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# **Far Detector Assembly Block Pivot Table Design WBS 2.9.1.4**

**Dave Pushka**

**August 31<sup>th</sup>, 2010**



# Component Design / Fab/ Assy Status

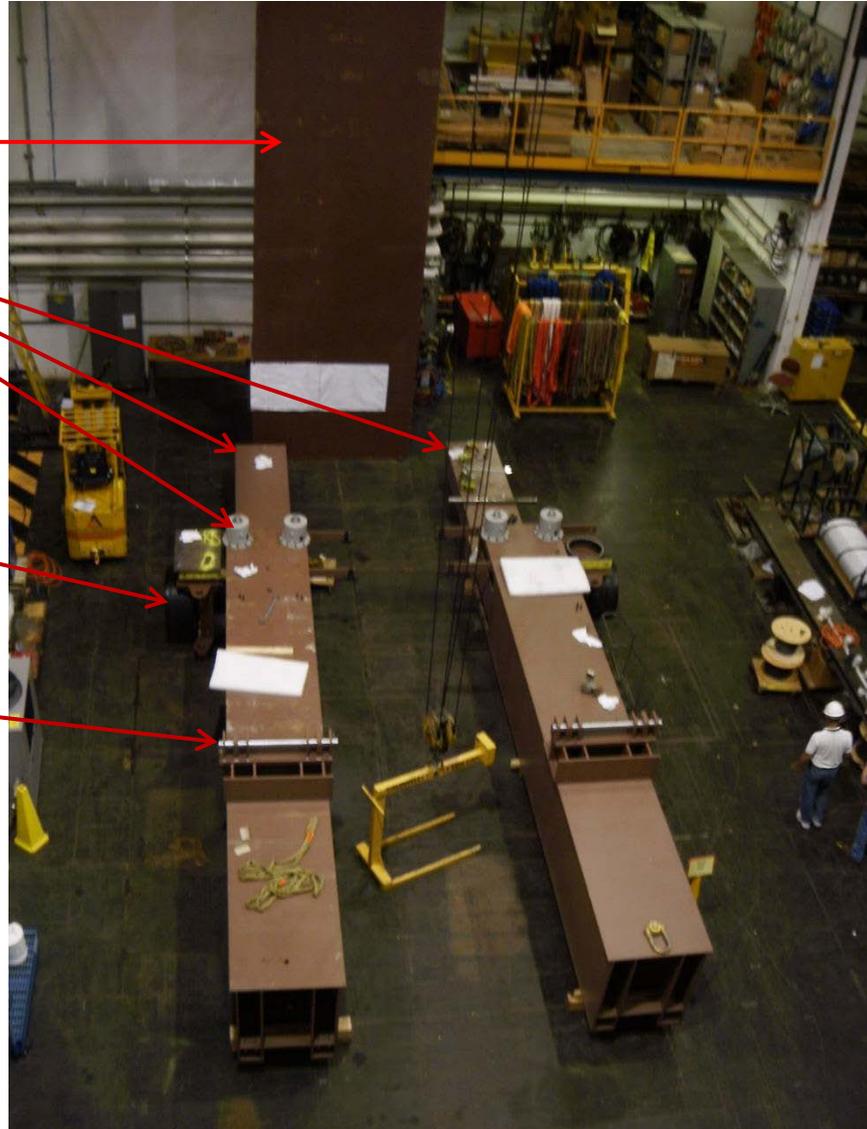
Item	Conceptual Design Complete	Parts Modeled	Calculations or FEA Started	Calculations or FEA Complete	Spec		Fabrication Started	Fabrication Complete	Needed for FHEP	Needed for Ash River	Assy in CDF Started	Assy in CDF Completed
					Written or Fabrication	Spec Written or Fabrication						
•Ash River Detector Assembly Table	Yes	Yes	Yes	Yes	Yes	NO	NO	NO	NO	Yes	n/a	n/a
•FHEP Assembly Table	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NO	Yes	No
•Upper Support Frames	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	YES	YES
•Lower Support Frame	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	YES
•Lower Frame Brace	Yes	Yes	Yes						NO	NO	n/a	n/a
•Pivot Cylinders	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	YES	YES
•Kneeling Cylinders	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
•Horizontal Drive Elements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	YES
•Table Dunnage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NO	Yes	Yes	NO	NO
•Pallet	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NO
•Rolling Elements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	YES
•Rail	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	YES	YES
•FHEP Bookend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NO	Yes	Yes
•Assembly Fixtures	Yes	Yes	Yes	Yes	Yes	Yes	no	no	Yes	Yes	NO	NO



