NoVA FNAL Engineering Needs

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Scope and Disclaimers

- NoVA detectors only.
- ANU project (part of NoVA and has some mechanical engineering tasks) is ignored.
- Effort to address scope changes/increases due to alternative detector construction methods ignored.
- Nothing on electronics.
- Nothing on computing.

Engineering Activities

Adequately Covered Engineering Activities:

- Detector Structure FEA (Ang Lee)
- Detector Integration (Ernie Villegas)
  - Awaiting details on: Oil Fill, Cooling system, Cable trays
- Scintillator Blending (Anna Pla-Dalmau, D. Pushka)
- Detector Assembly
  - Glue Machine (Vic Gaurino, ANL)
  - Block Pivot Table (D. Pushka – Design, Ang Lee – Analysis, Don Friend (on-call) & Gary Smith – Fabrication Dwgs.
  - FHEP (same as the Block Pivot Table above).

Engineering Activities

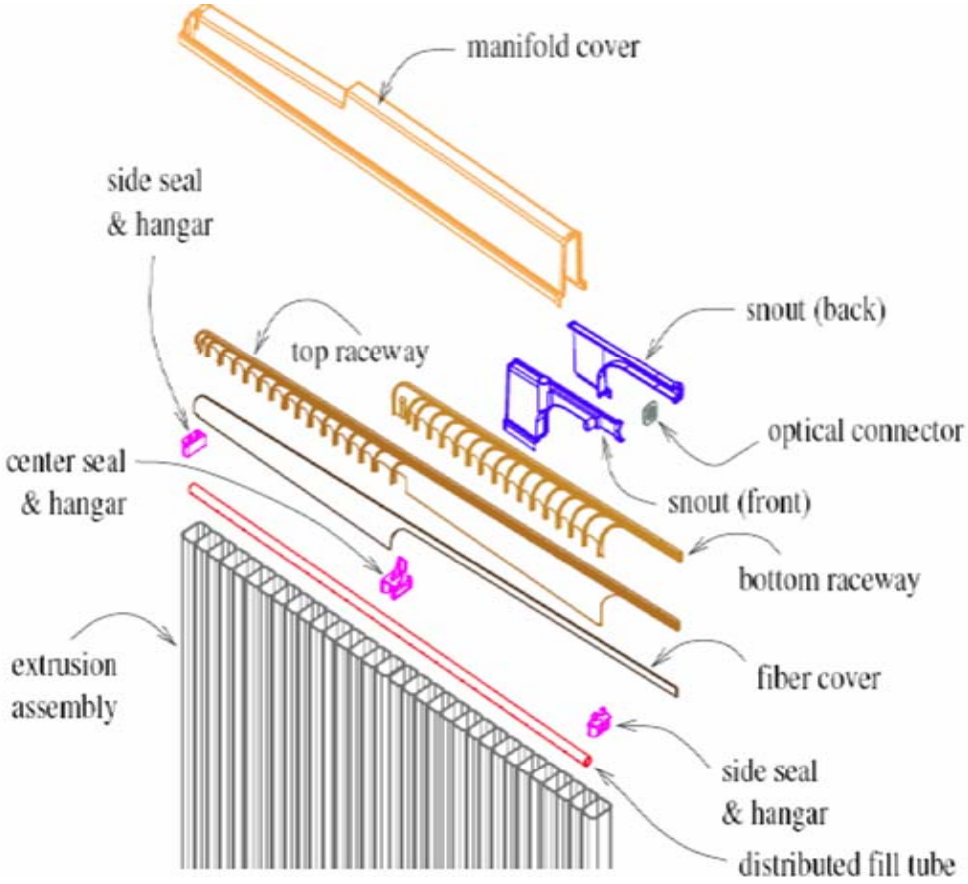
Un-covered engineering activities:

- Far Detector Building 30%, 60% and 90% reviews (Bill Miller is the most active reviewer, but he is not an engineer, formally helped by Dave Ayres)
- IPND Installation (Fire protection, secondary containment)
- ND Installation (alternates to the ND new cavern)
- Detector Electronics Cooling (Bill Gilbert, U of M)
- Scintillator Filling (Jim Musser and Mark Gebhard both of IU)

Engineering Activities

Marginally covered engineering activities:

- Module end caps and manifolds (T. Chase, U of M).
- Still need to finish
  - Snout design
  - Side and center seals design
- Modify Design to use MFG feedback on:
  - Manifold Cover
  - Raceways



Above image from Ken Heller's talk at the collaboration meeting. Likely the work of Tom Chase of U of M.

