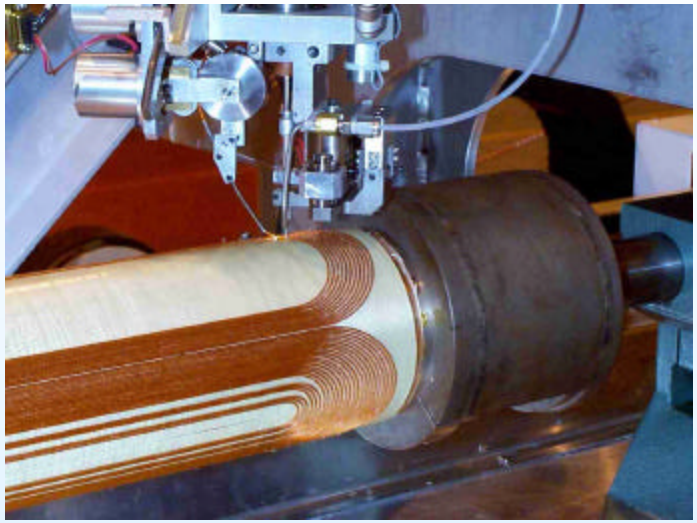
BNL FNAL BTeV Corrector Elements Production, Schedule

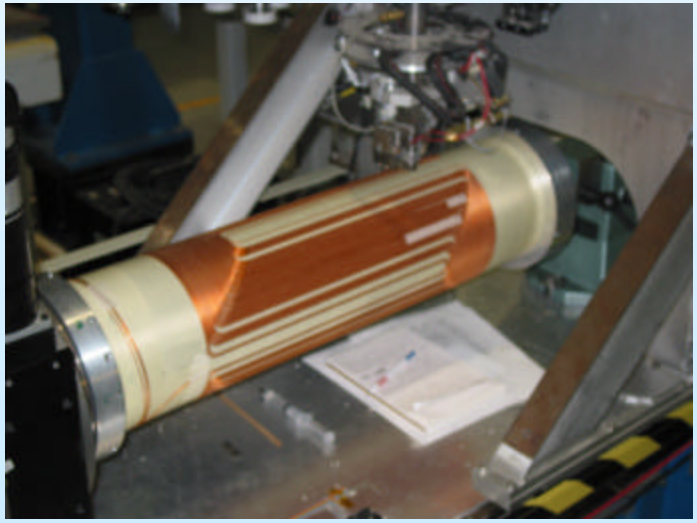
Michael Anerella

Design Overview

- Coil Design
  - Direct wind (i.e., DESY/BEPC-II style)
  - Optimized configuration;
    - "flat patterns + serpentine"
    - spacers "strategically placed in outer layer" to minimize non-winding time on machine



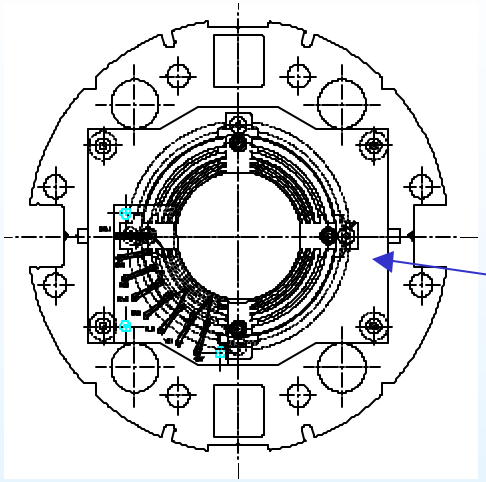
Flat pattern



Serpentine

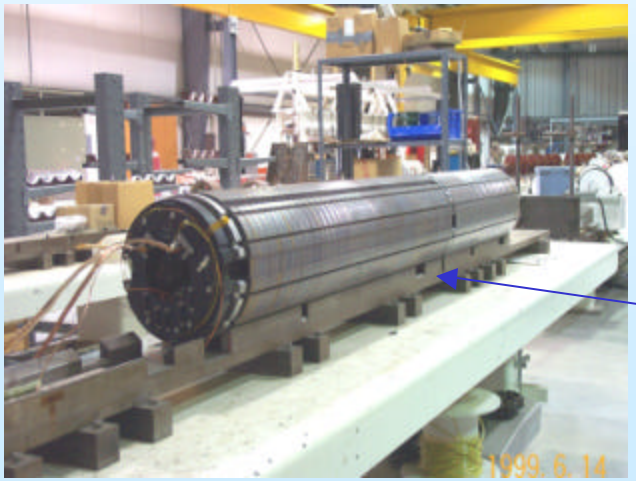
Design Overview (contd)

