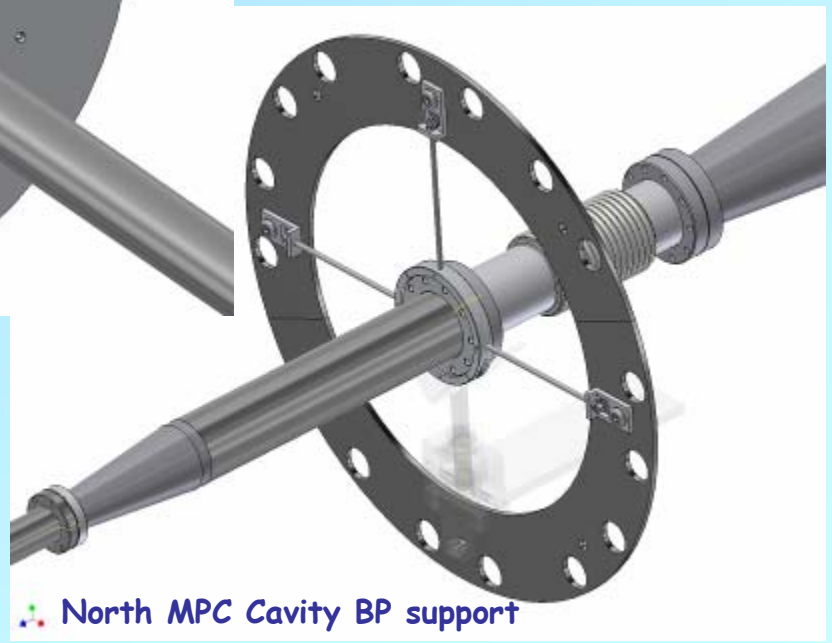
CM central BP supports (2 req'd)



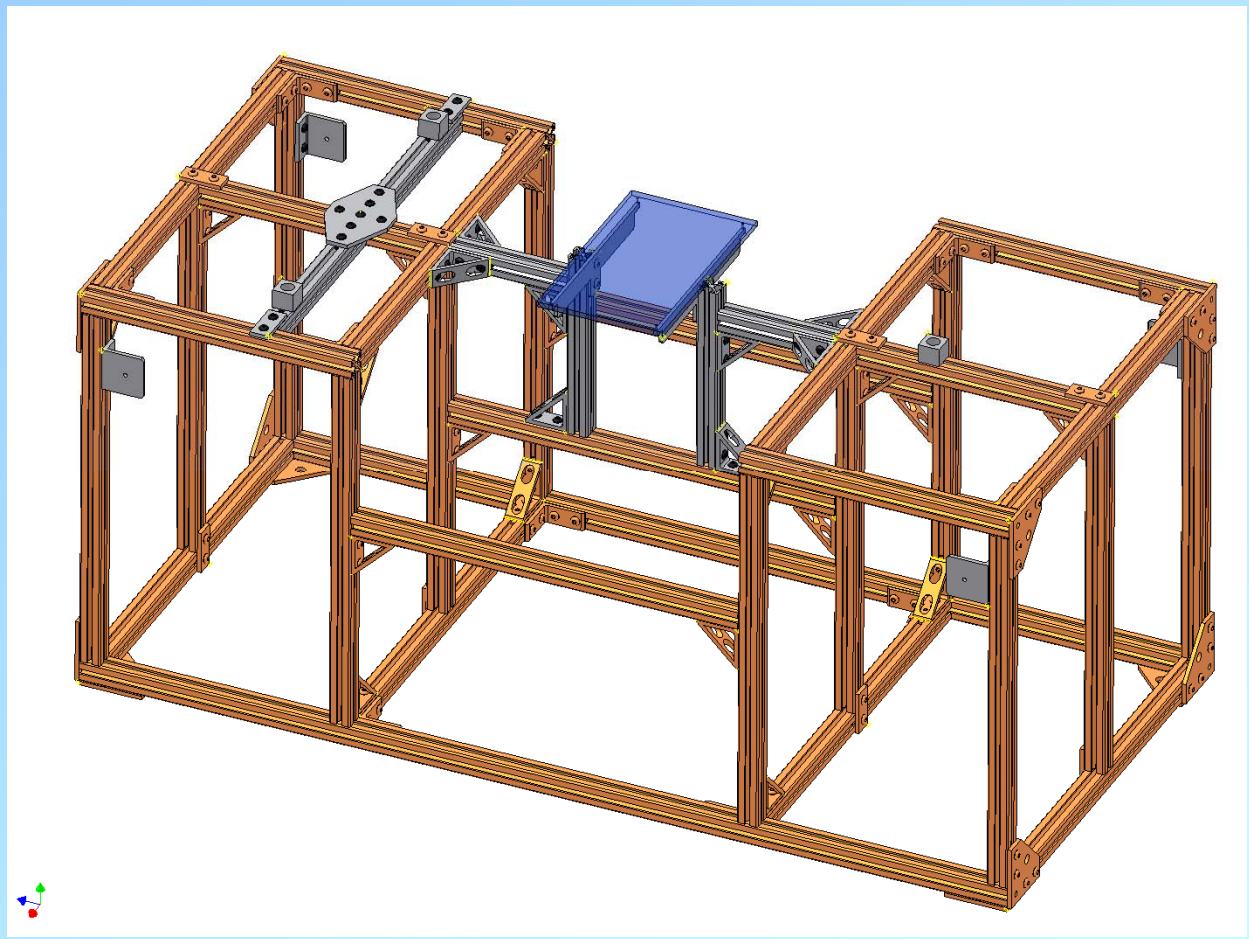
South BBC Cavity BP support



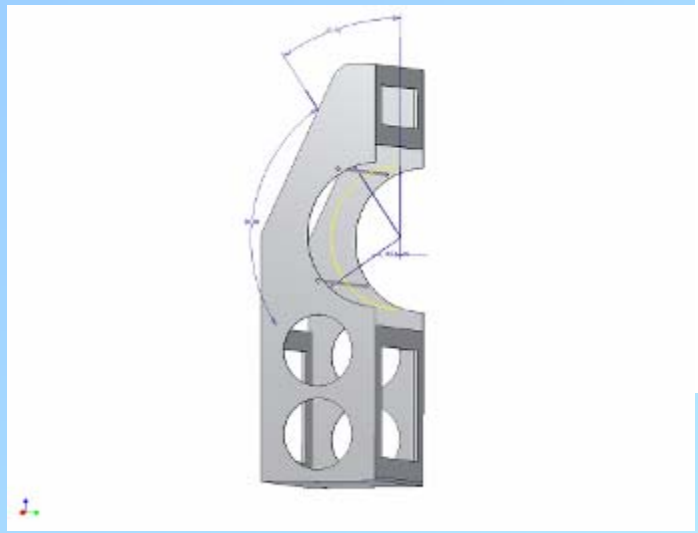


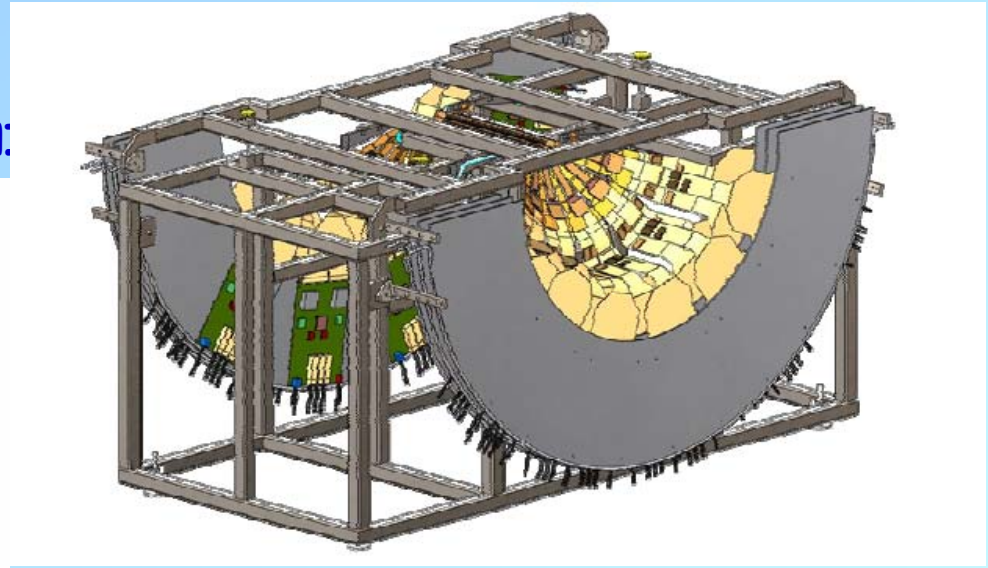
North MPC Cavity BP support

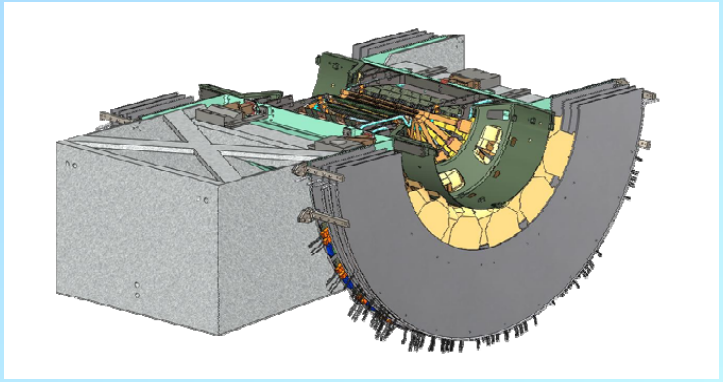
VTX Assembly Fixture (3 others are similar)

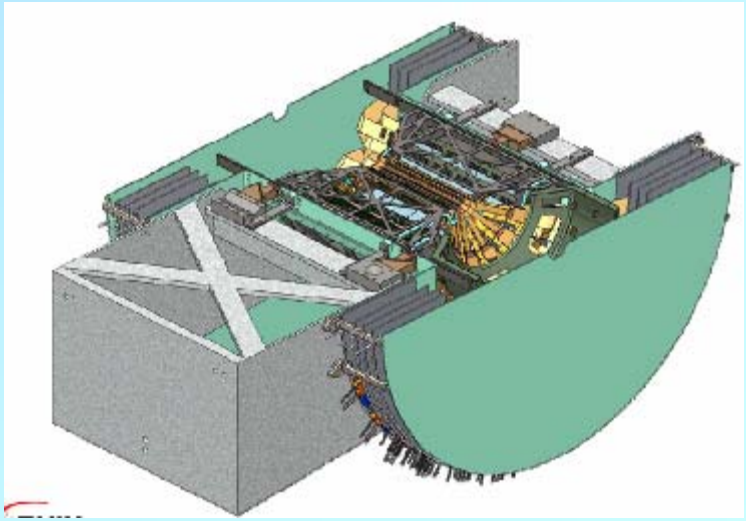


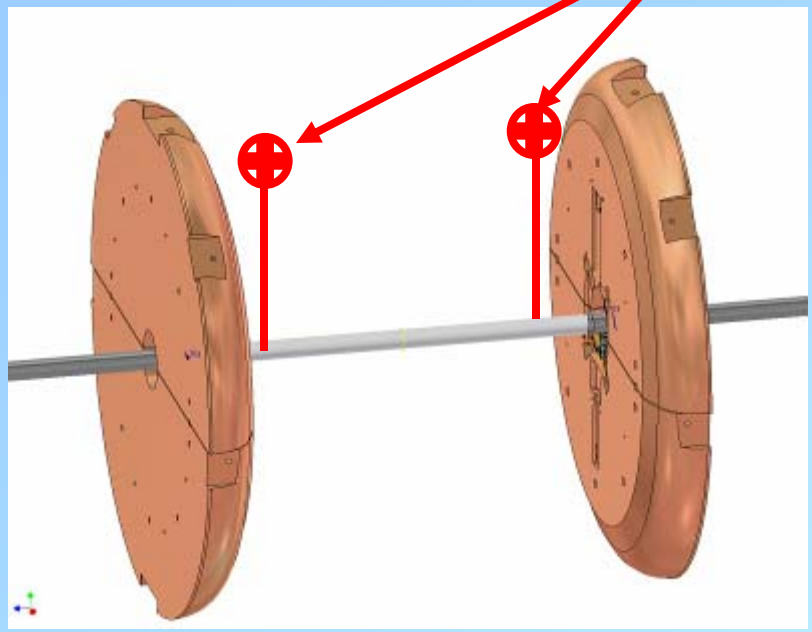
VTX Support Structure Base
Assembly Design In Progress
Fixtures being re-designed at PHENI





