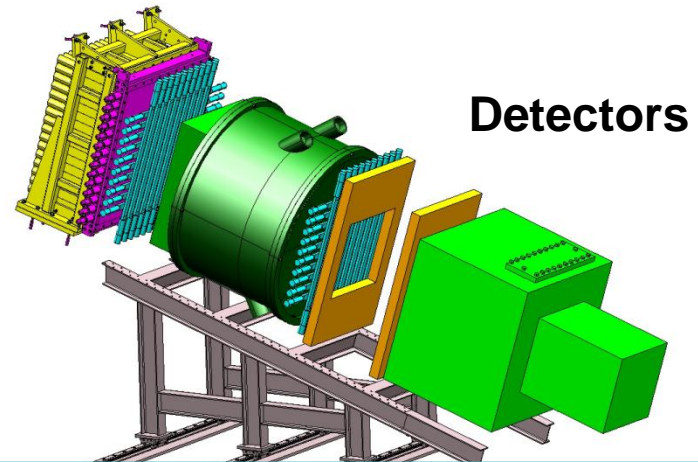
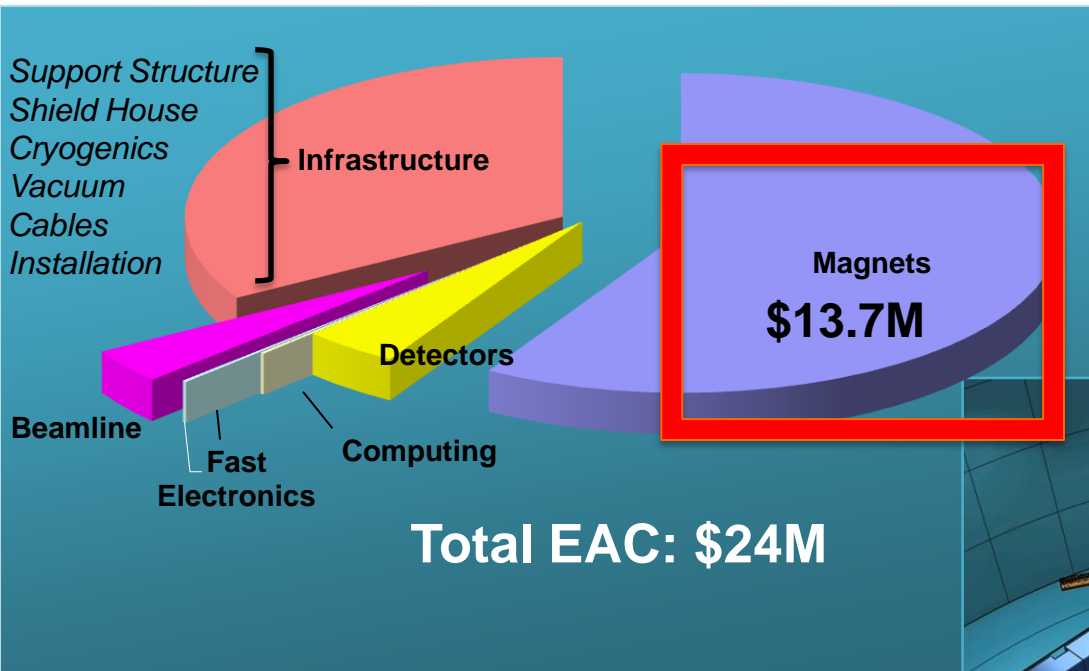


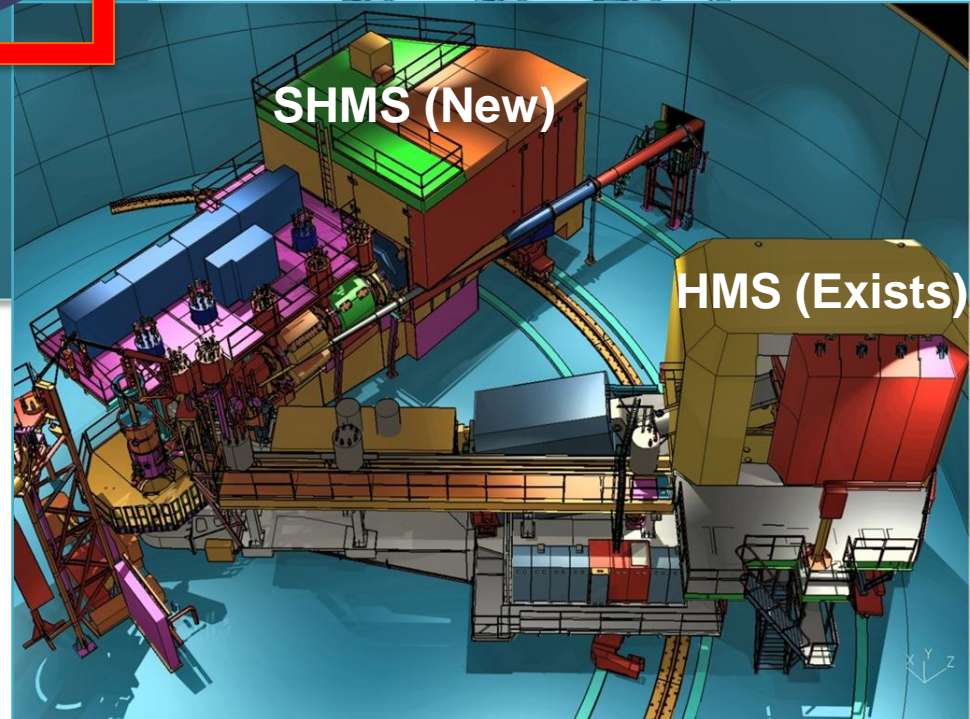
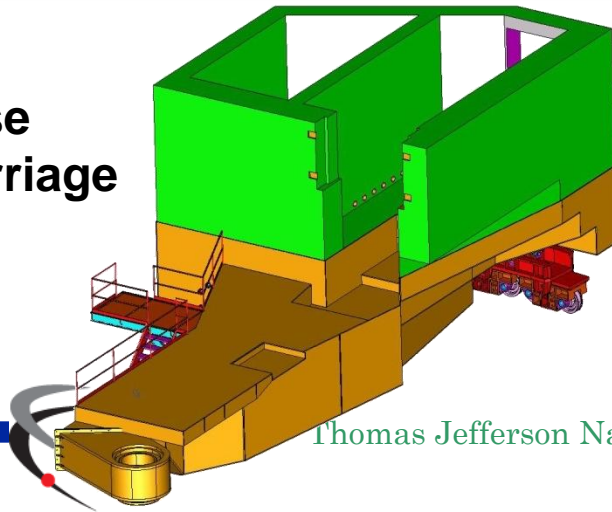
SHMS Status