- Cold Mass Design
  - RHIC 8cm yoke OD (26.6cm)
  - .5cm thick helium vessel (27.6cm overall dia.)



coil – yoke alignment keys

RHIC 8cm corrector



Yoke alignment (for shell welding)

RHIC CQS assembly

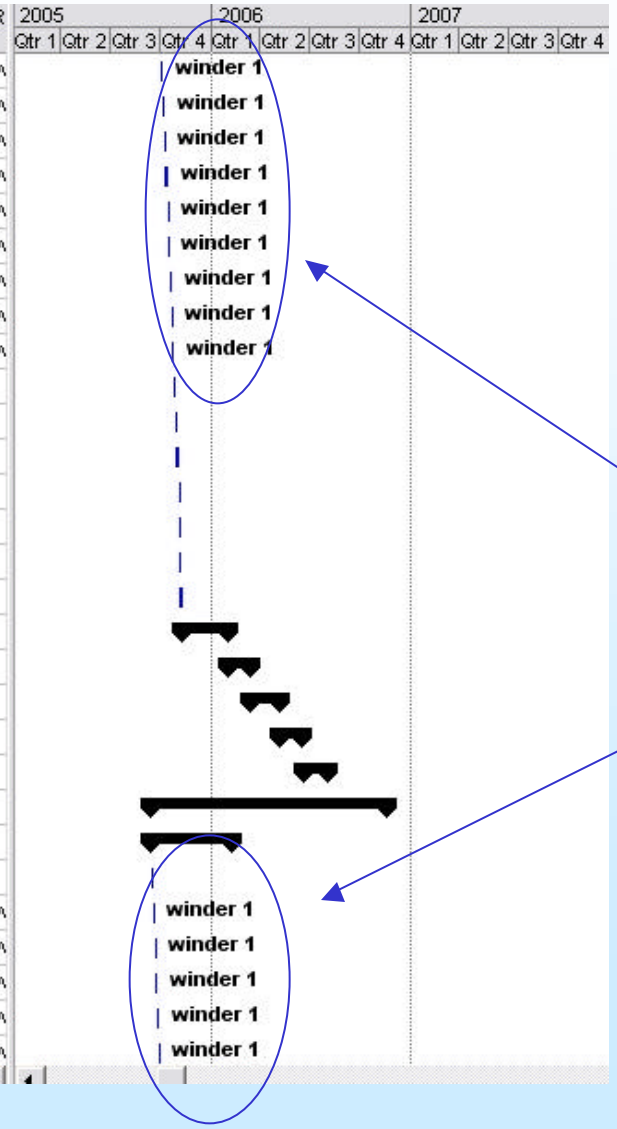
Available equipment / tooling

- Wiring machines (2)
- FG Wrapping machines (2)
- Curing ovens (2)
- Cold mass assembly fixture
- Automated MIG Shell welding press
- Automated MIG end volume welding fixture
- Testing top hats
- Vertical Cold Test Facility; dewars, power supplies, magnetic measurement equipment, etc.
- Pressure test dewar
- Survey equipment