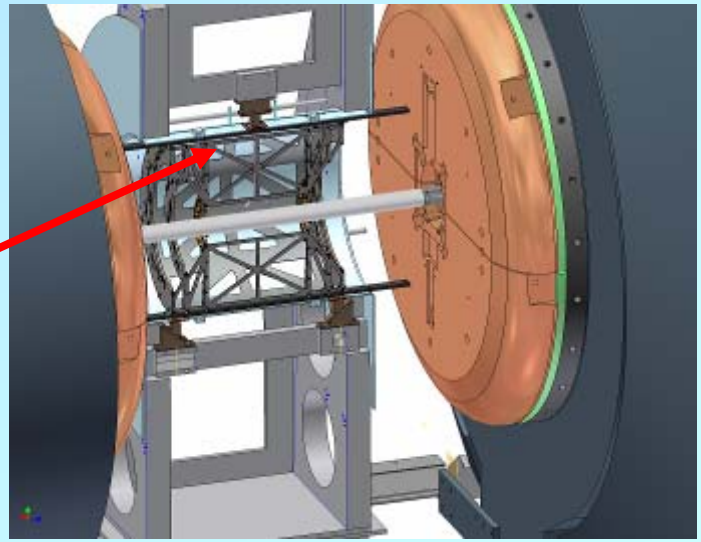






Survey Targets and fixtures TBD
Must be able to align BP to req'd radial and angular accuracy without VTX and with VTX in clamshells open configuration.

½ of VTX detector support structure



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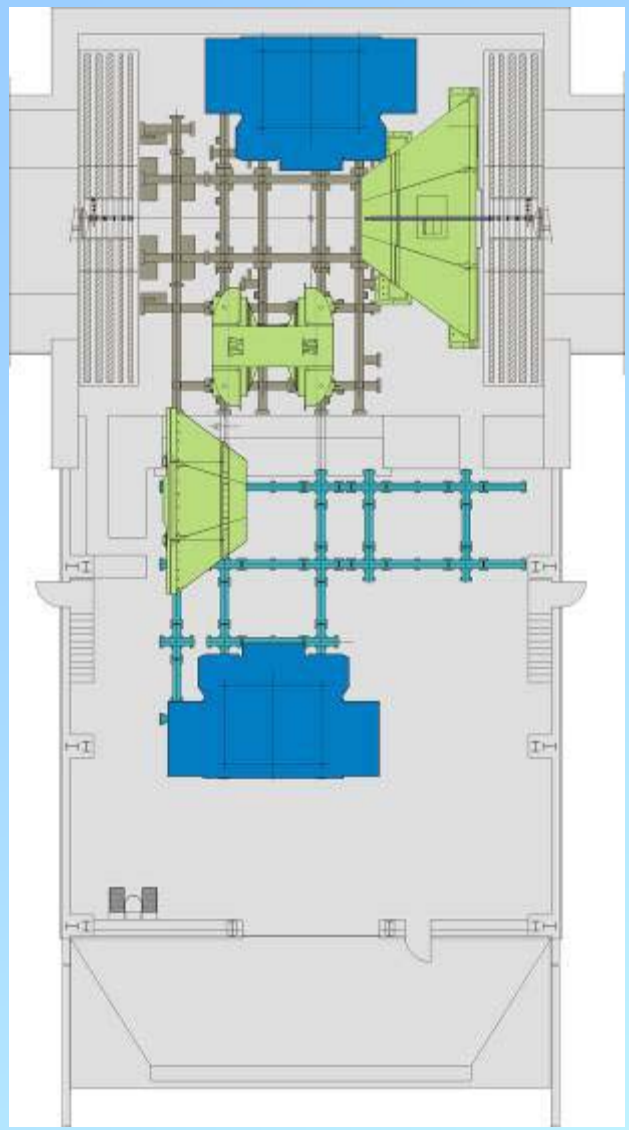

Major PHENIX Components during shutdown when Old beampipe is out and new beampipe is ready to go in. Approximately last week in July.

This is the optimal point for DC, MuTr Station 1, and/or RPC absorber work. Potential work in these areas is still under review by PM. The merits of these proposals will be weighed and decisions made in the next week or so. The schedule will be adjusted accordingly.

Note: Absorber installation to be done during this period. MuTr station 1 work shall be limited to work in situ (i.e. station 1 will not be removed). Similarly DC/PC1 work will be limited to work which can be accomplished with the DC in situ, although, if requested, it may be possible to translate the DC on its mounting rails to allow limited access to DC/PC1 electronics.

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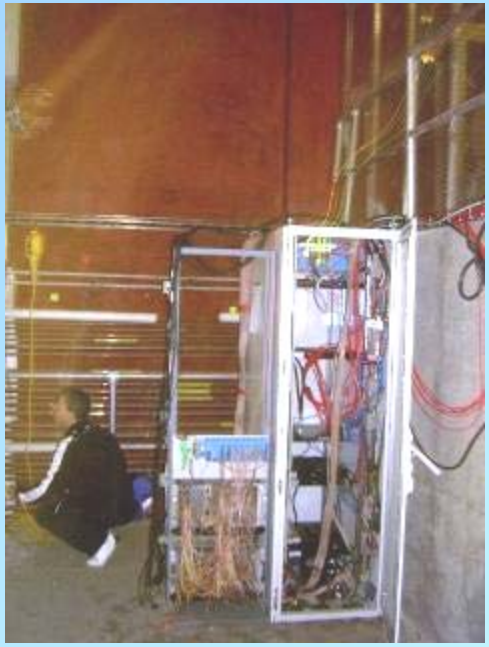

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Future Project:

Recapacitation of MuTr Station 1

Question: what would it take to revive the vacuum lift fixture(s)?

Received vendor information. Will follow up when convenient to support utilization of the fixture during 2011 shutdown.

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TECHNICAL SUPPORT 2010

New Beampipe Pre-Shutdown Prep

Task	Due By	NOTES
Design central beam pipe and new transition sections	Done	
Order beampipe	Done	Brush Wellman
Order new design transitions	Done	CAD
Order replacements for existing transitions and spools	Done	CS
Conceptual and mechanical design beampipe supports	Done	Done
Beampipe fabrication	Done	Done
Receive bp and all beampipe sections	Done	CAD
Beampipe Installation Review (Preliminary)	Done	Done
Bp and sections acceptance tests and inspection	In Progress	
Send beampipe to CERN for NEG Coating	4/15/2010	
Fabricate beampipe supports	5/31/2010	In Progress
Receive bp back at BNL	5/31/2010	May be delayed
Memorial Day: Lab Holiday	5/31/2010	Enjoy the weekend
Choreograph removal of old beampipe and installation of new (final)	6/1/2010	
Final acceptance and inspection bp and sections	6/15/2010	
Test and inspect beampipe supports	6/15/2010	
Beampipe Installation Review (Final)	6/15/2010	

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TECHNICAL SUPPORT 2010

VTX Subassembly, Top Assembly, Installation and Integration Prep

Task	Due By	NOTES
Design assembly workspace, tools and fixtures	Done	Fixtures designed by PHENIX
Fabricate/prepare assembly workspace, tools and fixtures	Done	Fixtures designed by PHENIX Done
Receive, inspect, test, rework and qualify assembly tools and fixtures	Done	Fixtures designed by PHENIX Done
Design assembly workspace, tools and fixtures	Done	VTX Group
Fabricate assembly workspace, tools and fixtures	Done	(PHENIX)
Conceptual and mechanical design of installation, structural support and detector alignment	4/2/2010	In Progress
Installation Review (ESRC)	~4/15/2010	After analyses done
Beampipe & VTX Installation Work Permits	5/31/2010	
Memorial Day: Lab Holiday	5/31/2010	Enjoy the weekend
Subassemblies complete ready for integration into hemispheres	6/30/2010	
Receive, inspect, test, rework and qualify assembly tools and fixtures, electronics racks and support	6/30/2010	VTX Group
Fabricate/procure detail components for installation, support and alignment, including station 1 work platforms	6/30/2010	
Design & fabricate fixtures, techniques and mockups for installation and alignment	6/30/2010	
4th of July Holiday	7/5-7/6/2010	Enjoy the long weekend
Receive & inspect components (installation, support & alignment)	7/15/2010	
Assemble Hemisperes	7/15/2010	
Mock installations/alignments, bench tests	7/31/2010	

RPC3 Pre Shutdown Prep

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TECHNICAL SUPPORT 2010

Task	Due By	NOTES
Review RPC3 North for Lessons Learned	Done	
Make a list of all purchased and fabricated parts	Done	
Place order for CS fabricated parts	Done	(Some parts to be added)
Implement design improvements for RPC3 South	Done	
Receive and inspect 1/2-octant shells	Done	Pre-survey in progress
Order raw materials for PHENIX fabricated parts	4/15/2010	In Progress
Order purchased parts for RPC3 South	4/15/2010	In Progress
Prepare Installation Plan	4/15/2010	In Progress
pre-survey 1/2 octant shells	Done	Done
Fabricate PHENIX parts	5/14/2010	In Progress
Receive and inspect CS fabricated parts	5/28/2010	In Progress
Memorial Day: Lab Holiday	5/31/2010	Enjoy the weekend
Prepare work permit for installation	6/1/2010	
Receive purchased parts	6/4/2010	
Assemble, test and burn-in 1/2 octants	6/18/2010	In progress
Pre-Assemble base components at PHENIX	6/18/2010	

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TECHNICAL SUPPORT 2010

Start of Shutdown

Task	Due By	NOTES
DAQ Tests	6/4/2010	
Purge Gas From Detectors	6/8/2010	
Remove BP Collar	6/22/2010	As early as possible after 6/1
Move MMS south	6/22/2010	As early as possible after 6/1
Prep EC for move to EC	6/22/2010	As early as possible after 6/1
End of Run 10	6/23/2010	
EOR Party	~6/25/2010	
Close North and South BP gate valves and lock closed for until new BP is installed	6/24/2010	
Open and disassemble wall	6/24/2010	
Remove EC ladder and fold platforms	6/30/2010	
Move EC to AH	6/28/2010	
Install cart	6/28/2010	
Move Collars to AH	6/30/2010	
Install decking	6/30/2010	
Install Manlift	6/30/2010	
Remove RPC2 Prototype, support brackets, cabling & Piping	6/29/2010	
Remove MMS east vertical lampshade	6/30/2010	If Necessary

Beampipe De-installation

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TECHNICAL SUPPORT 2010

Task	Due By	NOTES
4th of July Holiday & Floating Holiday	7/5&7/6/2010	Enjoy
Remove HBD's and HBD cables Remove RXNP's and cables	7/9/2010	Concurrent with Start of shutdown tasks
Remove MPC's	7/16/2010	Concurrent w MPC's
Remove BBC's	7/16/2010	Concurrent with BBC's
Position MMS for Vacuum break	7/19/2010	
Install Temporary supports for old BP	7/19/2010	Supports TBD
Break vacuum on north side of MMS	7/19/2010	
Remove south bellows	7/19/2010	
Move MMS north, remove spool and south3-5 transition	7/20/2010	
Move the MMS south & Prep MMS for move to AH	7/23/2010	Begin MMS prep with shutdown start
Move CM south, remove north bellows	7/23/2010	
Move old Be bp south into MMS and move CM north	7/23/2010	
Move MMS to shutdown park position	7/23/2010	
Remove old Be BP	7/23/2010	
Move CM south and east	7/23/2010	
Remove north 3 to 5 transition	7/23/2010	