Paul Brindza
June 22, 2012

Hall-C SHMS Project Overview

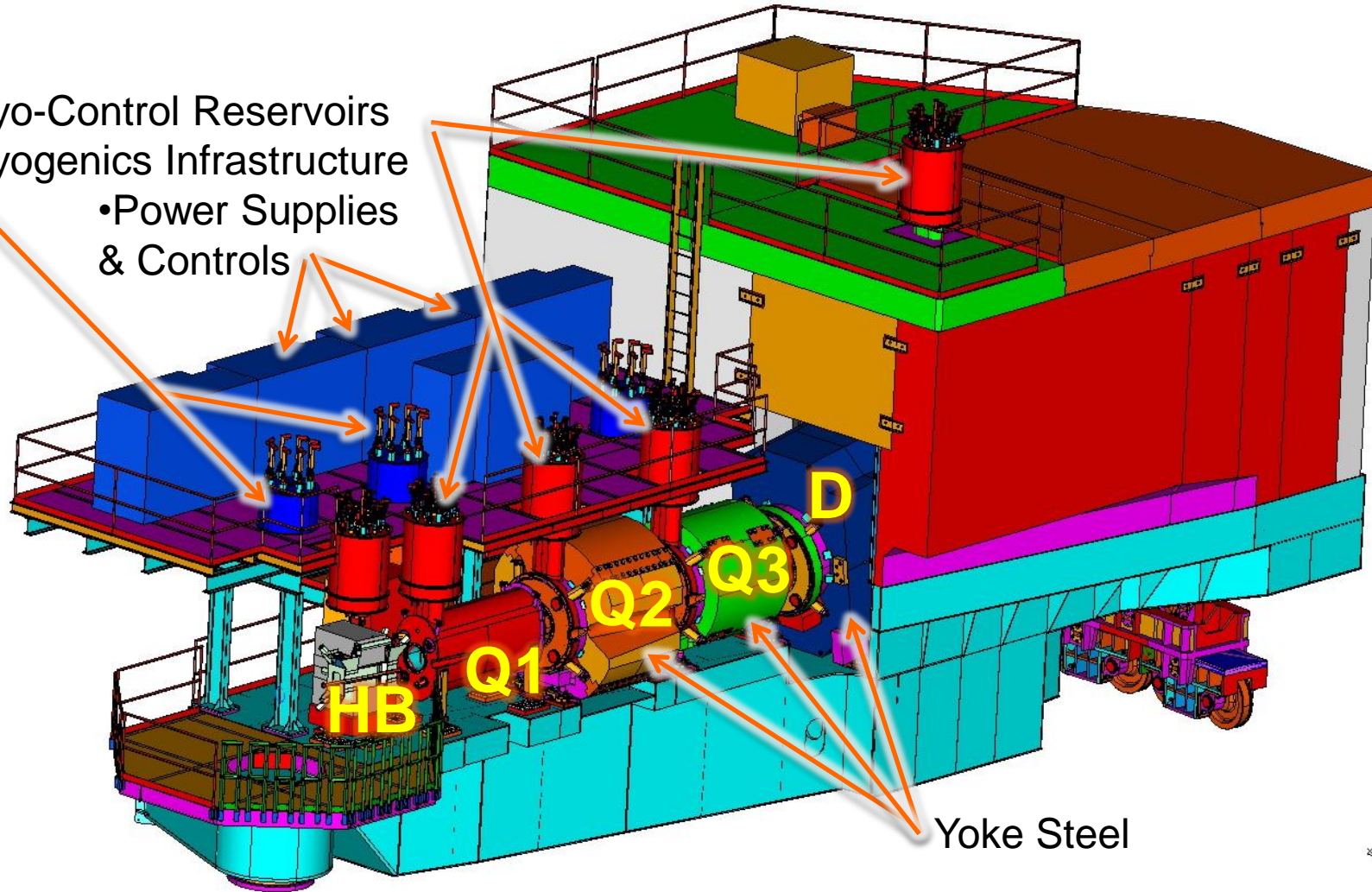


Shield House
Support Carriage



SHMS and Magnet Systems Overview

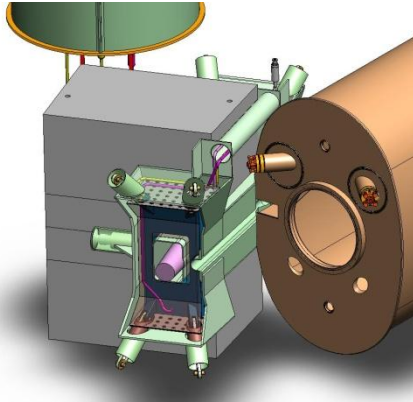
- Cryo-Control Reservoirs
- Cryogenics Infrastructure
 - Power Supplies & Controls



Conductor
Supports w/Alignment

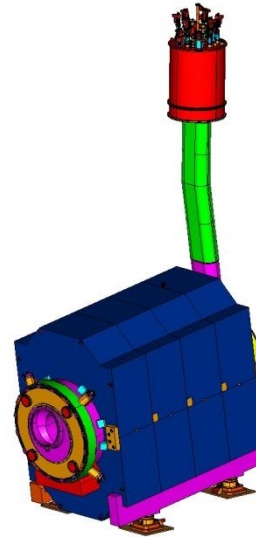
Coils + Cryostats

SHMS Magnets



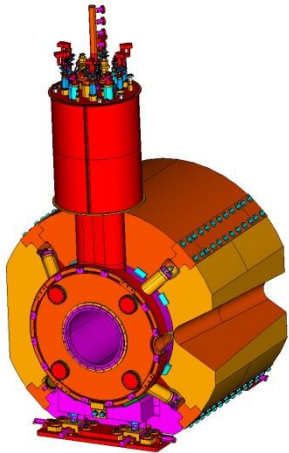
HB (Horizontal-Bend Dipole)