Schedule excerpt

Day to day task basis

	Task Name	Duration	Start	Finish	Predeces	R
30	Mount/indicate tube	2 days	Fri 9/30/05	Mon 10/3/05	29	w
31	install substrate	1 day	Tue 10/4/05	Tue 10/4/05	30	w
32	wind layer4	2 days	Wed 10/5/05	Thu 10/6/05	31	w
33	install G-10 parts, leads	3 days	Fri 10/7/05	Tue 10/11/05	32	w
34	install substrate	1 day	Wed 10/12/05	Wed 10/12/05	33	w
35	wind layer 5	2 days	Thu 10/13/05	Fri 10/14/05	34	w
36	install G-10 parts	3 days	Mon 10/17/05	Wed 10/19/05	35	w
37	install substrate	1 day	Thu 10/20/05	Thu 10/20/05	36	w
38	wind layer 6	2 days	Fri 10/21/05	Mon 10/24/05	37	w
39	solder outgoing lead	1 day	Tue 10/25/05	Tue 10/25/05	38	
40	prepare for cure	2 days	Wed 10/26/05	Thu 10/27/05	39	
41	cure	2 days	Fri 10/28/05	Mon 10/31/05	40	
42	overwrap fiberglass	0.5 days	Tue 11/1/05	Tue 11/1/05	41	
43	prepare for cure	0.5 days	Tue 11/1/05	Tue 11/1/05	42	
44	cure	1 day	Wed 11/2/05	Wed 11/2/05	43	
45	magnetic measurements	5 days	Thu 11/3/05	Wed 11/9/05	44	
46	+ **Quadrupole (6 layers)**	**11.8 wks**	**Thu 11/10/05**	**Tue 1/31/06**		
81	+ **Dipole (3 layers)**	**5.8 wks**	**Wed 2/1/06**	**Mon 3/13/06**		
99	+ **Vertical Cold Test**	**7.8 wks**	**Tue 3/14/06**	**Fri 5/5/06**		
106	+ **Magnet Assembly**	**6 wks**	**Mon 5/8/06**	**Fri 6/16/06**		
112	+ **Shipment**	**7 wks**	**Mon 6/19/06**	**Fri 8/4/06**		
116	− **X1V #2**	**61.8 wks**	**Wed 9/14/05**	**Mon 11/20/06**		
117	− **Sextupole**	**21 wks**	**Wed 9/14/05**	**Tue 2/7/06**		
118	insulate w/ kapton, hypot	1 day	Wed 9/14/05	Wed 9/14/05	21	
119	Mount/indicate tube	2 days	Thu 9/15/05	Fri 9/16/05	118	w
120	install substrate	1 day	Mon 9/19/05	Mon 9/19/05	119	w
121	wind layer 1	2 days	Tue 9/20/05	Wed 9/21/05	120	w
122	install G-10 parts, leads	3 days	Thu 9/22/05	Mon 9/26/05	121	w
123	install substrate	1 day	Tue 9/27/05	Tue 9/27/05	122	w



