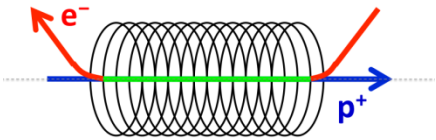
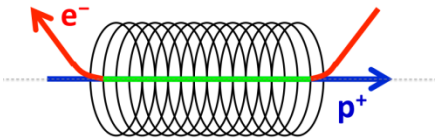


Electron Lens Superconducting Solenoid Status

Michael Anerella

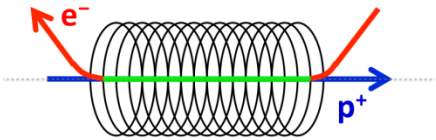
April 12, 2011

Outline



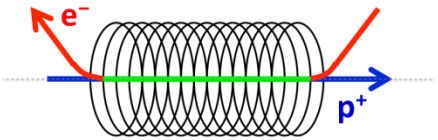
- Corrector coils
- Main solenoid coils
- Anti-Fringe field, Fringe Field coils
- Schedule

Corrector coils



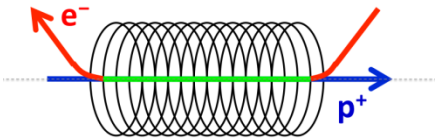
- 1st Coil winding complete
- 2nd Coil winding started
- OVEN – need "retort" for final cure (AM/RC)

Main Solenoid Coils



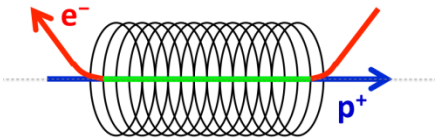
- Support tube insulated, Kapton wrinkled due to out-gassing during cure; re-insulated & cured without problem
- Internal support flanges installed, insulated
- Hipot complete
- Lead end "lead" flange received
- Released winding travelers are available
- Parts deliveries 90% complete
- Dimensional issue investigated, resolved – to be checked Monday 4/11 (LR)
- Winding should start ~ 4/13