- Superferric "C" magnet
- 2.6 Tesla
- 21 cm x 25 cm warm bore
- 0.75 m EFL
- 1.93 Tm
- 19 % design margin
- 220 kJ stored Energy
- SC is SSC outer cable



Dipole

- 3.86 Tesla Cosine(Θ) dipole
- 60 cm warm bore
- 2.85 m EFL
- 11.2 Tm Integral B.dL
- 10 % Test margin
- 13.7 MJ stored Energy
- 4800 A/cm²
- 11 GeV/c
- Iron Yoke: 126 Tons



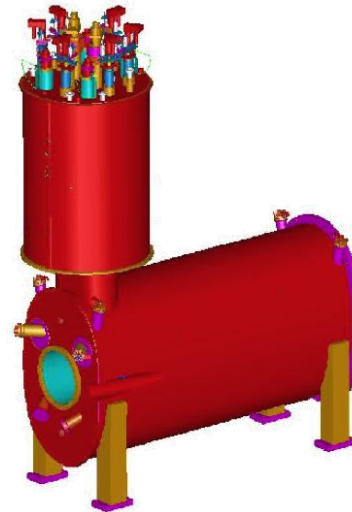
Q2 11.8 T/m cos(2Θ) Quad

- 60 cm. warm bore
- 1.64 m EFL
- 10 % Test margin
- 7.6 MJ stored Energy
- Iron Yoke: 72 Tons

Q3 identical to Q2 but runs at 7.9 T/m

- Iron Yoke: 18 Tons

Both use same conductor as dipole (Cu + SSC outer)

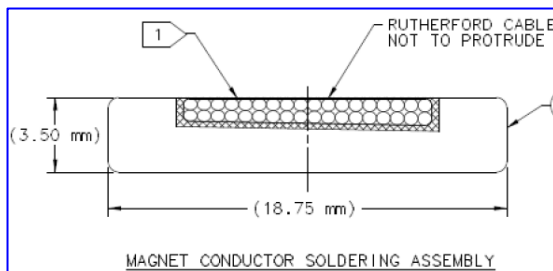
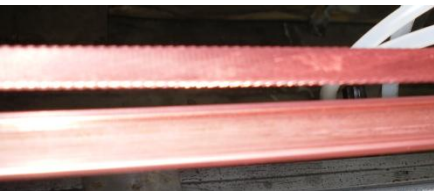


Q1 Quadrupole

- JLab Cold Iron Design
- Clone of HMS Q1
- 11 GeV/c performance
- 7.9 T/m Gradient
- 40 cm warm bore
- 1.86 m EFL
- 14.75 (T/m)m Int. Grad.
- 398 kJ Stored Energy
- 25 % design margin
- SC is SSC outer

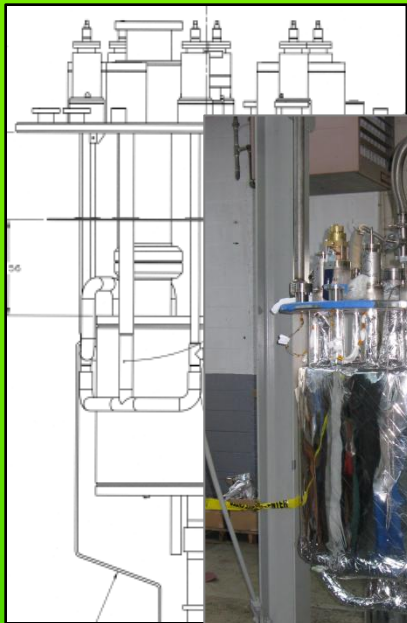
Superconductor Stabilizer

- Conductor soldering is approaching 60% complete, half has been shipped.
- Complete by September



Cryogenics & Controls

Cryo-Control Reservoirs (CCR's)



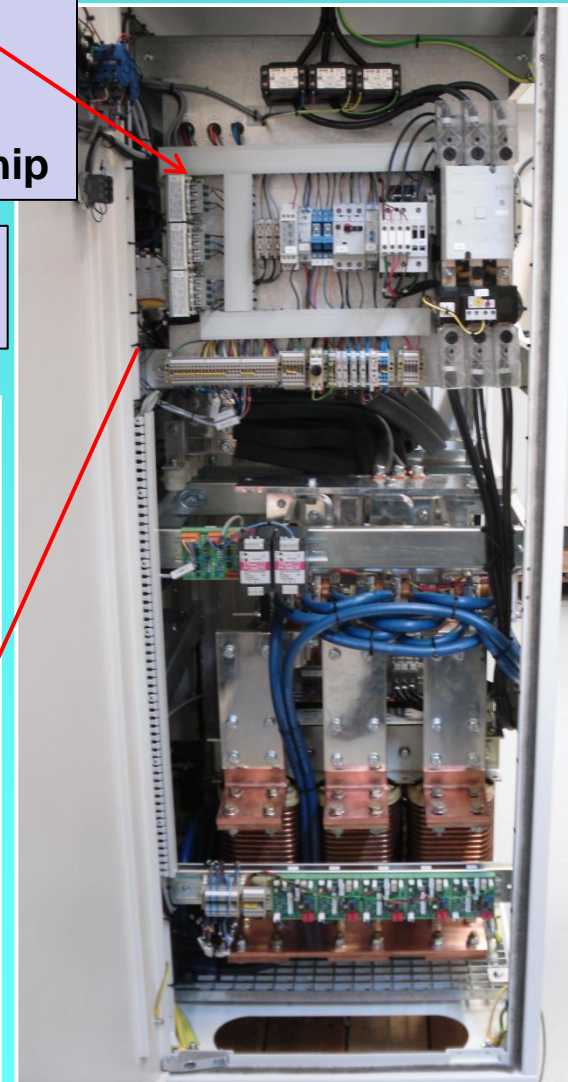
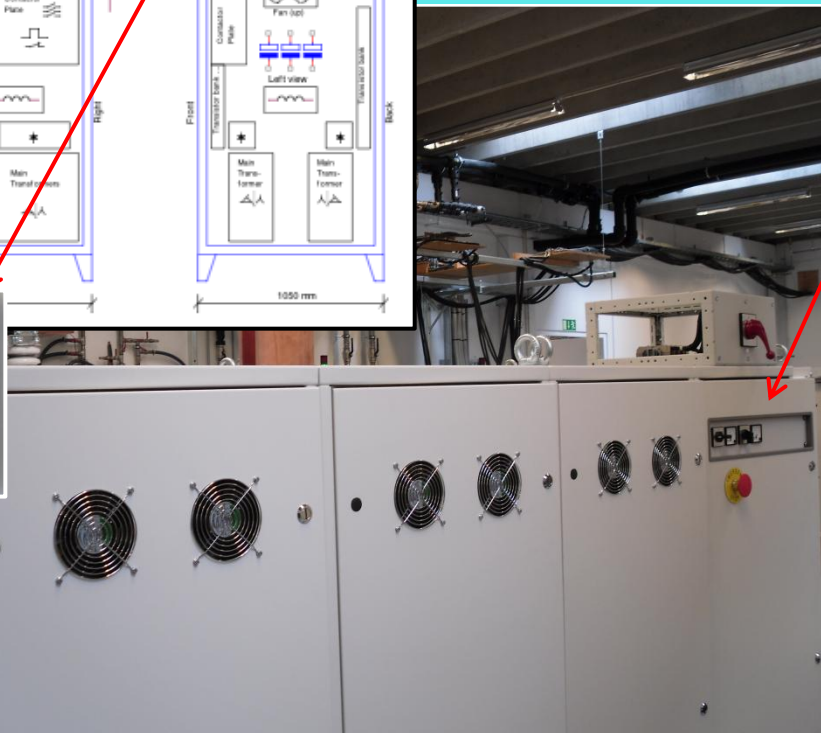
**Controls System Racks
Assembled at JLab.
Now being calibrated.**