New Beampipe installation

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TECHNICAL SUPPORT 2010

Task	Due By	NOTES
Prepare north 3 to 5 transition for installation with roller guides, bakeout wrap and thermocouples	7/23/2010	CAD
Prep CM North and South for Absorber and install	8/13/2010	(Install if absorber rec'd)
Install north 3 to 5 transition in MMN	8/13/2010	
Install new Be pipe in CM on temp supports	8/17/2010	
Move CM back to beamline & connect new Be BP to 1-5/8 transition and bellows and north 3-5 transition	8/17/2010	
Move CM to run position	8/18/2010	
Prealign Be/Alum pipe with transitions attached on new BP supports At MPC north, BBC south and north nosecone	8/19/2010	
Prepare south 3 to 5 transition for installation with roller guides, bakeout wrap and thermocouples	8/19/2010	
Install south 3 to 5 transition, bellows and 1-5/8 to 3" transitionin MMS	8/20/2010	
Move MMS back into IR on beamline	8/20/2010	
Move CM south, slide Transition assembly in MMS north and connect to new Be BP	8/20/2010	
Move CM and MMS north and install south spool. Leak check. Move MMS South	8/27/2010	
Install temporary bakeout supports	8/27/2010	
Install bakeout blankets and monitoring	8/27/2010	
Labor Day Lab Holiday	9/6/2010	Enjoy
Bakeout New BP and activate NEG coating	9/10/2010	How Long?
Leak check BP	9/10/2010	
Re-install MPC's including Cables and services Re-install BBC's including Cables and services	9/24/2010	Concurrent efforts
Move CM to run position	9/24/2010	
Final alignment of new BP	10/1/2010	

VTX Installation, VTX Services and Electronics

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TECHNICAL SUPPORT 2010

Task	Due By	NOTES
Install and align VTX rail attachment hardware to CM	10/1/2010	Install during bakeout?
Install and align VTX rails parallel to beam line	10/8/2010	
Install and align VTX rails perpendicular to beam line	10/8/2010	
Install and align west half detector module	10/15/2010	
Install and align east half detector module	10/22/2010	
Thanksgiving and Black Friday Holiday	11/25 & 11/26/2010	Enjoy
Install mechanical support structures for VTX services and electronics	10/29/2010	Concurrent Effort
Install Cable trays	10/29/2010	|
Install racks	10/29/2010	|
Install chiller	10/29/2010	|
Install cables, plumbing	10/29/2010	|
Connect cables and plumbing	10/29/2010	V
Test and commission	12/1/2010	

RPC3 South Prep, Early Shutdown

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TECHNICAL SUPPORT 2010

Task	Due By	NOTES
Remove wiring, walkovers, FCAL and scintillator hardware that would otherwise interfere with installation	7/2/2010	PHENIX
4th of July Holiday	7/5 & 7/6/2010	Enjoy
Remove/relocate shielding	7/9/2010	Riggers
Remove crystal palace & vapor barrier	7/16/2010	CAD
Inspect Gap 5 south for legacy items/problems	7/23/2010	
Address legacy items/problems as convenient prior to shutdown start	7/30/2010	
Install lighting & relocate sensors as necessary	8/6/2010	Electrrician
Temporarily relocate, re-position or otherwise address interfering piping, cable trays	8/20/2010	PHENIX (w/ CAD Help?), Electrician
Remove RPC prototype	8/20/2010	
Pre-survey $\frac{1}{2}$ octant reference points	8/27/2010	Surveyors
Drill and tap $\frac{1}{2}$ octant and rotating piston mounting points	8/31/2010	
Build/install access and work platforms for walk on top of MuID steel including stairs from MMS eyebrow	8/31/2010	Carpenters
Final cleaning and prep of gap 5 for grouting	9/3/2010	
Labor Day Lab Holiday	9/6/2010	Enjoy
Pre-installation orientation meeting with masons and riggers	9/7/2010	
Position lifting equipment in tunnel	9/10/2010	Riggers
Move east and west base structures into south tunnel and assemble on east and west sides of pedestal respectively. Include translation control fixtures	9/10/2010	Riggers & PHENIX techs

RPC3 South Installation

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TECHNICAL SUPPORT 2010

Task	Due By	NOTES
Install and align base structures on east and west sides of gap 5	9/14/2010	
Prepare for grouting	9/15/2010	
Install grout	9/16/2010	
Install pitch control rails on pedestal and gap 5 east & west inner walls	9/17/2010	
Install upper suspension support hardware	9/17/2010	
Install ½ octants, 2 at a time in accordance with work plan/work permit		
Transport ½ octants 2 at a time from RPC factory to south tunnel on angled transport carts		
Transfer ½ octants from angled transport carts one at a time to temporary free standing and re-orienting roller fixture (fore and aft wheels and axel)		
Lift (and re-orient if appropriate) ½ octant and install into base structure, previously installed ½ octant or upper suspension hardawre as appropriate per work plan		
Pre-align each ½ octant as installed		
Perform electrical integrity tests before proceeding to next pair of ½ octants		
After all ½ octants are in place and tested, join east and west halves of full south station 3 detector and align to survey markers	10/15/2010	Riggers & PHENIX Techs

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RPC3 South Integration

TECHNICAL SUPPORT 2010

Task	Due By	NOTES
Final survey	10/22/2010	Surveyors
Install new cable trays and piping supports	10/29/2010	Electrician, earlier if possible
Re-install MuID wiring and pipes	11/5/2010	
Re-install MuID gas rack	11/30/2010	
Install south thermal/vapor barrier	11/19/2010	CAD
Thanksgiving and Black Friday Holiday	11/25 & 11/26/2010	Enjoy
Re-install shielding	11/30/2010	Riggers
Commissioning and final acceptance tests	11/30/2010	RPC Group
Install RPC3 HV, LV and signal wiring and gas lines	11/30/2010	
Install RPC3 South gas distribution rack	11/30/2010	
Install RPC3 South environmental controls (heaters and thermostats)	11/30/2010	Electrician

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Shutdown 2010 Other Work

TECHNICAL SUPPORT 2010

Task	Due By	NOTES
RPC3 North unfinished business	7/15/2010	Electronics and cabling, grounding issues, environmental controls
MuTrigger FEE unfinished business	7/15/2010	MMS cable trays,
RHIC Summer Sunday Tour	8/15/2010	During bakeout
Other subsystem maintenance and repair	11/1/2010	TBD
Gas System maintenance, repair, upgrade	11/1/2010	
Bridge Electrical support upgrade	11/1/2010	Support for 4 full racks in 2010, 4 more (8 total) in future
PHENIX Infrastructure maintenance, repair, upgrade	11/1/2010	TBD
DC/PC maintenance/repair	11/15/2010	FEM and wire troubleshooting and repairs, major efforts will require longer shutdon
Thanksgiving and Black Friday Holiday	11/25 & 11/26/2010	Enjoy
Rack Room upgrade	11/30/2010	TBD
Future upgrade support	11/30/2010	RPC1, RPC absorbers, FVTX, FOcal, other TBD
Prepare for Run 11	11/30/2010	Normal end of shutdown tasks, typically taking 3-4 weeks
Run 11 Start	12/1/2010	
End of Shutdown Party	~12/3/2010	

2009 Building Maintenance Issues

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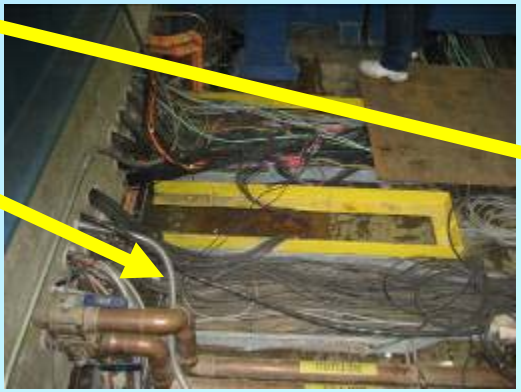
- Roof leaks in utility bathroom at northwest corner behind tech offices, over door between rack room and assembly hall and over door between control room and elect. ass'y room.

- General maintenance for Trailer Offices (in progress)
- Trailer Office Modifications planning in progress
- New roof leaks in laser room and IR (southeast corner)
- AC issues are back
- Flooding in AH



PHENIX Procedure Review Current Status:

147 Procedures Identified

84 Made Inactive (not currently in use, will require revision to re- activate if and when necessary, available for reference purposes)

10 CAD procedures relevant to PHENIX, all are current and up-to- date. (CAD web access to these documents is not up to date)

42 PHENIX approved procedures.

1 is currently under review
41 are current and up-to-date

11 Proposed/Draft Procedures (never previously formalized)

Web retrieval of latest procedures now available from PHENIX Internal:

http://www.phenix.bnl.gov/WWW/INTEGRATION/ME&Integration/DRL_procedures.htm

Nothing new to report this week.

New Argon Dewar and Empty Gas Bottle Storage Area

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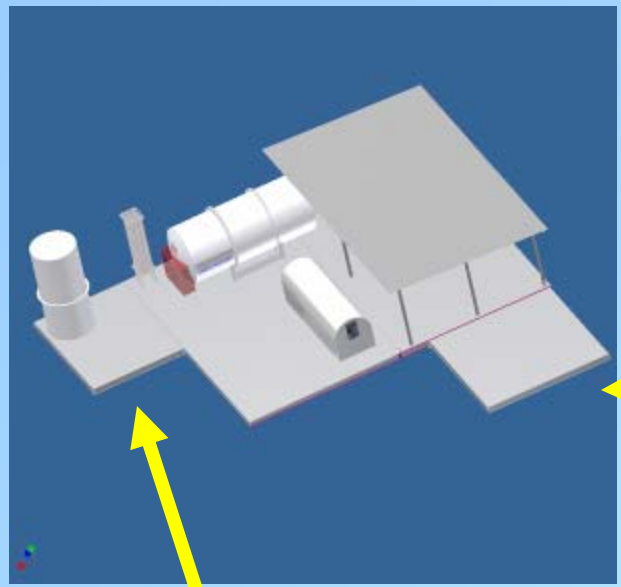

Pad for Empty Gas Bottles

Pad for argon Dewar

PO for material to fill cracks is in progress. PO for Ar Dewar installation and rental is in progress

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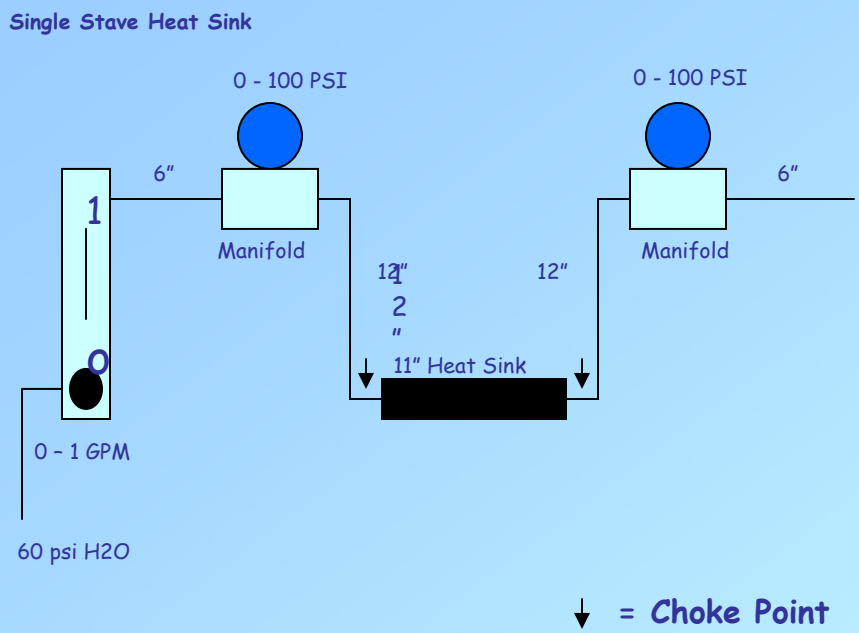
BNL Test Set-up



All connections were made with 1/4" polyflow fittings with a minimal ID of .125" except of the stave heat sinks themselves (45 deg barbed with max ID of .080")

Tubing = Tygon 1/4" OD, 1/8" ID Formula 2001 (max pressure 30 psi) or SE-200 (max pressure 85 psi) clamped to the polyflow inner tube with a plastic 'herbie' clamp.