AFF, FF Solenoid coils

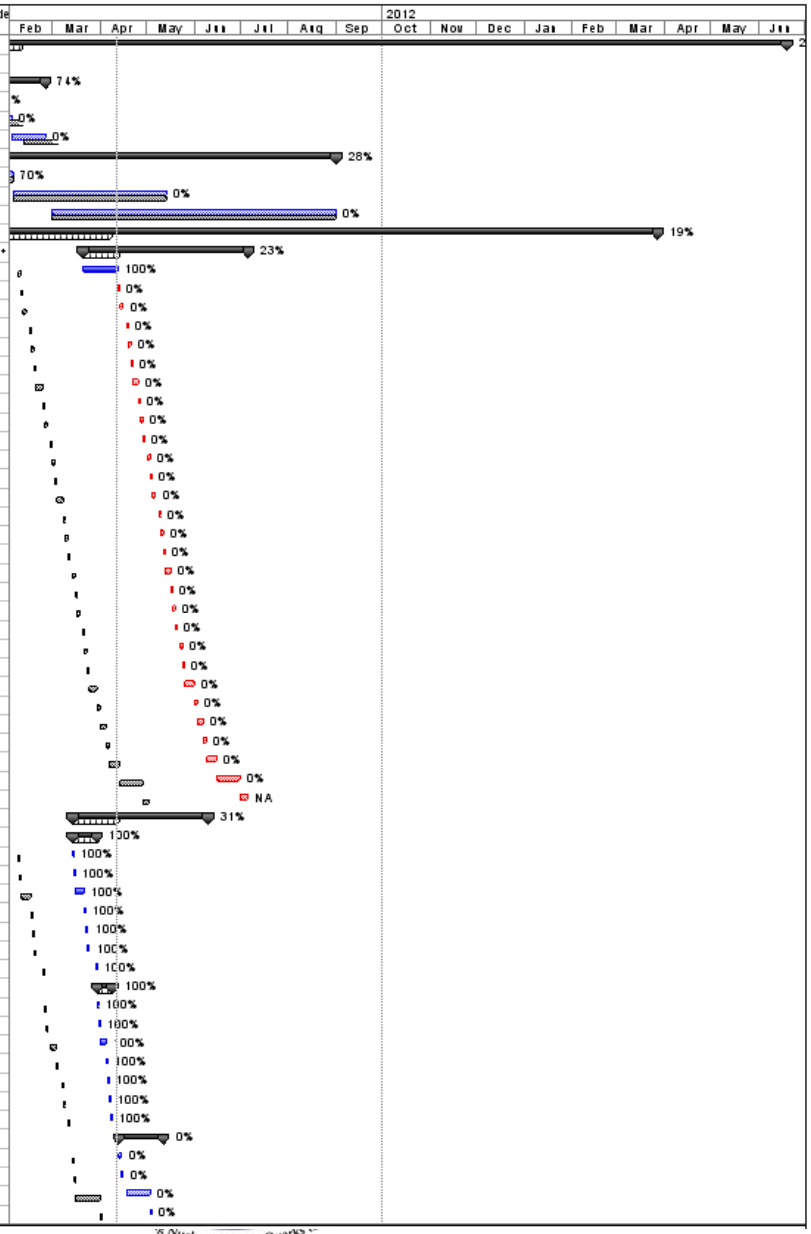


- AFF support hub, Winding machine upgrade are complete
- AFF Coil #1
  - complete
- AFF Coil #2
  - winding is complete
  - Initial hipot is complete
  - Cure / over-wrap of fiberglass / cure complete
- FF coil #1
  - Flange material back from grinder
  - 1st set of parts due Tuesday 4/12
  - Travelers needed
  - Winding starts after main solenoid "transition insert" parts are insulated

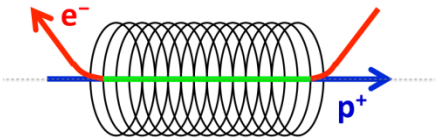
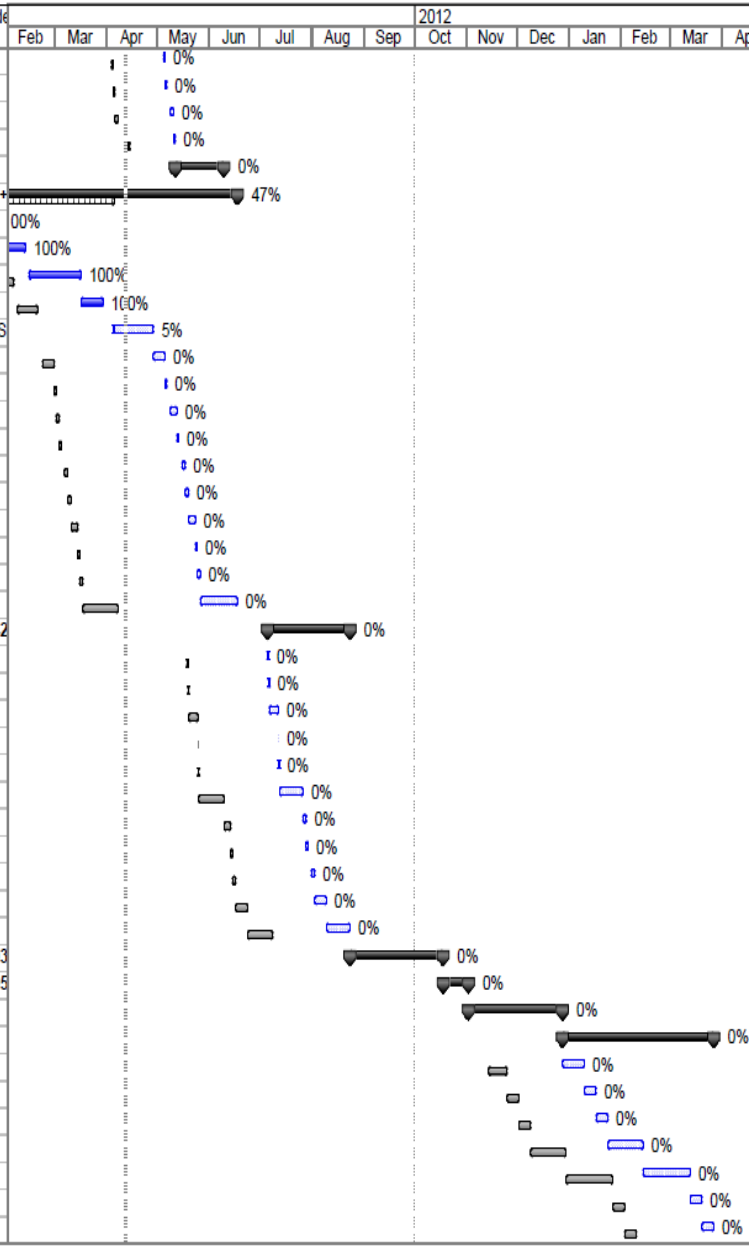
schedule p.1