**5 CCR's have been manufactured for Hall-C.
4 shipped to magnet vendors. 1 at JLab (Q1).**

Magnet Power System: Danfysik

1 Ready for Factory Test
2 Assembly done by July
3, 4 & 5 assembly start
5 Control Racks Ready to Ship

Acceptance Test
at JLab Feb. 2013

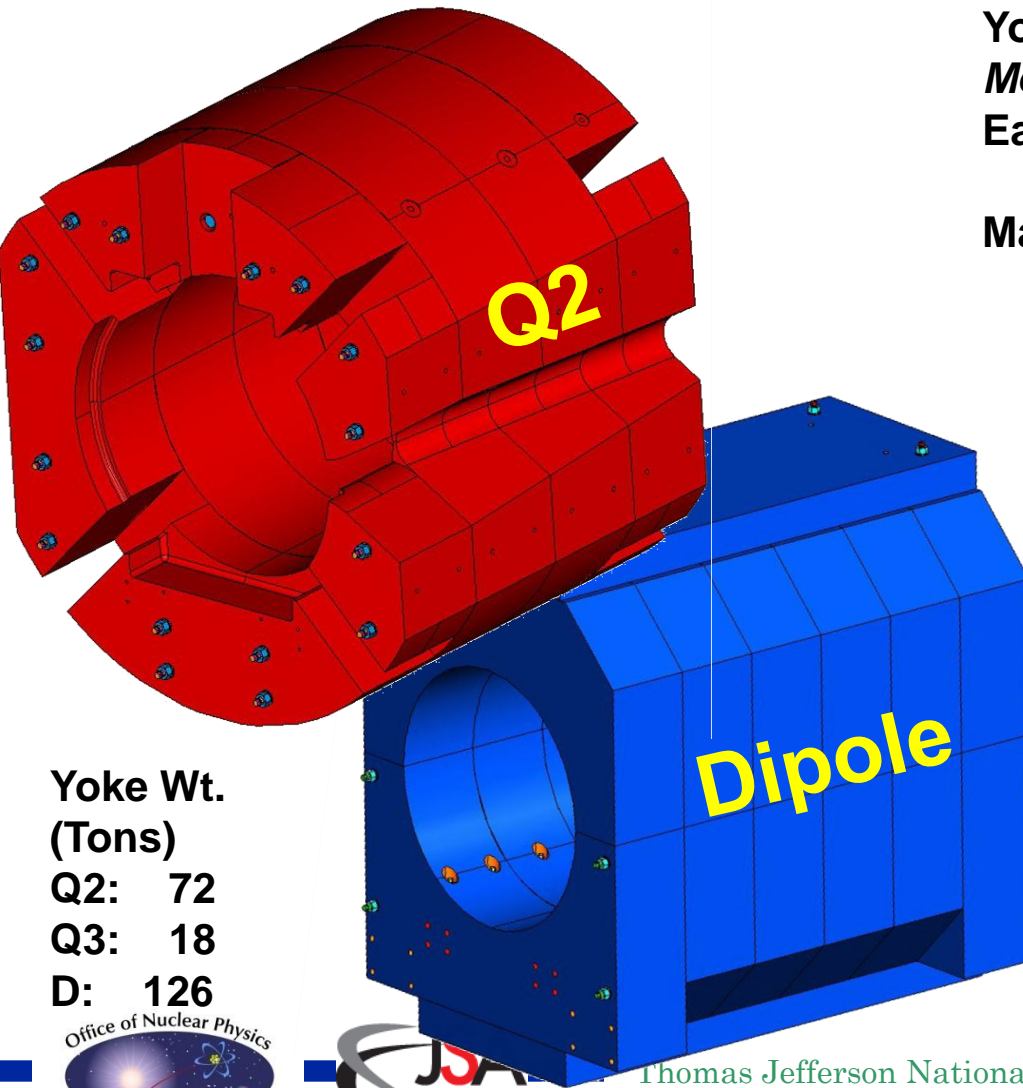


Yoke Steel for Q2, Q3, Dipole

Cast and Machined: ~10-Ton pieces

Yoke Steel Casting: *Ningbo Jansen Mechanism Corp.* , near Shanghai, China
Early Delivery Expected: October, 2012

Machining contracted - Craft-Hampton VA



Yoke Wt.
(Tons)

