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# **WBS 2.8/2.9 Plenary**

# **Near/Far Detector Assembly**

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# Far Detector Assembly

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- Preparation for assembly
  - Simplify design with single module type
  - Establish detailed plan
  - Understand structural requirements
- Tooling development
  - Block Pivoter
  - Lifting fixtures
  - Adhesive dispensing



# Block Pivoter Developments

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- The Full Height Engineering Prototype(FHEP) will be installed in the CDF assembly hall.
- A prototype for the pivoter was built for this.
  - Assembled in Fall, 2010
- Safety review summary is Nova #5790.
- Assembly of FHEP was then delayed
  - Scheduling of floor space at ANL



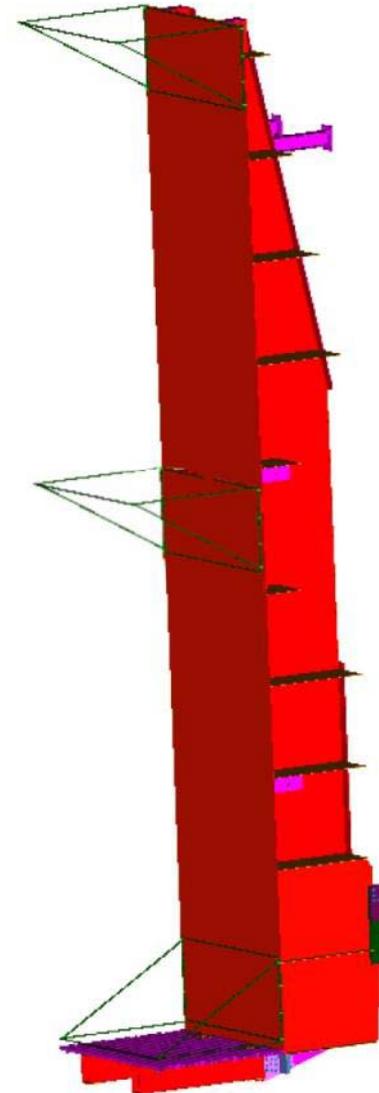
# NOvA prototype pivoter at CDF, Nov 11, 2010





# FHEP Positioning Test

- Unistrut arms were added to the table top (out “fake block”)
- 4 position sensors were mounted on each arm.
- The pivoter was then driven to the bookend, to check for repeatability, precision, etc.
  - More in #5755

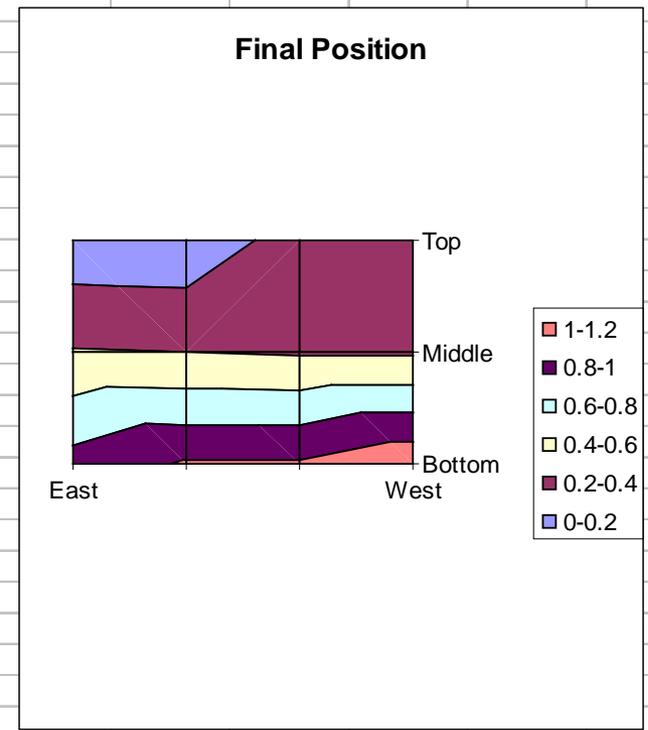




# FHEP Positioning Test

- The final position
- Blocks will be installed with a deliberate lean 1” to the south.
- We were able to set the tilt angle very precisely.
  - Nice “kneeling” cylinder control.

	East			West	
Top	0.065	0.052	0.295	0.309	
Middle	0.413	0.4	0.374	0.372	
Bottom	0.879	1.017	1.017	1.153	





# FHEP Construction

- FHEP construction is now in full swing at ANL.
- Tabletop was removed and shipped
- FHEP will be built, then entire loaded tabletop will be shipped back to CDF.



- Modules and lifting fixtures



# FHEP Construction

- Table is surrounded by scaffold.
- Tooling used:
  - Ash River lifting fixture
  - Near Detector lifting fixture
  - Near detector adhesive dispenser



- 12 layers in place.