ID		Task Name	Duration	Baseline Start	Baseline Finish	Actual Start	Actual Finish	% Complete	Prede
1		electron lens solenoid	564.5 days	4/5/10	5/22/12	4/5/10	NA	27%	
2	✓	Preliminary Design	80 days	4/5/10	7/27/10	4/5/10	7/27/10	100%	
3		Final Design	143.75 days	7/28/10	3/4/11	7/28/10	NA	74%	2
4		Coils	118.75 days	7/28/10	1/27/11	7/28/10	NA	90%	
5		Cold Masses	10 days	1/28/11	2/10/11	NA	NA	0%	4
6		Magnets	15 days	2/11/11	3/4/11	NA	NA	0%	5
7		Fabrication / Procurement	276 days	7/28/10	8/31/11	7/28/10	NA	28%	2
8		Coils	130 days	7/28/10	2/3/11	7/28/10	NA	70%	
9		Cold Masses	70 days	2/4/11	5/13/11	NA	NA	0%	
10		Magnets	130 days	3/1/11	8/31/11	NA	NA	0%	
11		Magnet #1	303.5 days	1/21/11	2/10/12	1/24/11	NA	19%	
12		Solenoid Coil Assembly	75 days	2/7/11	5/2/11	3/21/11	NA	23%	7 8 9+
13	✓	Insulate tube / core	17 days	2/7/11	2/8/11	3/21/11	4/12/11	100%	
14		Install cable spool, support tube	1 day	2/9/11	2/9/11	NA	NA	0%	13
15		wind double layer 1	2 days	2/10/11	2/11/11	NA	NA	0%	14
16		wrap, cure	1 day	2/14/11	2/14/11	NA	NA	0%	15
17		wind double layer 2	2 days	2/15/11	2/16/11	NA	NA	0%	16
18		wrap, cure	1 day	2/17/11	2/17/11	NA	NA	0%	17
19		wind double layer 3	2 days	2/18/11	2/22/11	NA	NA	0%	18
20		wrap, cure	1 day	2/23/11	2/23/11	NA	NA	0%	19
21		wind double layer 4	2 days	2/24/11	2/25/11	NA	NA	0%	20
22		wrap, cure	1 day	2/28/11	2/28/11	NA	NA	0%	21
23		wind double layer 5	2 days	3/1/11	3/2/11	NA	NA	0%	22
24		wrap, cure	1 day	3/3/11	3/3/11	NA	NA	0%	23
25		wind double layer 6	2 days	3/4/11	3/7/11	NA	NA	0%	24
26		wrap, cure	1 day	3/8/11	3/8/11	NA	NA	0%	25
27		wind double layer 7	2 days	3/9/11	3/10/11	NA	NA	0%	26
28		wrap, cure	1 day	3/11/11	3/11/11	NA	NA	0%	27
29		wind double layer 8	2 days	3/14/11	3/15/11	NA	NA	0%	28
30		wrap, cure	1 day	3/16/11	3/16/11	NA	NA	0%	29
31		wind double layer 9	2 days	3/17/11	3/18/11	NA	NA	0%	30
32		wrap, cure	1 day	3/21/11	3/21/11	NA	NA	0%	31
33		wind double layer 10	2 days	3/22/11	3/23/11	NA	NA	0%	32
34		wrap, cure	1 day	3/24/11	3/24/11	NA	NA	0%	33
35		wind double layer 11, including 4 layer 1	3 days	3/25/11	3/29/11	NA	NA	0%	34
36		wrap, cure	2 days	3/30/11	3/31/11	NA	NA	0%	35
37		over-wrap fiberglass	2 days	4/1/11	4/4/11	NA	NA	0%	36
38		cure	2 days	4/5/11	4/6/11	NA	NA	0%	37
39		machine OD	5 days	4/7/11	4/13/11	NA	NA	0%	38
40		stabilize, install vts, insulate exiting lea	11 days	4/14/11	4/28/11	NA	NA	0%	39
41		electrical tests	2 days	4/29/11	5/2/11	NA	NA	0%	40
42		Fringe Field Solenoid Coils	63 days	2/7/11	5/18/11	3/14/11	NA	31%	
43	✓	AFF Coil #1	12 days	2/7/11	2/23/11	3/14/11	3/25/11	100%	
44	✓	insulate hub	1 day	2/7/11	2/7/11	3/14/11	3/14/11	100%	
45	✓	splice, insulate start lead / install h	1 day	2/8/11	2/8/11	3/15/11	3/15/11	100%	44
46	✓	wind 24 layers	4 days	2/9/11	2/14/11	3/16/11	3/21/11	100%	45
47	✓	splice, insulate exiting lead	1 day	2/15/11	2/15/11	3/22/11	3/22/11	100%	46
48	✓	cure	1 day	2/16/11	2/16/11	3/23/11	3/23/11	100%	47
49	✓	overwrap / cure	1 day	2/17/11	2/17/11	3/24/11	3/24/11	100%	48
50	✓	electrical tests	1 day	2/23/11	2/23/11	3/29/11	3/29/11	100%	49
51	✓	AFF Coil #2	8 days	2/24/11	3/11/11	3/30/11	4/8/11	100%	
52	✓	insulate hub	1 day	2/24/11	2/24/11	3/30/11	3/30/11	100%	50
53	✓	splice, insulate start lead / install h	1 day	2/25/11	2/25/11	3/31/11	3/31/11	100%	52
54	✓	wind 24 layers	2 days	2/28/11	3/3/11	4/1/11	4/4/11	100%	53
55	✓	splice, insulate exiting lead	1 day	3/4/11	3/4/11	4/5/11	4/5/11	100%	54
56	✓	cure	1 day	3/7/11	3/7/11	4/6/11	4/6/11	100%	55
57	✓	overwrap / cure	1 day	3/8/11	3/8/11	4/7/11	4/7/11	100%	56
58	✓	electrical tests	1 day	3/11/11	3/11/11	4/8/11	4/8/11	100%	57
59		FF Coil #1	21 days	3/14/11	4/14/11	4/13/11	NA	0%	
60		insulate hub	2 days	3/14/11	3/14/11	4/13/11	NA	0%	58
61		splice, insulate start lead / install h	1 day	3/15/11	3/15/11	NA	NA	0%	60
62		wind 70 layers	12 days	3/16/11	3/31/11	NA	NA	0%	61
63		splice, insulate exiting lead	1 day	4/1/11	4/1/11	NA	NA	0%	62