Flowmeter 0 -1 GPM (H2O), Gages 0 -100 psi, Manifolds 1" x 1" x 2" Alum with 1/2" ID.

BNL Tests: 3 Staves in Series

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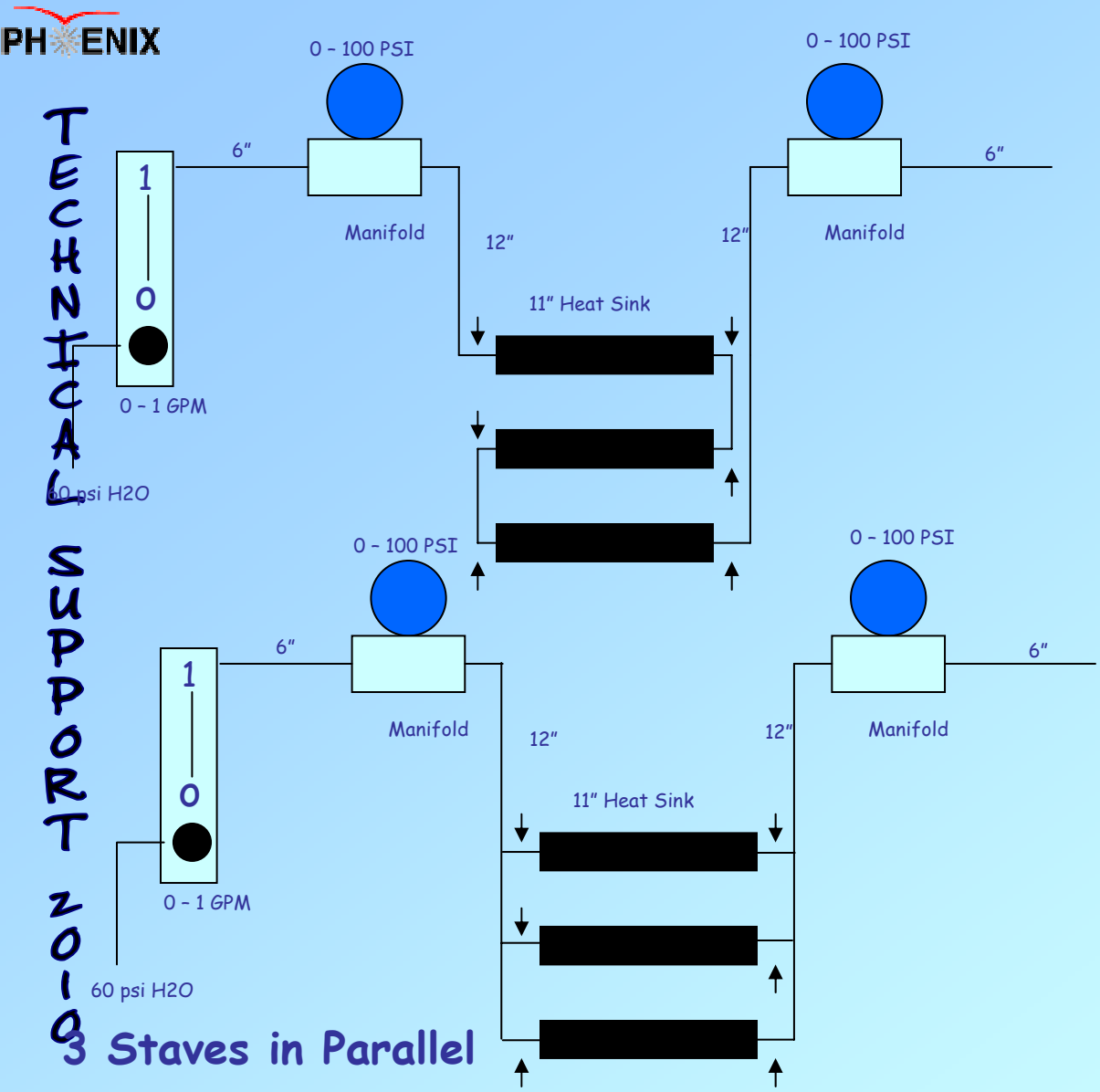


3 Staves in Parallel

3/25/2010

↓ = Choke Point

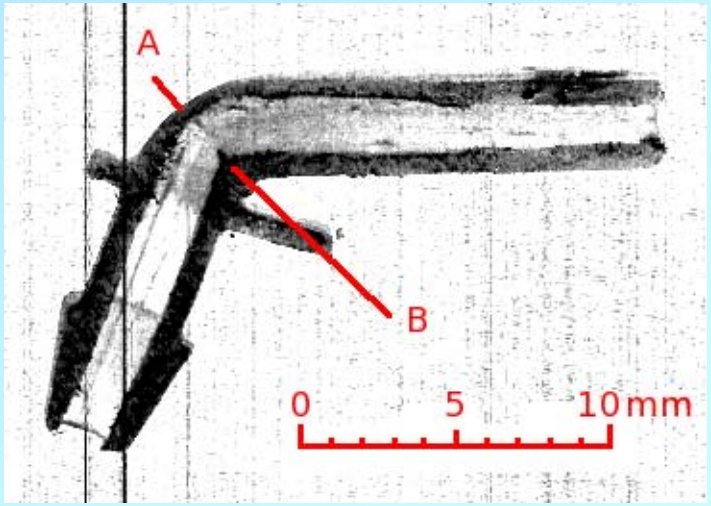
Tests indicate that the choke points in the sysem are the 45 deg bends in the plastic barbed fittings on the stave heat sinks (see below)

Obstruction (cross-section A – B) can't be filed or cut out very easily without doing damage to the fitting.

Barbed fitting glued to ends of carbon fiber heat sink

Cut away view of fitting showing choke point

(Image courtesy of Hubert)



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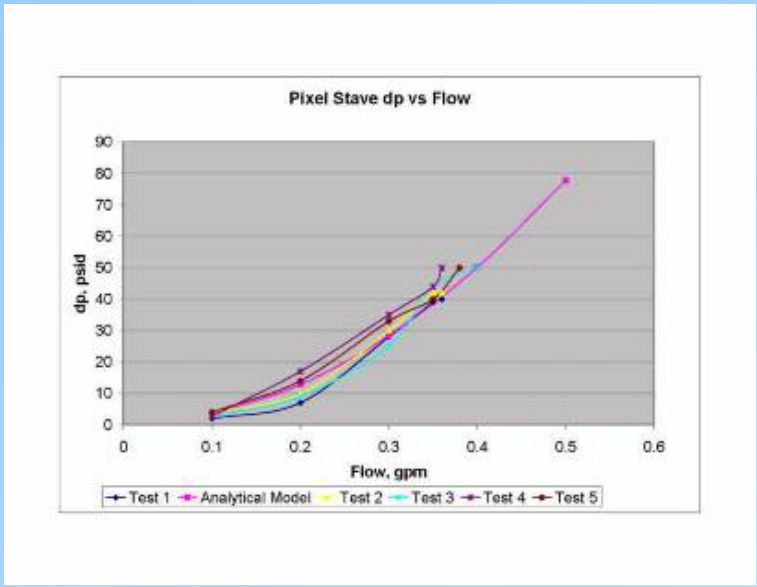
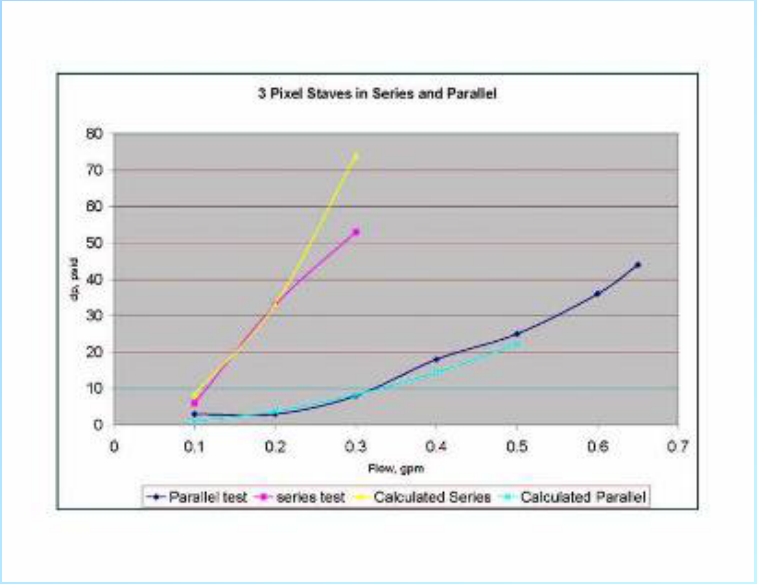
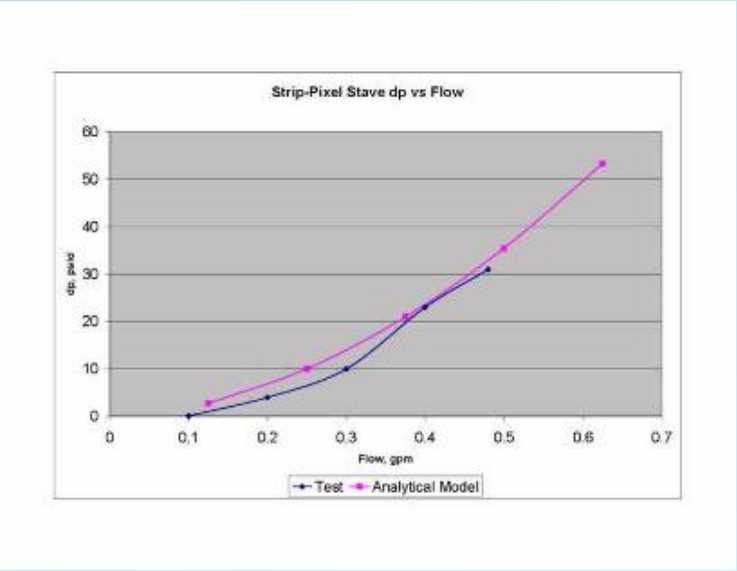
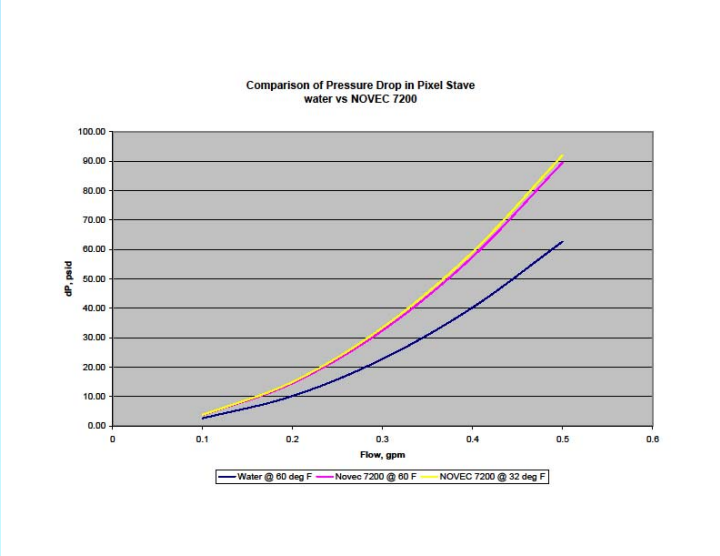




Test Results used to adjust pixel analytical flow model for choke point only. Strip pixel model required no adjustment.