# FHEP Construction

- Pallet (base) end of FHEP
- 10 layers in place.





# FHEP goals when back at CDF

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# Assembly Tooling Status

- 3 Lifting fixtures built, one certified, two with minor vacuum issues
  - Provides a live spare for Ash Rivier
- Adhesive dispenser
  - Pumps, carriage, module roller in hand
  - Rails installed at Ash River
  - Needs electrical, programming work
    - After FHEP (Sep.)





# Assembly Tooling Status

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- Block Pivoter will set the schedule for assembly readiness.
- All components are in hand or on order
- Assembly of the lower section is in progress at FNAL
- Parts shipped to Ash River in the fall
- Current working schedule has completion on 19 Jan 2012.



# Pivoter Assembly Sequence



# Pivoter Assembly



- Most pieces will be assembled here to assure the fit
- Sections will be sent as complete as possible.
- Issues (some have been found) are best handled here.



- Lower section assembly at FNAL



# Pallets

- Six pallet sections are required for each block
  - Twelve are on order
- Recent visit by engineers reinforced the importance of the flatness
  - Vendor is improving welding technique.



- First pallet section
  - Laying upside down
- At the vendor



# Ash River Preparations

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- The largest consumable for assembly is the adhesive
- A long term contract for this is now in place.
- A contract for pallets will be established after the first two blocks have been received.



# Schedule Risk

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- The assembly schedule at Ash River is untested.
  - Good timing shown during the Full Size prototype two years ago.
  - Steady state, local issues, are untested
  - Compression plates have been added to the procedure - not a big delay



# Assembly Production

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- Currently, two 10 hour shifts, 4 days
  - Fifth day has one shift for receiving, maintenance.
- Potentially, 6 additional shifts are available for assembly
  - Scheduling these is our fallback, if needed.
  - Contingency on labor is 70%, to cover these shifts.



# Assembly Strategy

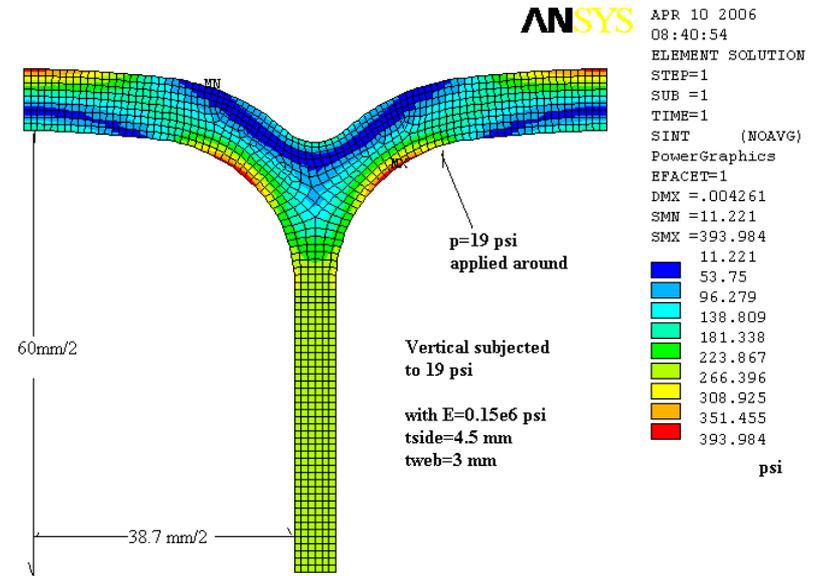
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- The assembly plan has developed since the TDR - all towards simplicity and reliability.
  - All blocks will be identical, 32 planes
  - All modules will be identical
  - All block-to-block gaps will be identical
  - All blocks will have a small tilt to the south
- A south wall “bookend” will offset the first block from the wall, establish the surface.



# Design of the Structure

- New module plan uses only thick walled extrusions.
  - Previously, horizontals were thinner
- Analyzed for stability to buckling, sensitivity to the block gap.
  - Safety factor for buckling increased from 1.3 to 3.1
- Summarized in #6257



- Greater tolerance for installation variations
- Block gap not as critical



# Ash River Crew

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- The staffing at Ash River is beginning to grow
- Bill Miller - Assembly Manager
- Larry Salmela - Safety Officer, reports to UM.
- Curt Lerol
- Couple more - need Bill to return from vacation.



# Near Detector Construction

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- Construction of a Near Detector could occur in summer/fall 2012
- Argonne is available - different crew, tooling
  - No loss of capability at to Ash River
- Would likely require some design
  - Probably consider thinner blocks, easier handling
  - 16 or 24 layers, all identical



# Assembly Conclusions

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- The Detector Assembly group has its tooling in production
- The pivoter is our critical path - ready in Jan.
- New module plan makes strategy more robust
- Assembly schedule is not tested at Ash River
  - Argonne experience shows that it is not far off.
  - Time/contingency for additional shifts is there if needed.