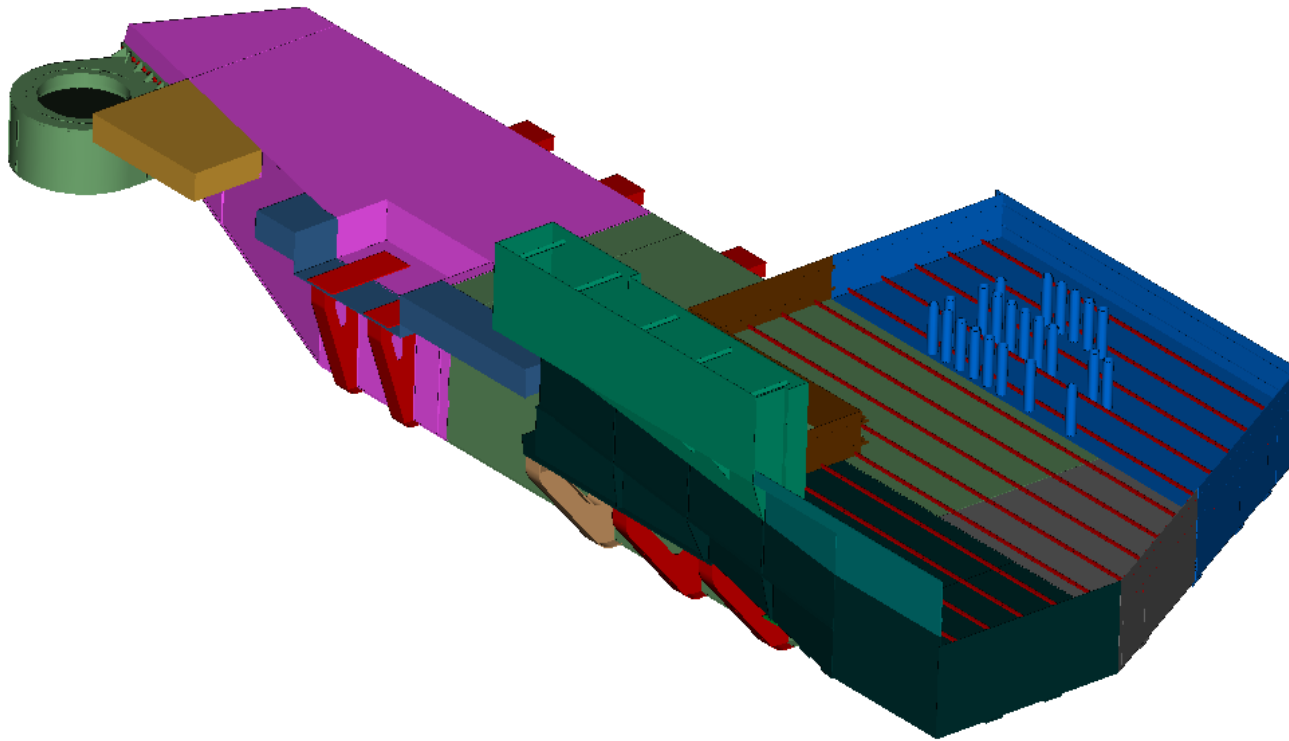
Q2: 72

Q3: 18

D: 126

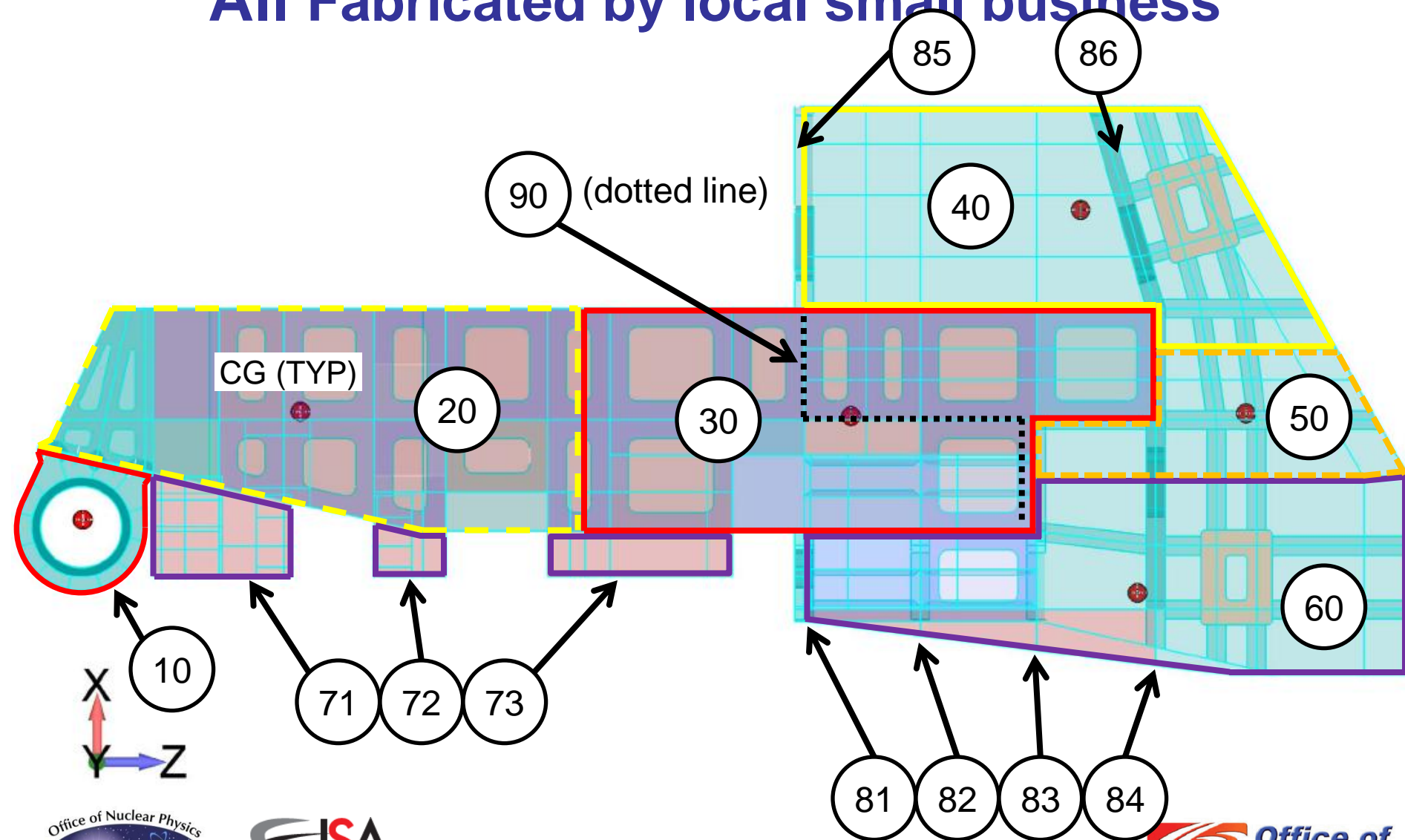


SHMS Support Structure



SHMS Support Structure Subdivision Plan

All Fabricated by local small business



SHMS Steel Structure-Most on site now



Section 100, platform, bogies