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In order to find an acceptable configuration and set of flow parameters a completely new set of flow and thermal calculations for the pixel staves, strip-pixel staves and FVTX disks 1-4 was set up.

The specifications fixed for the analyses were as follows:

Maximum inlet pressure: 20 psig
Maximum pixel sensor temperature: 20°C
Maximum strip-pixel sensor temperature: 0°C
Maximum FVTX disk sensor temperature: 20°C
Maximum pressure drop between external inlet manifold and external outlet manifold: 10 psid
Electronics heatloads

Additional input for the calculations: estimate ambient heat gain for detector is distributed among all cooling loops as a ~ 35% increase in sensor heat load. (Based on conservative ambient heat gain analysis.)

Temperature rise from cooling circuit wall temperature to sensor is derived from HYTEC thermal analyses: scaled from FEA calculation specified heat loads to tabulated (spreadsheet heatloads) and scaled again for 35% ambient load allowance described above. It is assumed that the FEA analyses

Flow calculations for FVTX based on available information in FEA, tabulating spreadsheet and flow diagrams provided by HYTEC. Calculations should be considered as design requirements for future FVTX design work to assure appropriate flow balancing.

Flow calculations were iterated until flows were balanced by pressure drop among all parallel loops and maximum exit temperatures for all loops met above requirements

The FVTX exit flow will be channeled through an external heat exchanger to precool N2 flow to the detector gas enclosures. This will be established empirically during VTX installation and the results provided to FVTX for final thermal/flow design refinements after VTX installation this summer.

Layers 1 and 2 Pixel Stave Cooling Loop

F_V= 17.3 ml/sec
Tin= -8 °C
Pin = 138 KpA
(20 PSIG)

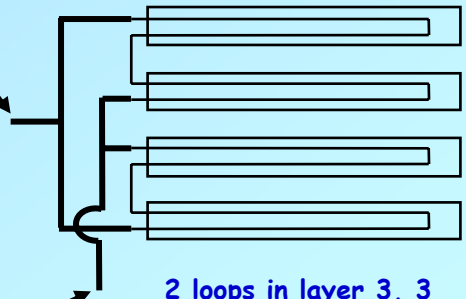
Tout= -4°C
Pout = 69 KpA
(10 psig)

1 loop in layer 1, 2 loops in layer 2 per ½ detector

New internal loop designs which meet design requirements

Layers 3 and 4 Strip-Pixel Stave Cooling Loop

F_V= 27.6 ml/sec
Tin= -8 °C
Pin = 138 KpA
(20 PSIG)

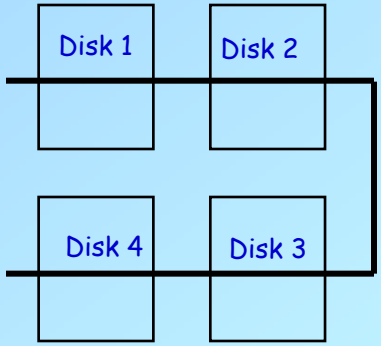


Tout= -6°C
Pout = 69 KpA
(10 psig)

2 loops in layer 3, 3 loops in layer 4 per ½ detector

FVTX Cooling Loop

F_V= 19 ml/sec
Tin= -8 °C
Pin = 138 KpA
(20 PSIG)



Tout= -7°C
Pout = 69 KpA
(10 psig)

1 loop in north end, 1 loop in south end per ½ detector

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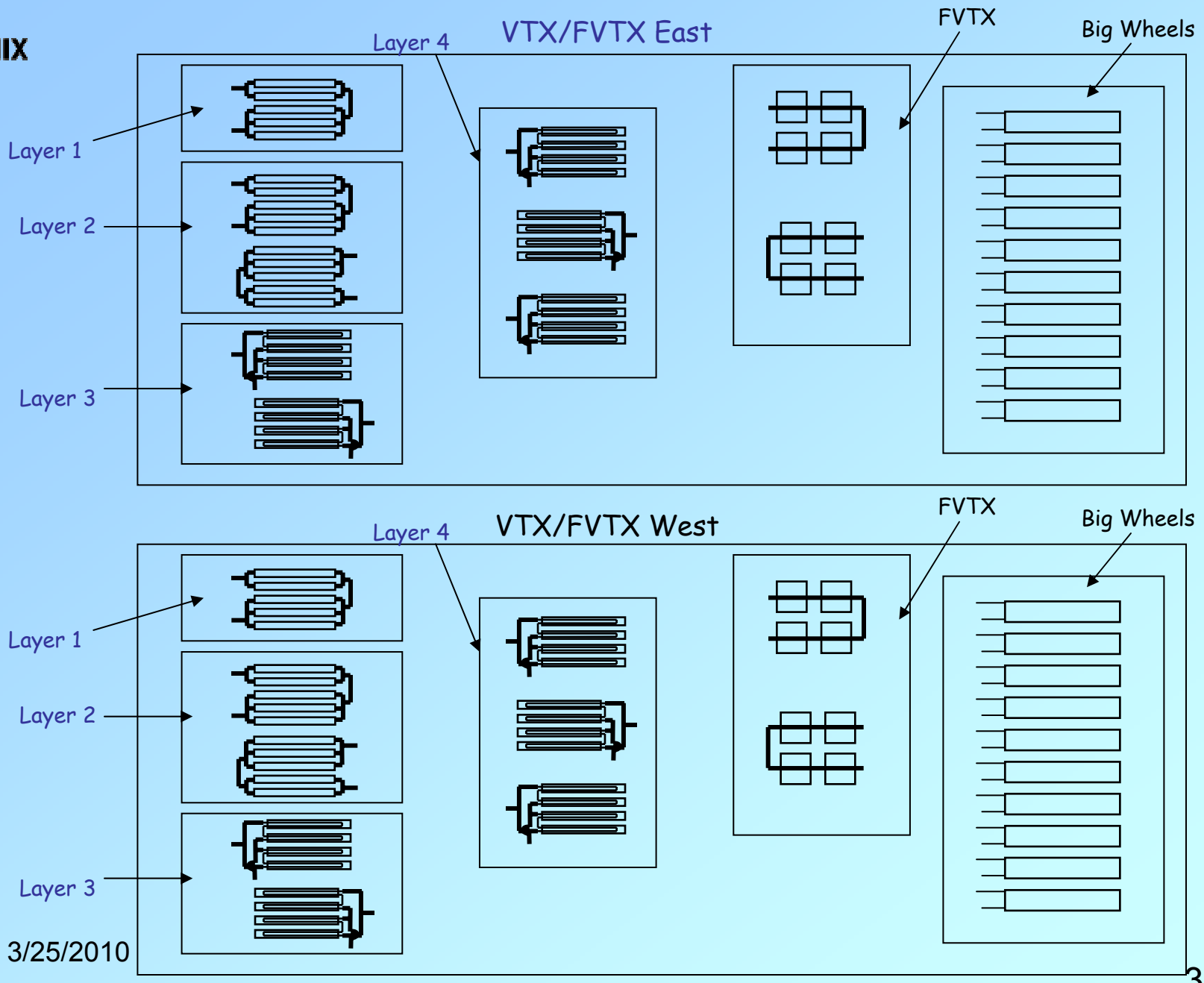
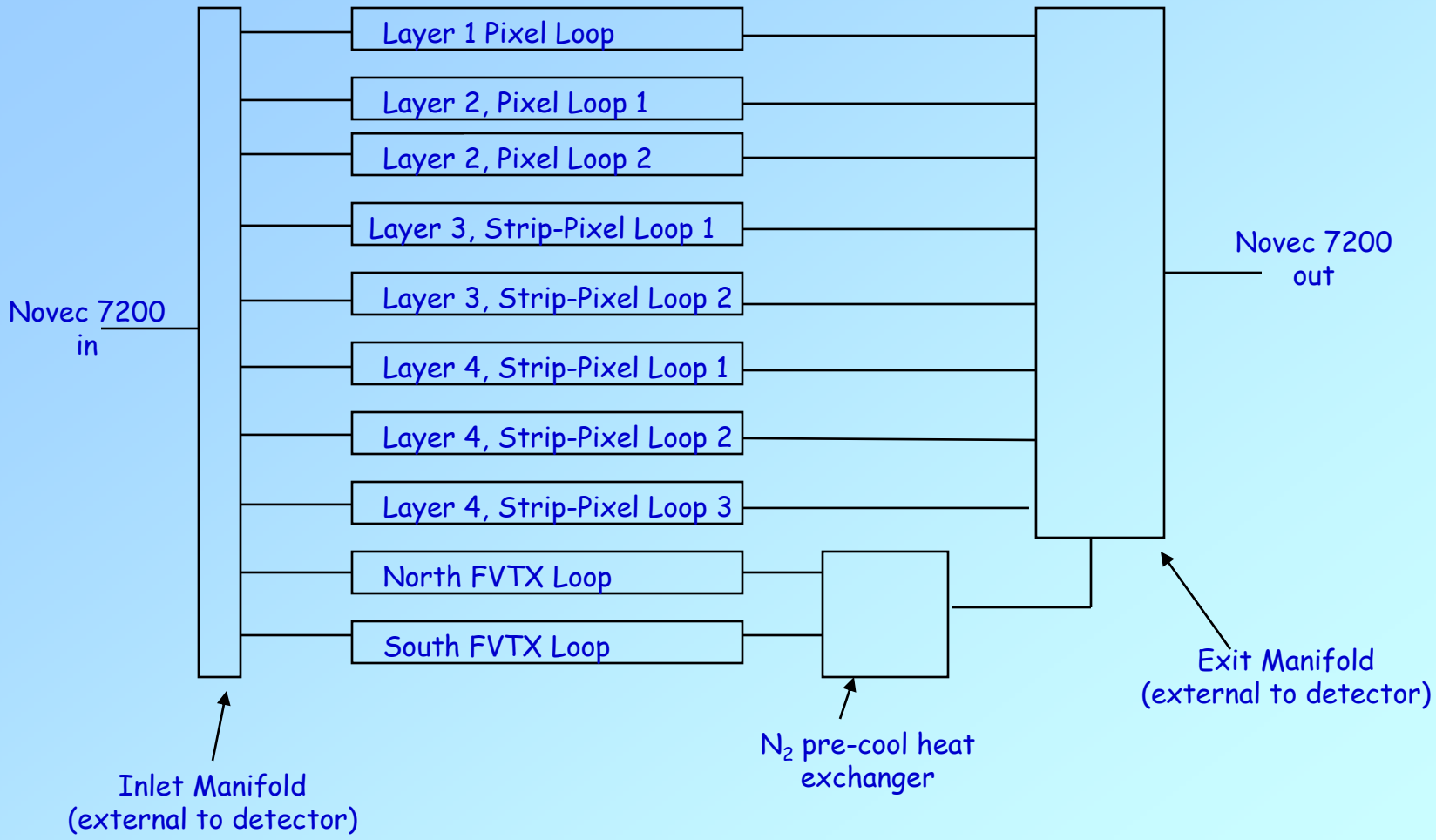