Engineering Activities

Marginally covered engineering activities:

- Detector Factory Tooling
  - Likely okay until production starts in earnest….then problems will need to be corrected ASAP.

Design and Drafting Activities

Adequately Covered Design Drafting Activities:

- Detector Structure FEA
  - will not need D/D unless there is a major change)
- Detector Integration
  - Once EV is done, will need plan and elevation drawings completed with utilities (cooling piping, scintillator fill and vent piping, cable tray). Some drawings has been initiated.
- Scintillator Blending
  - Use of a ‘toll blender’ is unlikely to need drawings
- Detector Assembly
  - Glue Machine (handled byANL)
  - Block Pivot Table (will need weldment and assembly drawings. Some started by Don Friend)
  - FHEP (same as the Block Pivot Table above) Bookend drawings in process.

Design and Drafting Activities

Un-covered Design and Drafting activities:

- Far Detector Building 30%, 60% and 90% reviews
  - Unlikely to need design and drafting
- IPND Installation
  - Will need design drafting to update layout dwgs.
- ND Installation (alternates to the ND new cavern)
  - Need solid modeling design work. Some being done by D. Friend.
- Detector Electronics Cooling (Bill Gilbert, U of M)
  - If FNAL steps into this, will need design drafting help to make schematics, pipe routing drawings.
- Scintillator Filling (Jim Musser and Mark Gebhard both of IU)
  - If FNAL steps into this, will need design drafting help to make schematics, scintillator pipe routing drawings.

Technician Activities

Adequately Covered Technician Activities:

- Detector Structure FEA
  - will not need technician work unless there is a major change
- Detector Integration
  - Will not need technician work
- Scintillator Blending
  - Use of a ‘toll blender’ will likely require use of a technician for quality control, quality assurance. Perhaps from Tech Centers?
- Far Detector Building 30%, 60% and 90% reviews
  - Unlikely to need technician effort on this.
- Detector Electronics Cooling (Bill Gilbert, U of M)
  - Need for FNAL technician effort unlikely.
- Scintillator Filling
  - Need for FNAL technician effort unlikely.

Technician Activities

Up-coming Technician activities:

- Detector Assembly
  - Glue Machine (handled by ANL – no request for FNAL help)
  - Block Pivot Table (will need heavy technician and welding effort)
  - FHEP (will need heavy technician and welding effort).
- IPND Installation
  - Will need significant technician effort to install this detector.
- ND Installation (be it the baseline scheme or alternates to the ND new cavern)
  - Will need significant technician effort to install this detector.

Scheduled Labor Profiles

Resource		FY07	FY08	FY09	FY10
Drafting	(Baseline Scheduled)	0.09	0	0.1	0
	(Actual Used)	0.04	0.05	0	
Designer	(Baseline Scheduled)	0.12	0	0.71	0.09
	(Actual Used)	0.12	0.01	0	
Proj. Engr	(Baseline Scheduled)	0.15	0.5	0.75	1.00
	(Actual Used)	0.15	0.5	0.18	
Proj. Chemist	(Baseline Scheduled)	0.41	0.45	0.95	1.02
	(Actual Used)	0.41	0.45	0.14	
Mechanical Engr	(Baseline Scheduled)	1.04	0.65	1.54	0.43
	(Actual Used)	1.02	0.59	0.05	
Mechanical Tech (weekly)	(Baseline Scheduled)	0.69	0.01	0.66	0.64
	(Actual Used)	0.70	0.04	0.03	
Mechanical Tech (Monthly)	(Baseline Scheduled)	0.12	0	0	0
	(Actual Used)	0.12	0	0	
Mechanical Tech Leader	(Baseline Scheduled)	0.23	0.1	0.79	0.52
	(Actual Used)	0.20	0.13	0	

Analysis of Plans v Actuals

What can be learned from EVMS Data?

- #FY07 & 08 Plans v Actual are surprisingly similar.
- #FY09 Ramp ups for:
  - Designer
  - Mechanical Engineer
  - Mechanical Tech
  - Technician Leader
- This is consistent with my view of reality.

Decisions

Where do we need to apply some engineering and design drafting expertise:

- #1 FHEP and Block Raiser (Lee, Friend)
- #2 TEC cooling (Process Group Member?)
- #3 Scintillator Filling (Process Group Member?)
- #4 ND Alternatives (Another Designer?, Grimm, Arnold, ?)
- #5 Building Plan Reviews (Villegas?)