National Accelerator

IPR Ju

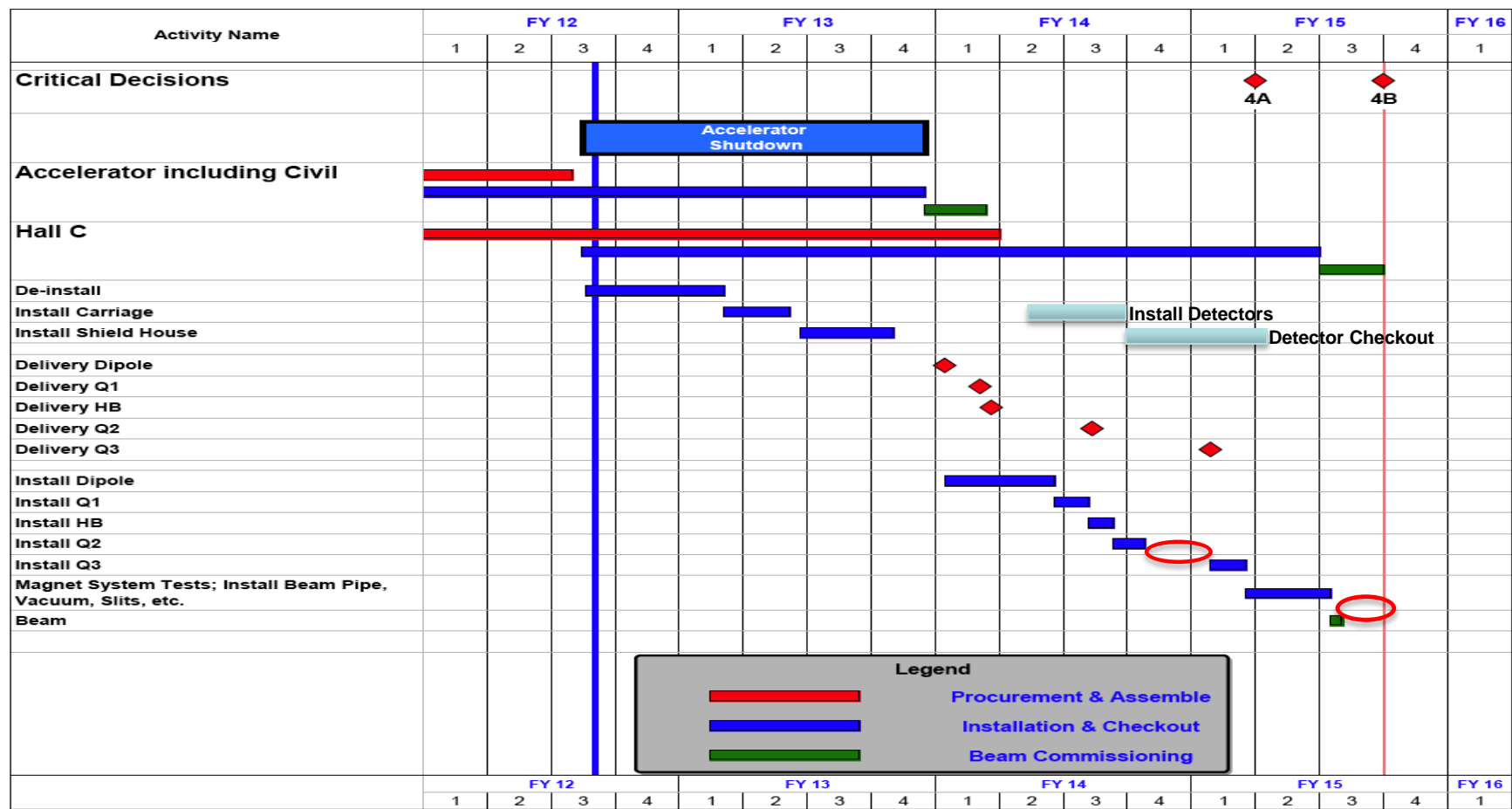
Sections 40, 50 & 60 on site



SHMS Structure sections 20 & 30 with Mike for scale



Hall C top level Schedule



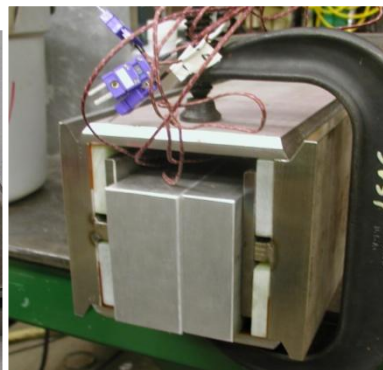
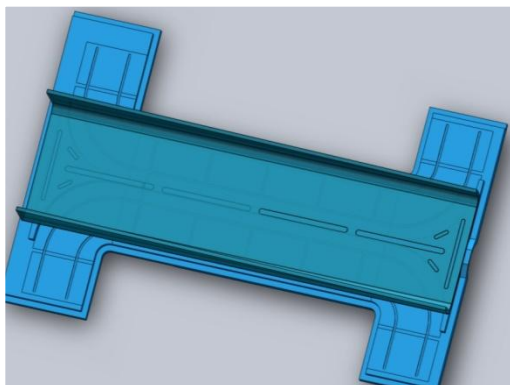
HB Highlights @ MSU/NSCL