VTX/FVTX Flow Schematic, ½ detector



VTX/FVTX Thermal Calculation Summary

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Layer	Coolant	Number of loops/layer	# Circuits in parallel per loop	# of passes in series per loop	Fluid Inlet Temperature		Inlet Pressure		Flow rate in circuit		Total flow rate in loop	
					°F	°C	psig	kPa	gpm	ml/sec	gpm	ml/sec
1	Novec 7200	1	3*	2	17.5	-8.056	20	137.895	0.137	8.64	0.274	17.29
2	Novec 7200	2	3*	2	17.5	-8.056	20	137.895	0.137	8.64	0.274	17.29
3	Novec 7200	2	2	2	17.5	-8.056	20	137.895	0.219	13.82	0.438	27.63
4	Novec 7200	3	2	2	17.5	-8.056	20	137.895	0.212	13.38	0.424	26.75
FVTX	Novec 7200	2	1	4	17.5	-8.056	20	137.895	0.3	18.93	0.3	18.93

Layer	Total Loop Heat Load		Fluid Outlet Temperature		Loop Pressure drop		Maximum Sensor Temperature		Notes
	BTU/hr	Watts	°F	°C	psid	kPa	°F	°C	
1	450	132	25.1	-3.9	10.0	68.9	67.1	19.5	2 circuits in 1st pass, 3 circuits in 2nd pass
2	450	132	25.1	-3.9	10.0	68.9	66.7	19.3	
3	340	100	21.1	-6.1	10.0	68.9	31.5	-0.3	
4	392	115	21.8	-5.7	10.0	68.9	32.2	0.1	
FVTX	500	146	25.2	-3.8	10*	68.9	65.8	18.8	* includesDisk 1 through 4 in series and N2 pre-cool heat exchenger

Inlet and Return Piping Calculations & Requirements

After determining internal flow requirements, the inlet and exit piping requirements were analyzed with the following results:

Flow: ~7.5 gpm
Piping length: 100 feet each, inlet and outlet
Inlet and outlet ambient heat gain: 1.4 kW (total for inlet and outlet assumes moderately insulated piping)
Pipe size: 1 inch ID
Piping pressure drop: 8.45 psid inlet and same for outlet (maximum allowed 10 psid both sides)

VTX/FVTX Chiller Requirements (not including "Big Wheels")

Coolant: Novec 7200

Flow rate: 7.5 gpm

Coolant Supply Temp.: -9°C

Coolant Supply Pressure: 30 psig

Capacity: ~4 kW

VTX/FVTX Chiller Requirments ("Big Wheels")

Coolant: Ethylene Glycol/Water 60/40

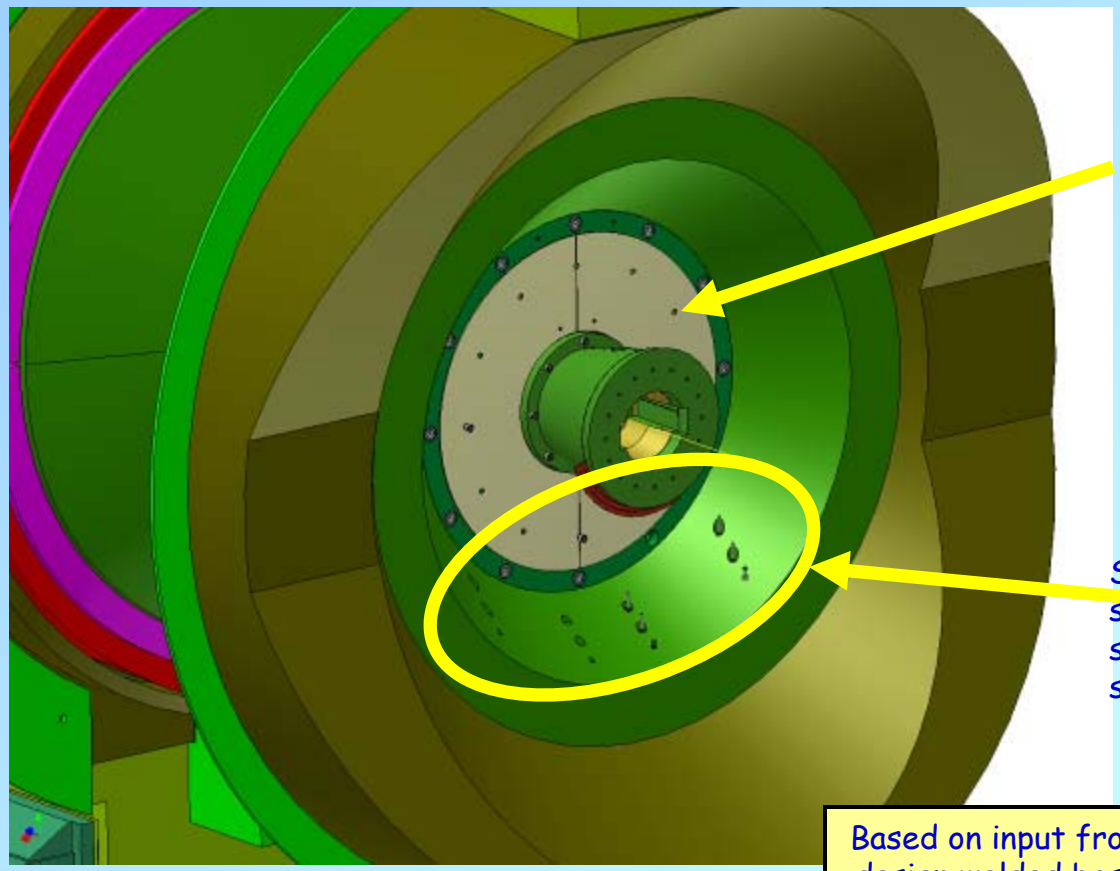
Flow rate: TBD gpm

Coolant Supply Temp.: TBD °C

Coolant Supply Pressure: TBD psig

Capacity: ~2.5 kW

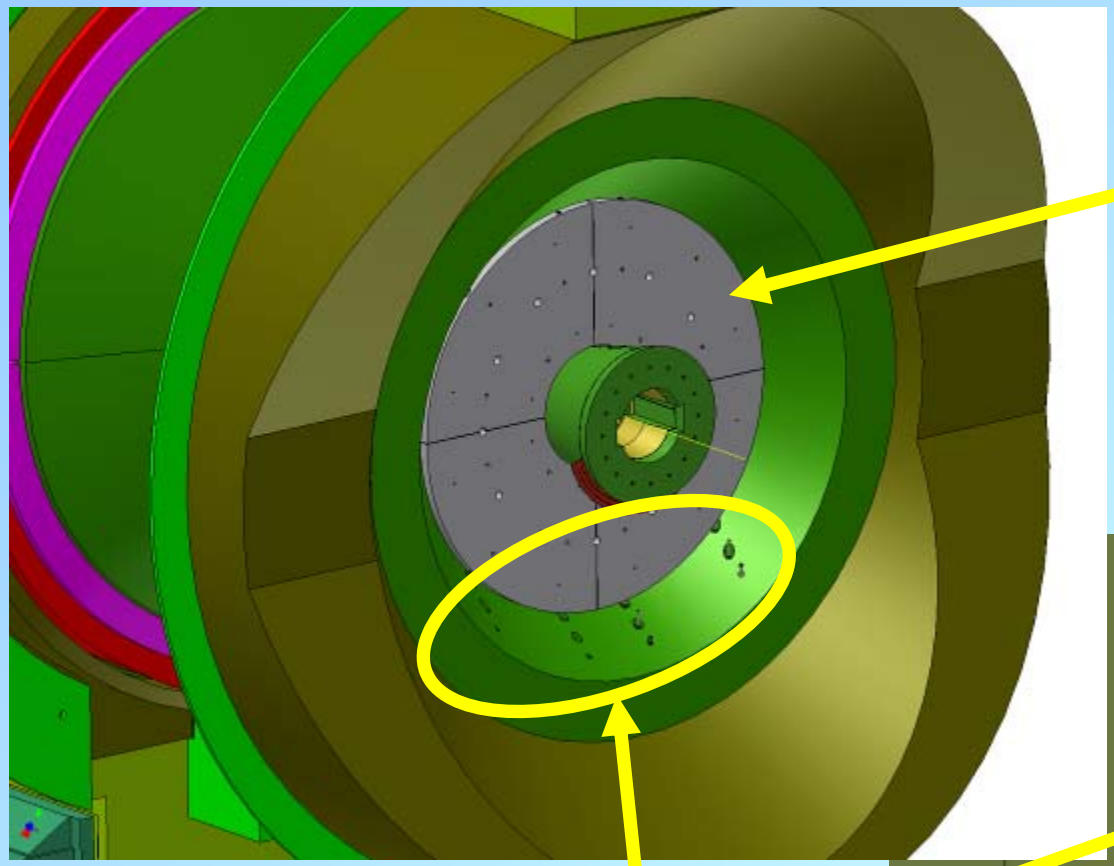
RPC Absorber Design Plan Presented to RPC group and approved, Detail design drawings in progress to be completed by 4/14/2010



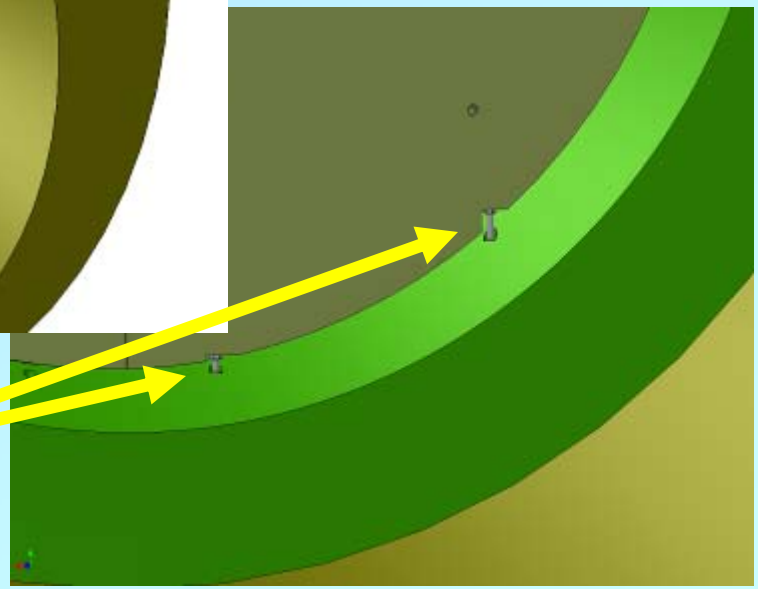
~ 1/8" th plate in 2 halves to shim out and compensate for existing prominent bolt heads. Holes in plates to allow access to existing M24 tapped holes.