## Two Lower Weldment Assemblies @ CDF

- FHEP Bookend 
- Lower Weldments 
- Kneeling Cylinders (4) 
- Drive Wheel Assemblies (2) 
- Rear Pivot Pin and Brackets 

Photo taken on  
8/3/2010

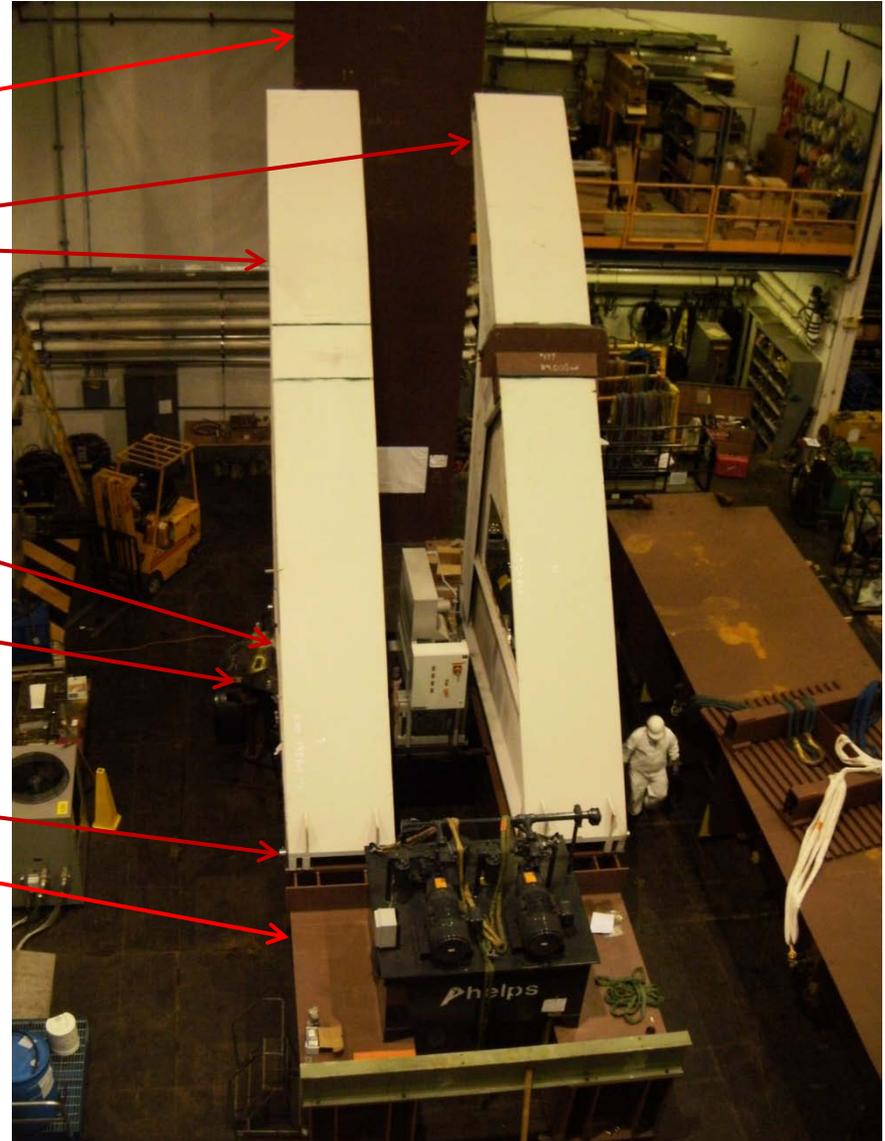




## Two Lower Weldment Assemblies @ CDF

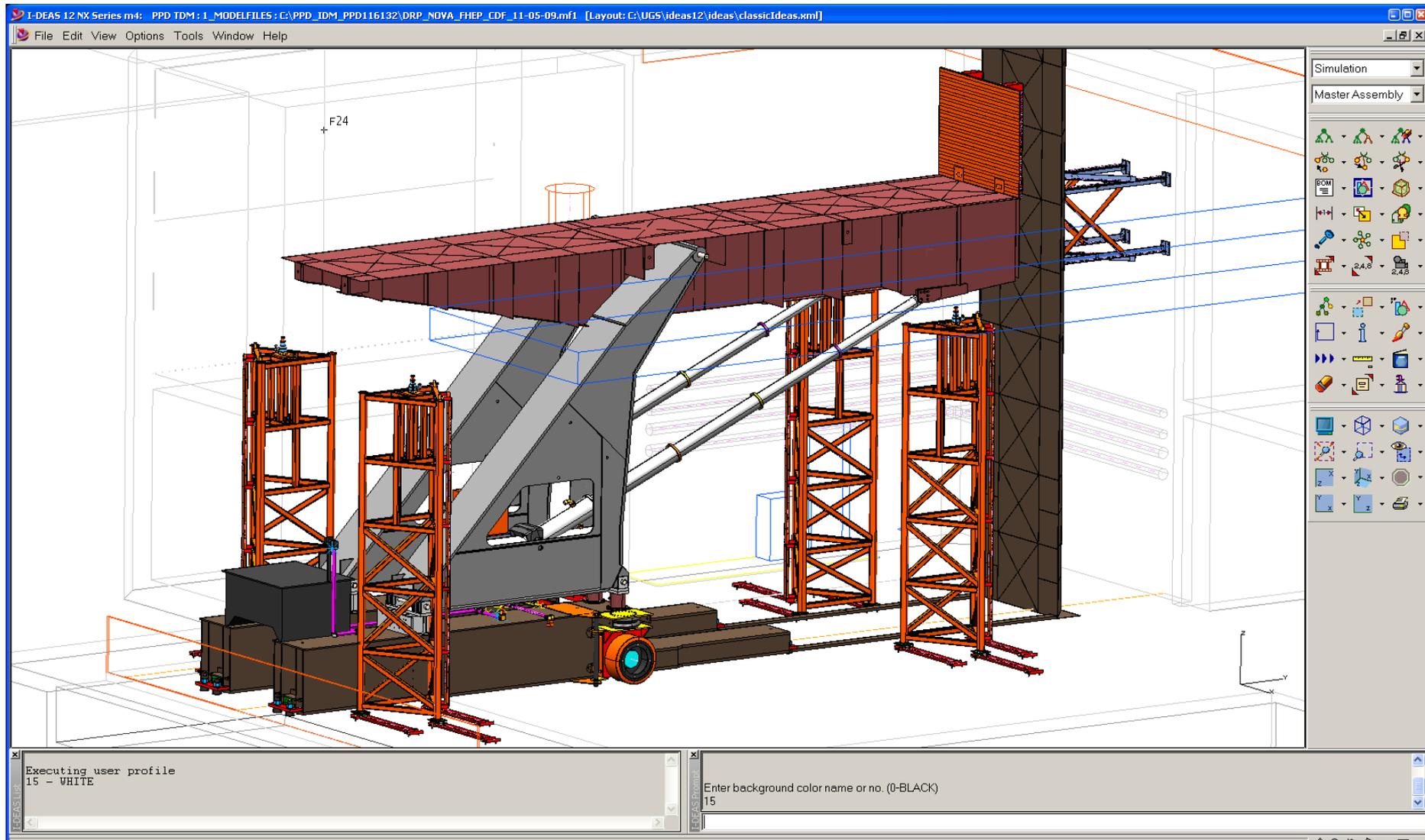
- FHEP Bookend
- Upper Weldments
- Kneeling Cylinders (4)  
(Hidden)
- Drive Wheel  
Assemblies (2)
- Rear Pivot Pin and  
Brackets
- Lower Weldments

Photo Taken 8/25/2010





# Next Steps





# Design Documentation Partial List

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- Engineering Note Written and Reviewed for Pivoter:
  - Pivot Cylinders on MSD Note number 184 (MSD docdb #1003)
  - Lifting Fixtures on MSD Note number 229 (MSD docdb #1199)
  - Kneeling Cylinders on MSD Note number 202 (MSD docdb #1044)
  - FHEP @ CDF on MSD Note number 181 (MSD docdb #1043)
- Engineering Analysis Reports Prepared by Ang Lee for:
  - FHEP Table and Lifting Lugs (NOvA docdb 3647 & 4132)
  - Upper Weldments (NOvA docdb 3666 & 4217)
  - Lower Weldments (NOvA docdb 4416)
  - Conceptual Design of Ash River Table (NOvA docdb 4132)
  - FHEP Bookend (NOvA docdb 3560)