- Design Detailing near complete
 - About 70% of drawings done – need to be checked.
 - Manufacture of vessel pieces starts after approval.
- Both coils wound and one has passed its cold test.
- Magnet assembly requires one critical/difficult weld.
 - Full penetration slot weld close to coil
 - Possibility of deforming vessel
- NSCL prepared a weld-test assembly
 - Welded successfully: No Warping or Overheating
- HB Difficulties:
 - Limited Manpower Assigned – Schedule Slipping
 - NSCL Cryo Plant Availability Constrains test Schedule



Ongoing:

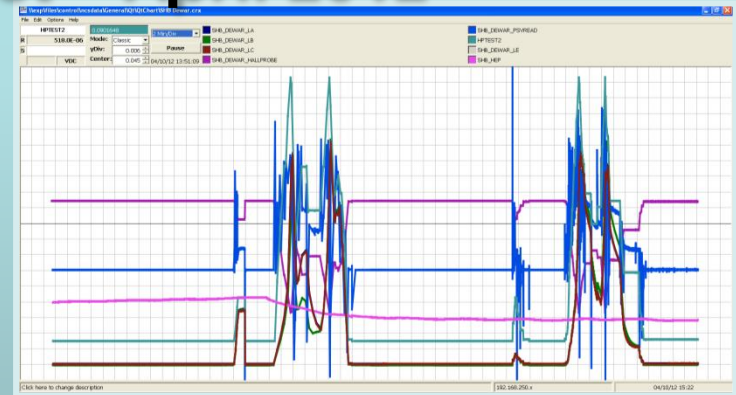
- Preparing 2nd Coil Test
- Preparing for FDR
- AWS weld qualifications



HB Highlights

First coil cold test – April 2012

**Coil Test: Ramped to 3000A four times.
4/10/12**

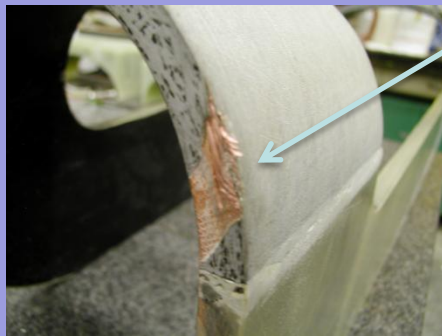


**Coil #2 Cold
Test scheduled
July 2012**



Coil 2 damaged while moving (12/1/11). Replacement now wound (2/16/12.)

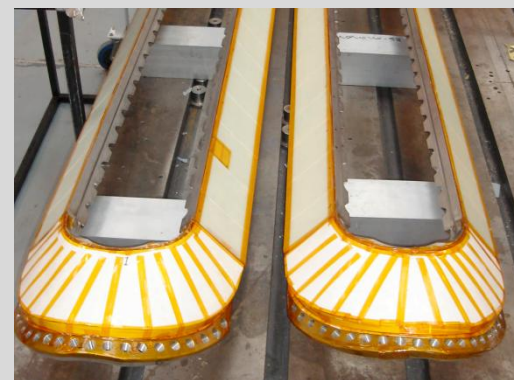
Low helium level during test caused quench (12/15/11). Current bus arced. Has been repaired and coil re-tested successfully (Apr. 2012). Coil was never damaged.



Q1 Highlights@ SMI

- **3 Coils wound and preparing for #4**
 - Successful electrical/electronic tests.
- **Yoke laminations Now in Production**
 - Passed dimensional tests
 - Magnetic properties analysis ongoing
- **Vendor now making progress, having survived financial uncertainty in early 2011.**
 - Vendor's schedule had been slipping.
 - Latest monthly report shows no further slip.
- **New developments:**
 - Helium and Vacuum vessel ASME design and analysis complete
 - ASME work by subcontractor Stainless Specialties
- **Upcoming:**
 - Completion of coil winding and testing on-track for August.
 - Assemble Cold Mass

Coils 1 & 2



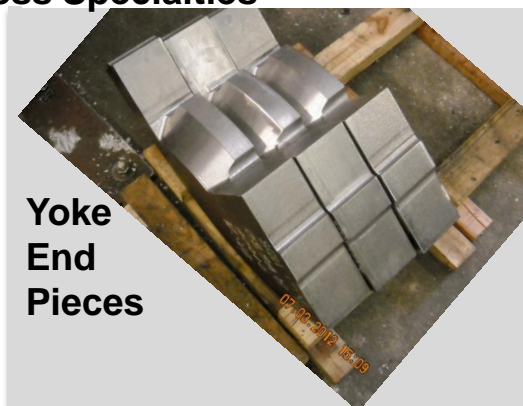
Coil 3



Coil 4
Form

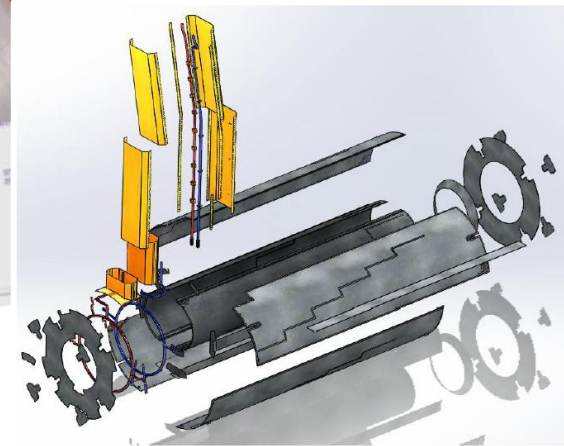


Yoke
End
Pieces



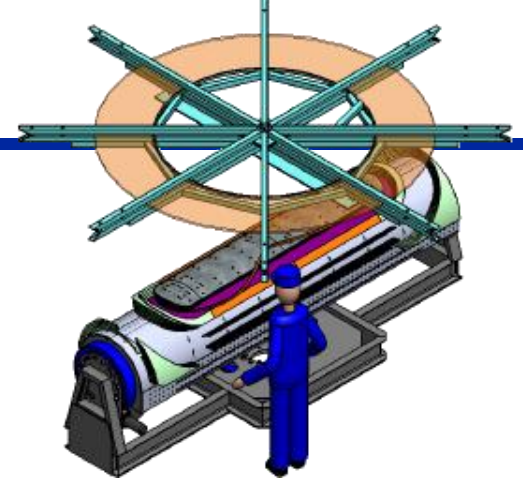
Dipole Highlights @ SigmaPhi

- Four Prototype coils wound
- Final Design Review(FDR) ~90% Complete
 - FDR I May 2012- complete with punch list
 - Drawings and design documents done
 - Only open issue: conductor hardness
 - FDR II July 9-10 at Sigma Phi
- Dipole production Planning
 - Sigma-Phi added a Manufacturing Engineer
 - Sigma Phi added a Production Scheduler
 - Sigma Phi Purchased second winding machine
- First production reels of conductor arrived at Sigma-Phi 31-May. Second shipment was sent June 8- due at Sigma Phi July 2nd.