Spotface, drill and tap lower side of conical outer cavity surface for absorber supports

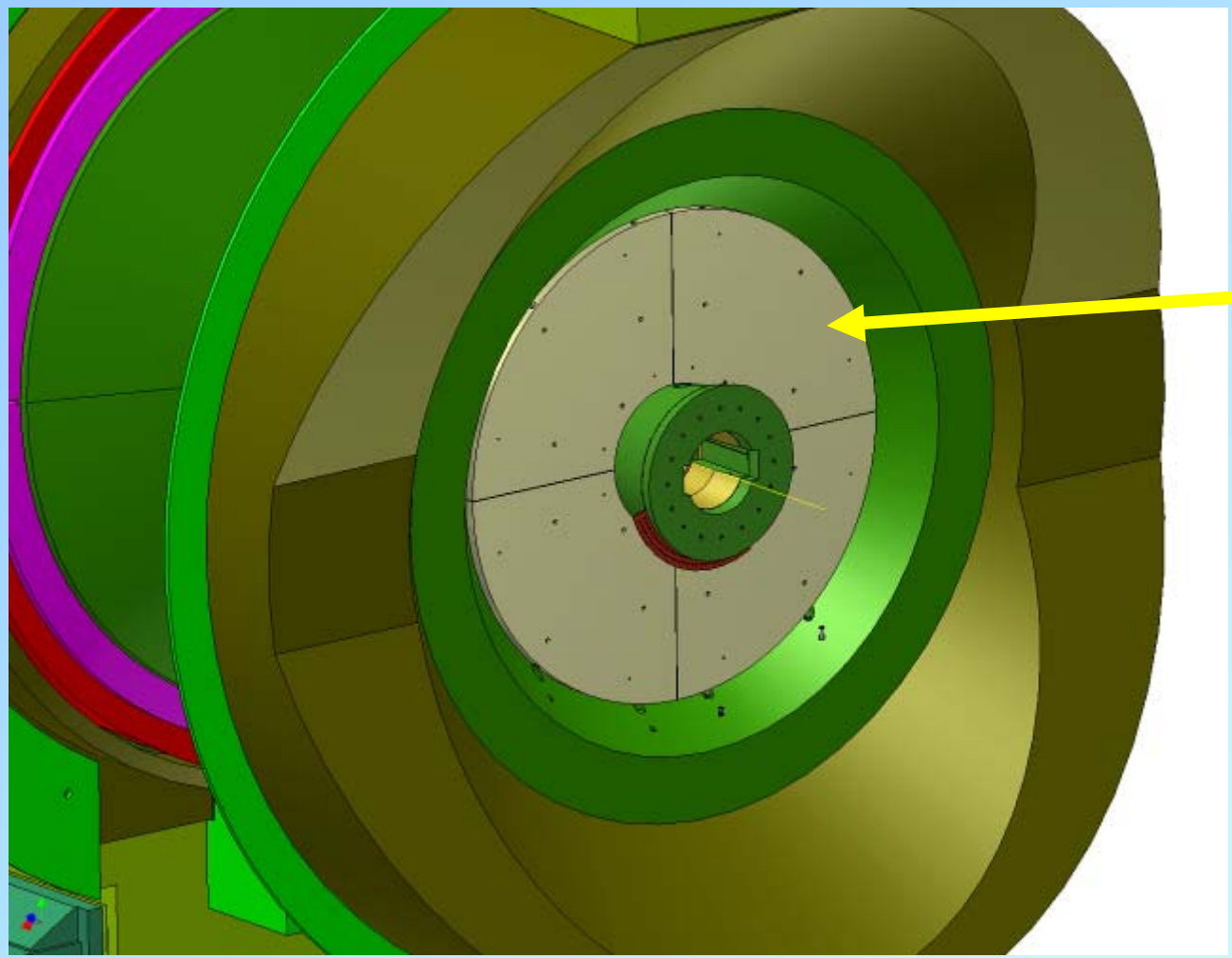
Based on input from PHENIX techs we will design welded bosses to support absorber plates instead of spotface, drill & tap



3 layers of 2" thick plate with counterbored holes for M24 screws to attach to existing tapped holes at rear of cavity. Layers are sliced into quadrants for easier handling and positioning



½-13 bolts support 3rd 5th and 7th layers in 12 Spots


Layers 4 and 5: (2) 2" plates, again divided into quadrants

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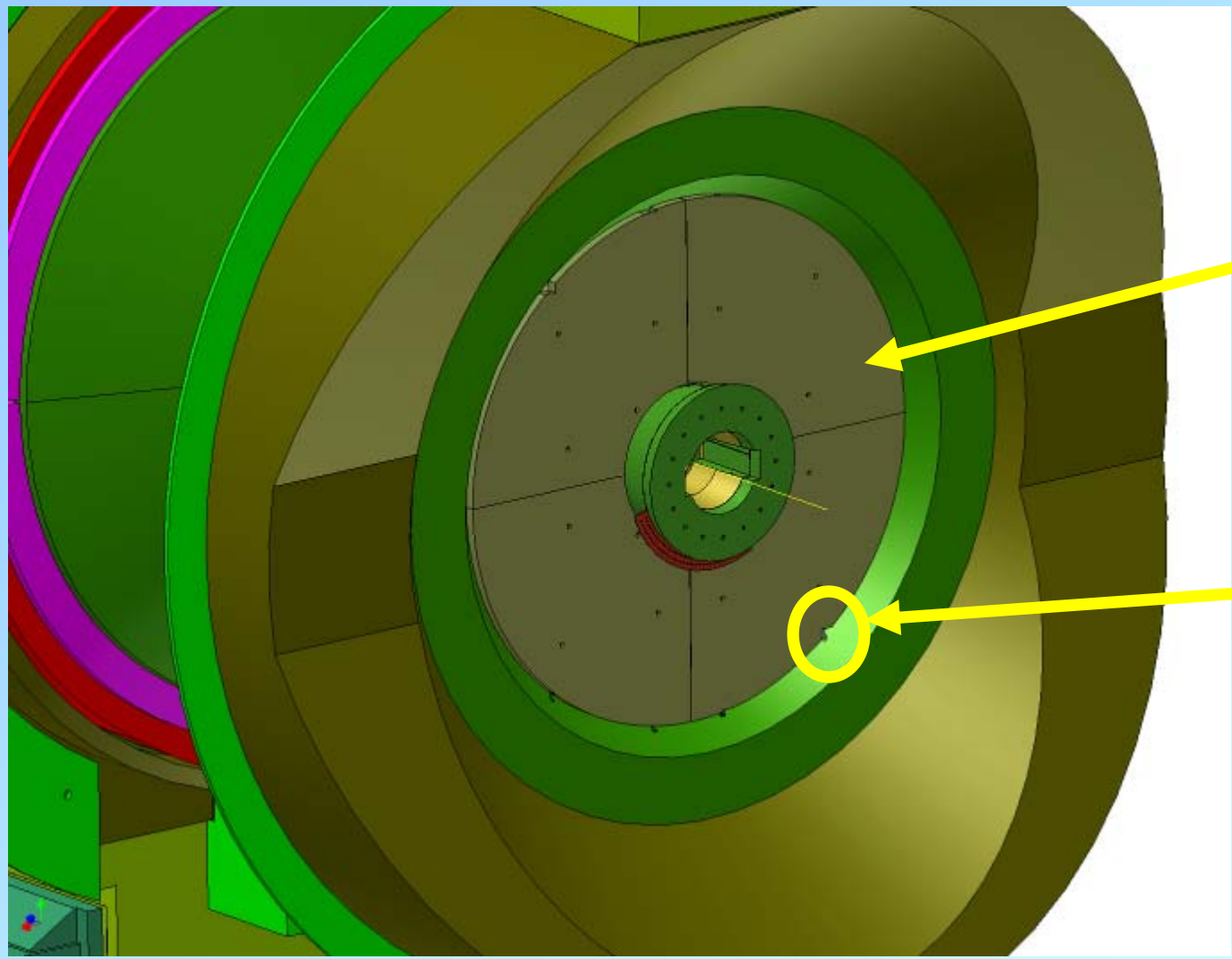
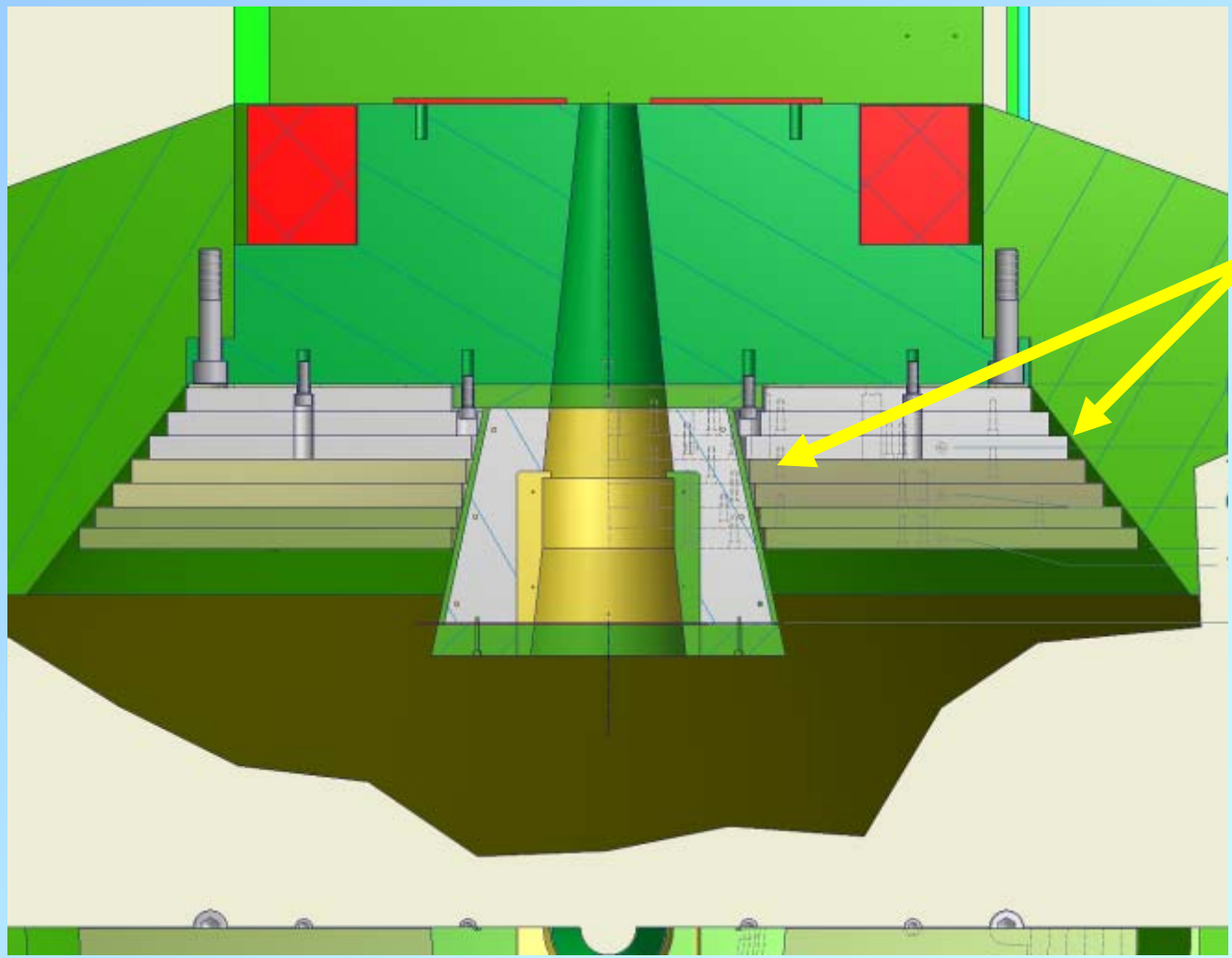


Layers 6 and 7, (2) 1-3/4" plates. Each plate has counter bored holes to allow attachment to the next underneath layer and tapped holes to allow the next outer layer to attach to it.

Layers 3, 5 and 7 have machined flats on the bottom quadrants to support the weight of the absorber.



Inner and outer radii for each layer is adjusted to allow conformance with the inner and outer conical cavity shape. North side and south side have different inner radii to allow for differring flower pot angles.