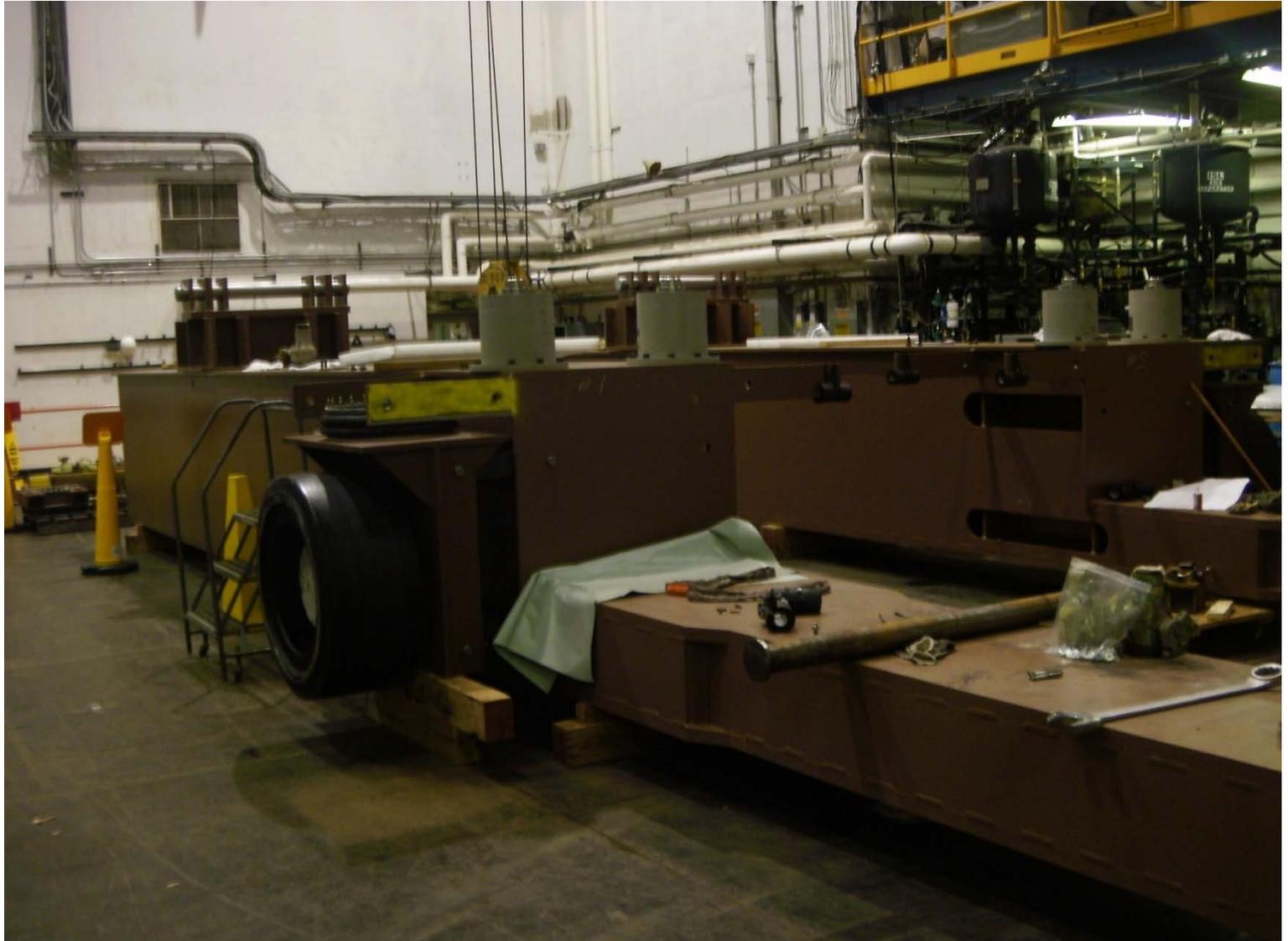
# Summary

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- Mostly FNAL Designed Weldments
- Vendor Supplied Hydraulics (semi-custom applied, almost off the shelf items) with vendor supplied controls.
- Uses Bearings, Hilman Rollers and Cam-followers similar to many installations at FNAL and nationwide.
- Mostly Assembled by PPD/MSD technicians with some ‘fine tuning’ of parts.
- Some limited FNAL supplied welding will be needed (one design goal was to minimize in-house welding and machining). **MOSTLY ALL COMPLETE**
- Remaining items to design and procure include the Ash River Table, FHEP Table + Detector Lifting Fixture, and Table Installation Stanchions, Cribbing or Dunnage.



# Lower Weldments w/ Kneeling Cylinders





# Hilman Roller Assemblies





## One of Two Upper Weldments -





# 100,000 Pound, 325 inch Stroke Cylinders:





# Hydraulic Power Supplies

Drive Unit:



Pivot Cylinders:





## Pivot Cylinders and Trunions





# Upper Frame Lifting Fixture





# Cam Followers





## 700 gallons of hydraulic oil