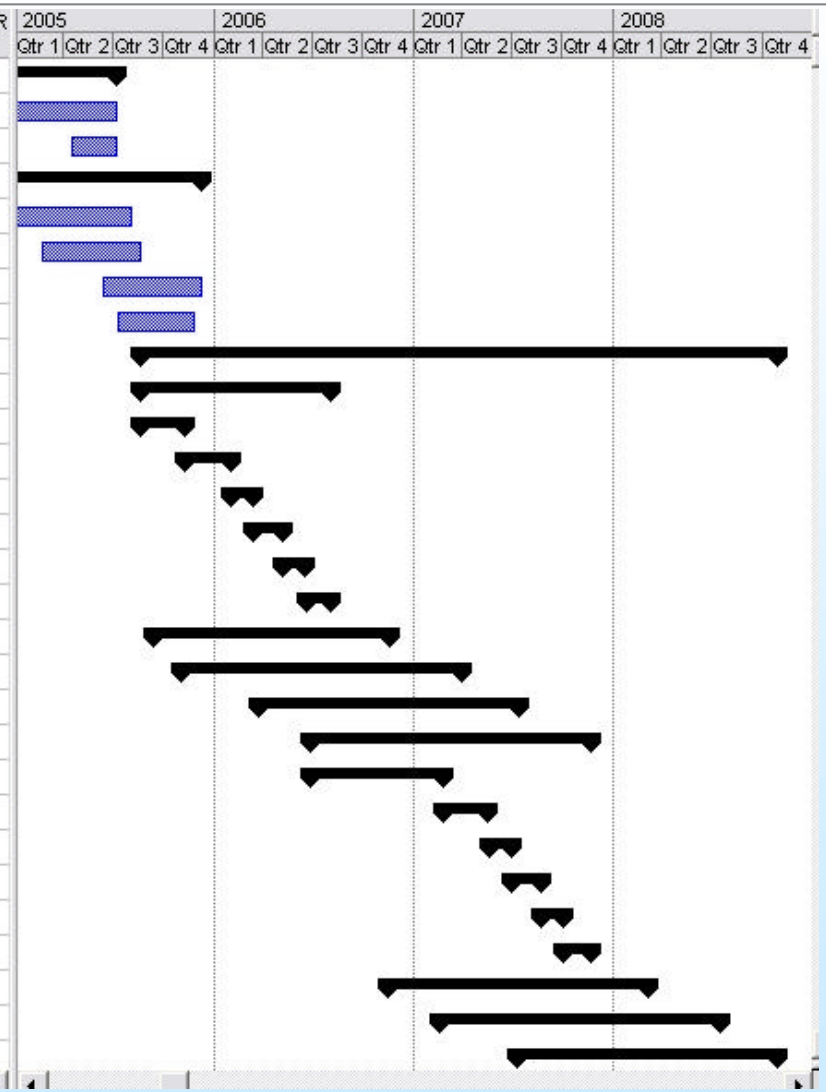
Resource leveling at winder

BROOKHAVEN NATIONAL LABORATORY

Superconducting Magnet Division

Draft Schedule ? X1V, X1H (X2L, X2R, X3 work in parallel on winder #2)

	Task Name	Duration	Start	Finish	Predeces	R
1	**- Design**	**40 wks**	**Fri 10/1/04**	**Thu 7/7/05**		
2	Cold Mass	40 wks	Fri 10/1/04	Thu 7/7/05		
3	Tooling	12 wks	Fri 4/15/05	Thu 7/7/05	2FF	
4	**- Fabrication / Procurement**	**58 wks**	**Fri 10/29/04**	**Thu 12/8/05**		
5	Superconductor	40 wks	Fri 10/29/04	Thu 8/4/05	2SS+20 c	
6	Coil Parts	26 wks	Fri 2/18/05	Thu 8/18/05	2FS-20 w	
7	Cold Mass Parts	26 wks	Fri 6/10/05	Thu 12/8/05	2FS-4 wk	
8	Tooling	20 wks	Fri 7/8/05	Thu 11/24/05	3	
9	**- Production**	**166.8 wks**	**Fri 8/19/05**	**Wed 10/29/08**		
10	**- X1V #1**	**50.2 wks**	**Fri 8/19/05**	**Fri 8/4/06**		
11	**+ Sextupole (6 layers)**	**11.8 wks**	**Fri 8/19/05**	**Wed 11/9/05**		
46	**+ Quadrupole (6 layers)**	**11.8 wks**	**Thu 11/10/05**	**Tue 1/31/06**		
81	**+ Dipole (3 layers)**	**5.8 wks**	**Wed 2/1/06**	**Mon 3/13/06**		
99	**+ Vertical Cold Test**	**7.8 wks**	**Tue 3/14/06**	**Fri 5/5/06**		
106	**+ Magnet Assembly**	**6 wks**	**Mon 5/8/06**	**Fri 6/16/06**		
112	**+ Shipment**	**7 wks**	**Mon 6/19/06**	**Fri 8/4/06**		
116	**+ X1V #2**	**61.8 wks**	**Wed 9/14/05**	**Mon 11/20/06**		
222	**+ X1V #3**	**73.6 wks**	**Tue 11/1/05**	**Thu 3/29/07**		
328	**+ X1V #4**	**68.4 wks**	**Thu 3/23/06**	**Fri 7/13/07**		
434	**- X1H #1**	**73.4 wks**	**Tue 6/27/06**	**Wed 11/21/07**		
435	**+ Sextupole (6 layers)**	**35 wks**	**Tue 6/27/06**	**Mon 2/26/07**		
470	**+ Quadrupole (6 layers)**	**11.8 wks**	**Tue 2/27/07**	**Fri 5/18/07**		
505	**+ Dipole (3 layers)**	**5.8 wks**	**Mon 5/21/07**	**Thu 6/28/07**		
523	**+ Vertical Cold Test**	**7.8 wks**	**Fri 6/29/07**	**Wed 8/22/07**		
530	**+ Magnet Assembly**	**6 wks**	**Thu 8/23/07**	**Wed 10/3/07**		
536	**+ Shipment**	**7 wks**	**Thu 10/4/07**	**Wed 11/21/07**		
540	**+ X1H #2**	**68.2 wks**	**Thu 11/16/06**	**Thu 3/6/08**		
646	**+ X1H #3**	**73.2 wks**	**Tue 2/20/07**	**Tue 7/15/08**		
752	**+ X1H #4**	**68 wks**	**Thu 7/12/07**	**Wed 10/29/08**		



Summary

- Tremendous advantages from existing equipment, infrastructure
- Mature (unique) design/build capabilities
- Important to advance projected finish as possible to provide schedule contingency:
  - Order superconductor, coil parts early
  - Continue to optimize process efficiency (saves labor costs in addition to schedule)