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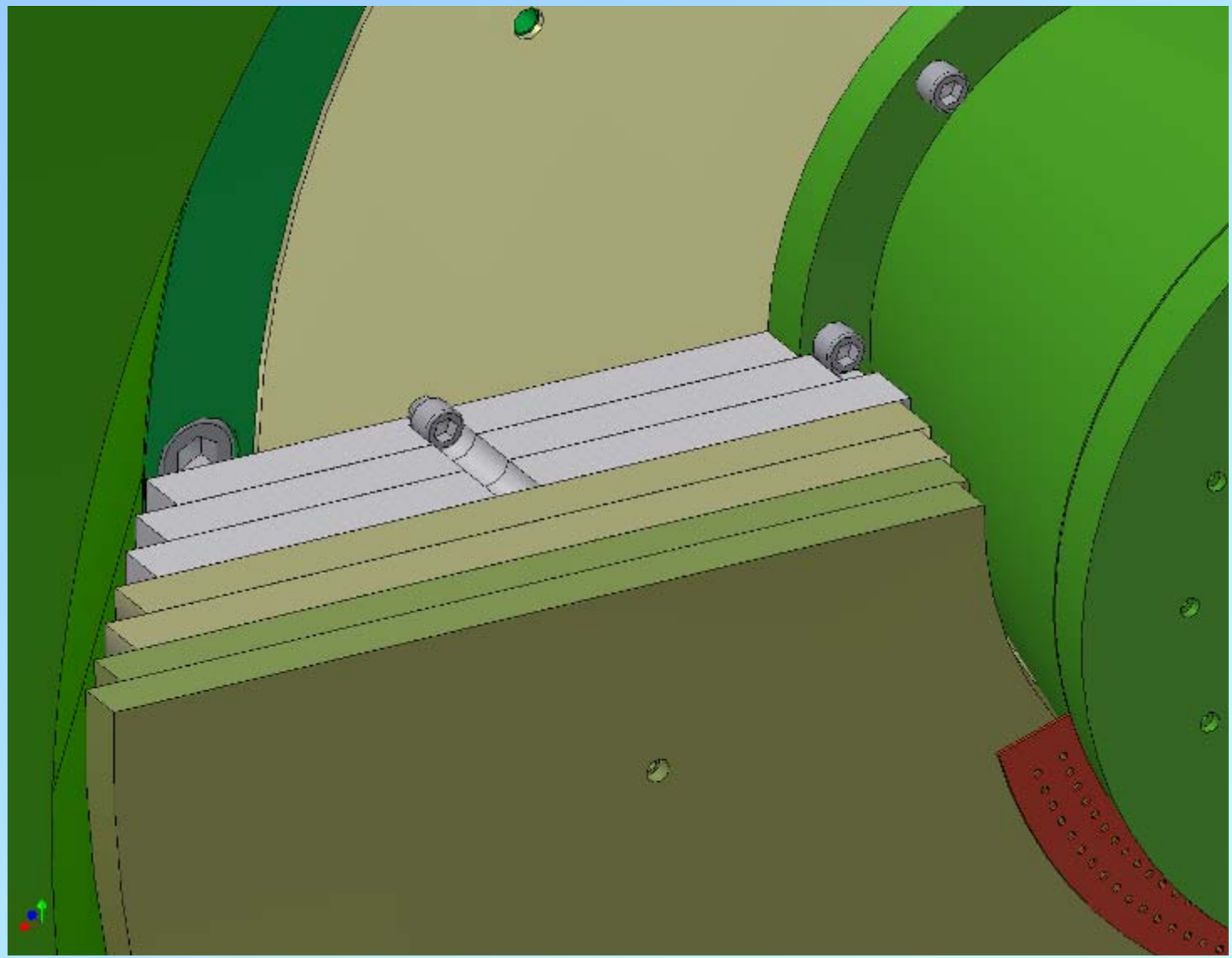

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Material Procurement Info

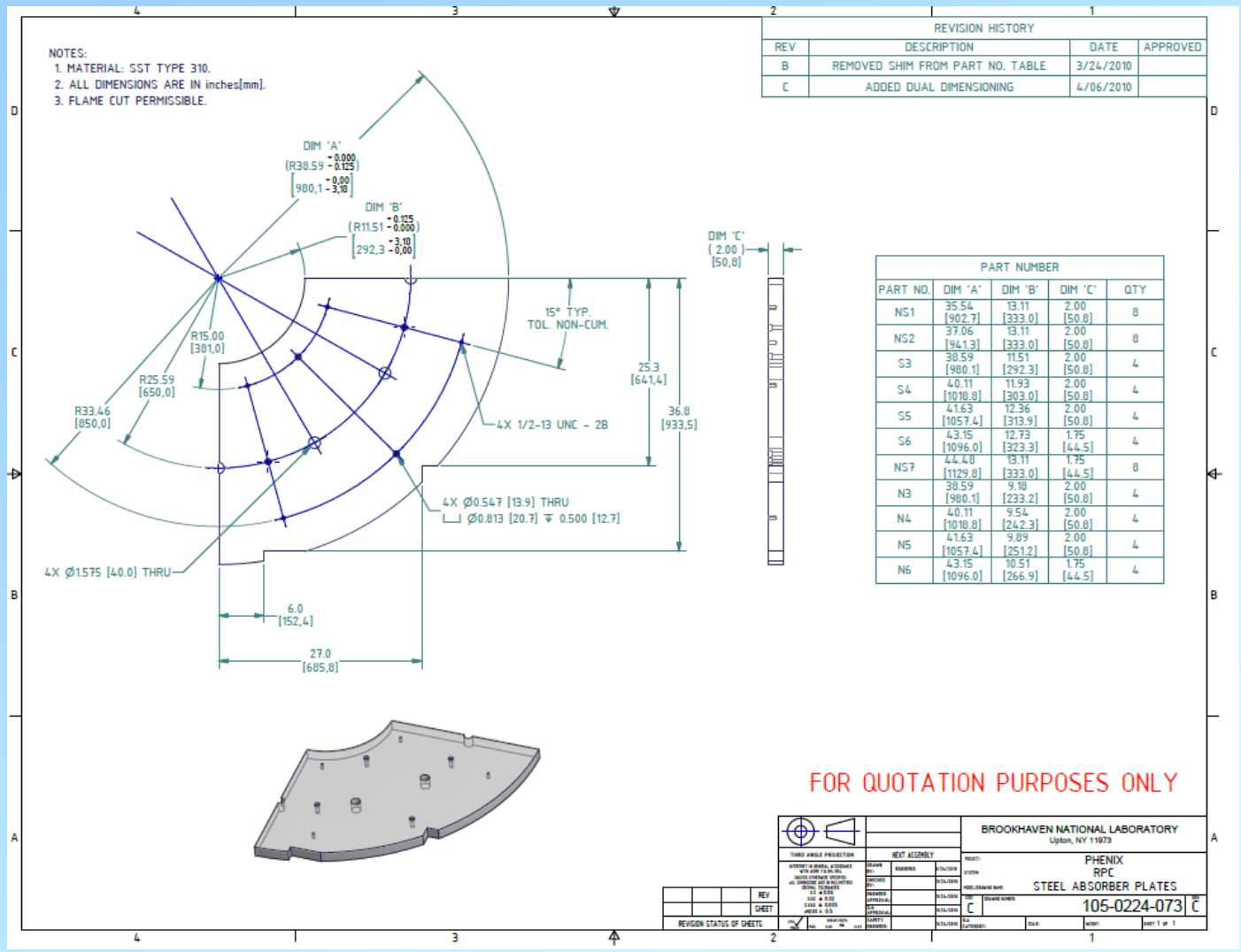
We need a total of 56 ¼ clindrical 310 Stainless Steel plates (28 for each side) for the north and south absorbers, with inner radius, outer radius and thickness as shown in the drawing on the next slide.

We also need 4 half cylindrical .25" plates of 310 stainless steel for the shims.
(Note: preliminary drawing shows ¼ cylindrical shims, needs to be corrected.)

Weight Calculations for absorber ¼ cylindrical plates

	Density	Outer Radius	Inner Radius	angle	thickness	area	volume	weight
	lb/cu ft	In	In	deg	In	sq in	cu in	lb
NS1	0.29	35.54	13.11	90	2	857.0	1714.1	497.1
NS2	0.29	37.06	13.11	90	2	943.7	1887.4	547.4
S3	0.29	38.58	11.5	90	2	1065.1	2130.3	617.8
S4	0.29	40.11	11.93	90	2	1151.8	2303.6	668.0
S5	0.29	41.63	12.36	90	2	1241.2	2482.3	719.9
S6	0.29	43.15	12.73	90	1.75	1335.1	2336.4	677.6
NS7	0.29	44.48	13.11	90	1.75	1418.9	2483.1	720.1
N3	0.29	38.58	9.18	90	2	1102.8	2205.6	639.6
N4	0.29	40.11	9.54	90	2	1192.1	2384.2	691.4
N5	0.29	41.63	9.89	90	2	1284.3	2568.6	744.9
N6	0.29	43.15	10.51	90	1.75	1375.6	2407.3	698.1
Shim	0.29	31.5	13.11	180	0.25	1288.6	322.2	93.4

Preliminary design specification for procurement of absorber plates. Final design drawings are in progress



REVISION HISTORY

REV	DESCRIPTION	DATE	APPROVED
B	REMOVED SHIM FROM PART NO. TABLE	3/24/2010	
C	ADDED DUAL DIMENSIONING	4/06/2010	

NOTES:
1. MATERIAL: SST TYPE 310.
2. ALL DIMENSIONS ARE IN inches[mm].
3. FLAME CUT PERMISSIBLE.

PART NUMBER

PART NO.	DIM 'A'	DIM 'B'	DIM 'C'	QTY
NS1	35.54 [902.7]	13.11 [333.0]	2.00 [50.8]	8
NS2	37.06 [941.3]	13.11 [333.0]	2.00 [50.8]	8
S3	38.59 [980.1]	11.51 [292.3]	2.00 [50.8]	4
S4	40.11 [1018.8]	11.93 [303.0]	2.00 [50.8]	4
S5	41.63 [1057.4]	12.36 [313.9]	2.00 [50.8]	4
S6	43.15 [1096.0]	12.73 [323.3]	1.75 [44.5]	4
NS7	44.48 [1129.8]	13.11 [333.0]	1.75 [44.5]	8
N3	38.59 [980.1]	9.18 [233.2]	2.00 [50.8]	4
N4	40.11 [1018.8]	9.54 [242.3]	2.00 [50.8]	4
N5	41.63 [1057.4]	9.89 [251.2]	2.00 [50.8]	4
N6	43.15 [1096.0]	10.51 [266.9]	1.75 [44.5]	4

FOR QUOTATION PURPOSES ONLY

BROOKHAVEN NATIONAL LABORATORY
Upton, NY 11973

PHENIX
RPC
STEEL ABSORBER PLATES

105-0224-073 C

Safety, Security, etc.

Holiday weekend, be extra careful driving

New NFPA 70E Requirements for Insulated Hand Tools

Insulated hand tools are used for safety. NFPA 70E is the "Standard for Electrical Safety in the Workplace". This was revised effective January 2009 for insulated hand tools in section 130.7(D)(1)(a)(3).

The overall requirements for where to use insulated tools didn't change. If there is any chance that a tool could make accidental contact when working close to energized parts, insulated tools are required. In addition, insulated hand tools are required where specified in Table 130.7(C)(9).

The new requirement is for the electrician to inspect his insulated tool prior to each use. This required inspection looks for damage in the outer protective coating, which covers the inner insulation. The different layers have contrasting colors to easily spot any damage. Also the user should be checking whether the insulated tool meets the OSHA safety standards.

This new requirement emphasizes that electricians should be taking the responsibility to check their own tools. What's the difference between a hardware store orange screwdriver marked "Insulated" and an insulated screwdriver complying with OSHA and NFPA 70E - besides the price? The answer is safety and OSHA compliance.

UL has an insulated tool standard that includes all the OSHA and NPFA 70E requirements. If the insulated tool is UL listed for the voltage, it's safe to use.

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Where To Find PHENIX Engineering Info

In honor of April Fools Day, there will be no meeting today.
(no, really, this is not an April Fools joke)
Next meeting will be next week on April 8th.

Links for the weekly planning meeting slides, archives of past meeting slides,long term planning, pictures, videos and other technical info can be found on the PHENIX Engineering web site:

http://www.phenix.bnl.gov/WWW/INTEGRATION/ME&Integration/DRL_SSint-page.htm