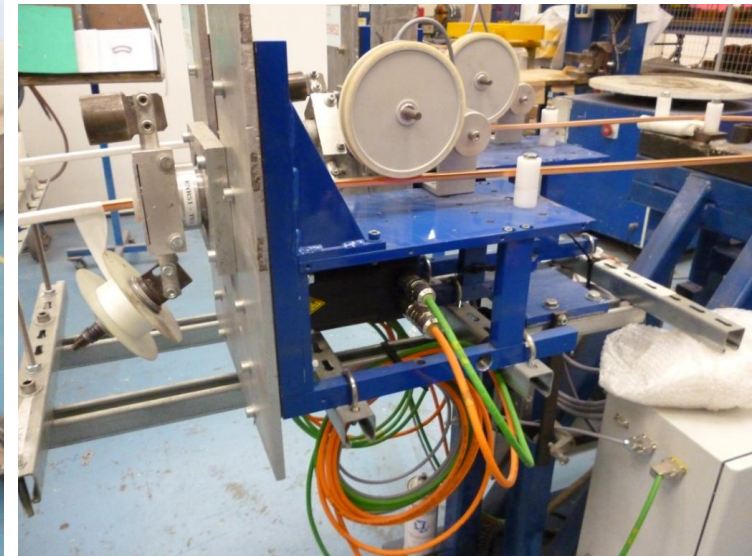
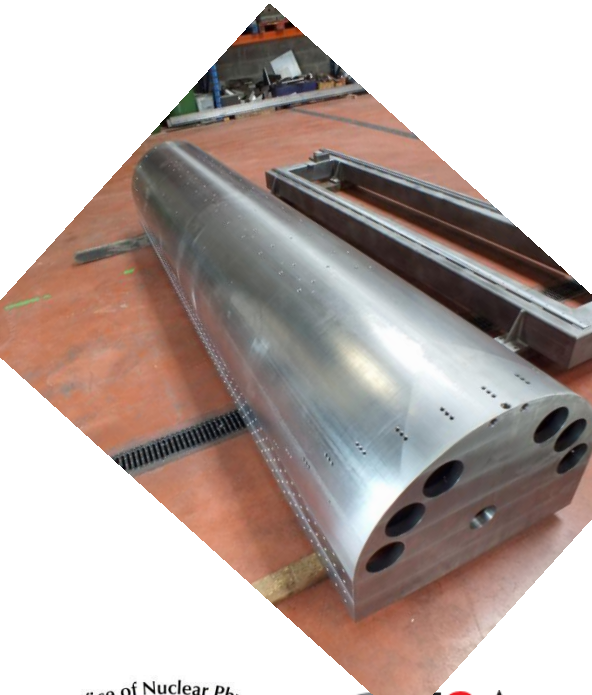


Dipole Status

- Production Winding Tooling has Arrived at Sigma-Phi for start of full scale prototype coil in July
- French Break for August
to think about magnets at the beach!
- Dipole Coil winding begins Aug 27, 2012



Photos from June 11, 2012



Dipole Winding tooling assembled



Q2 / Q3 Highlights @ Sigma Phi

- **Q2 and Q3 use conductor that is identical to that in the Dipole**
 - Dipole winding solution → Q2/Q3 winding solution
 - Cold mass construction and assembly - identical design and method
 - Cryostats are also identical so design is cut and paste
- **Q2/Q3 Delivery dates recently updated by vendor's Manufacturing Engineer**
 - Q2 Will arrive while Q1 is being tested in place
 - Q3 Critical Path for Hall-C - 3 months float after testing
- **Status**
 - No problems, but manufacturing design awaiting conclusion of Dipole FDR (July).
- **Ahead**
 - IDR scheduled in October; FDR scheduled in December
 - Coil winding will start March '13 as soon as dipole coils are off the dual turntables
 - Q2 winding : 6 months duration
 - Q3 winding : 5 months duration

Summary

Hall-C SHMS Summary

- All five magnets are under contract- making progress.
- JLAB Magnet Components making excellent progress
- Projection: all magnets cold, tested, and ready for beam in February, 2015.
- SHMS Support Structure- Most items on site now
- Installation contracts- preparation for bid
- SHMS Detectors excellent progress(Saturday's Talks)
- Hall C removal of Qweak and legacy equipment underway
- SHMS major installation start Nov 2012

Appendix

Hall-C Upgrade

Magnet Components by JLab

fixed price contracts

Contract	Vendor	PO #	Cost K\$	Delivery	Status
DC System	Danfysik	10-C3491	922	Oct 2012	1 Done 1 in fabrication
CryoReservoir	Meyer Tool	10-C0505	1,067	Jan 2012	Complete
Current Leads	AMI	09-P2571	94	Feb 2010	Complete
Controls	JLAB	Multiple	1,009	Jan 2013	5 Racks Complete in Testing
Yoke Castings	Ningbo-Jansen	12-C3425	1,298	Oct 2012	5 Pieces Cast & Inspected
Yoke Machining	Craft Machine	12-C1004	125	June 2013	Awaiting Steel
SC Cable	SSC surplus	NA	NA	NA	Complete
SC Cable Testing	BNL	07-F0533	91	Nov 2007	Complete
Copper Channel	FMM	10-C1246	266	Feb 2012	Complete 2 more due Sep
Redraw Channel	FMM	10-C1246	15	Feb 2012	Complete
Wave solder	AES	10-C3362	284	Aug 2013	Underway

SHMS SC Magnet System Plan