schedule p.2



ID		Task Name	Duration	Baseline Start	Baseline Finish	Actual Start	Actual Finish	% Complete	Prede
64		cure	1 day	4/4/11	4/4/11	NA	NA	0%	63
65		overwrap / cure	1 day	4/5/11	4/5/11	NA	NA	0%	64
66		machine OD	2 days	4/6/11	4/7/11	NA	NA	0%	65
67		electrical tests	1 day	4/14/11	4/14/11	NA	NA	0%	66
68		**FF Coil #2**	**20 days**	**4/15/11**	**5/18/11**	**NA**	**NA**	**0%**	
77		**Block Corrector Coils**	**103 days**	**1/21/11**	**4/7/11**	**1/24/11**	**NA**	**47%**	**7SS+**
78	✓	deburr / clean tube	0.5 days	1/21/11	1/21/11	1/24/11	1/24/11	100%	
79	✓	return to CS for rework	14 days	NA	NA	1/25/11	2/11/11	100%	78
80	✓	insulate 0.5m/2.5m grooves (20 blocks,	22 days	1/24/11	2/4/11	2/14/11	3/16/11	100%	79
81	✓	wind 1st layer 0.5m coil block	9 days	2/7/11	2/18/11	3/17/11	3/29/11	100%	80
82		wind remaining 19 blocks	18 days	NA	NA	4/5/11	NA	5%	81FS
83		stabilize / insulate 40 leads	5 days	2/22/11	2/28/11	NA	NA	0%	82
84		electrical tests	1 day	3/1/11	3/1/11	NA	NA	0%	83
85		wind 1 layer 2.5m coil blocks (4)	4 days	3/2/11	3/3/11	NA	NA	0%	84
86		stabilize / insulate 8 leads	1 day	3/4/11	3/4/11	NA	NA	0%	85
87		electrical tests	2 days	3/7/11	3/8/11	NA	NA	0%	86
88		kevlar wrap / cure	2 days	3/9/11	3/10/11	NA	NA	0%	87
89		strip / wrap / prep for cure	2 days	3/11/11	3/14/11	NA	NA	0%	88
90		final cure	1 day	3/15/11	3/15/11	NA	NA	0%	89
91		electrical tests	2 days	3/16/11	3/17/11	NA	NA	0%	90
92		magnetic measurements	15 days	3/18/11	4/7/11	NA	NA	0%	91
93		**Yoke Assembly**	**35 days**	**5/19/11**	**7/8/11**	**NA**	**NA**	**0%**	**12,42**
94		install AFF coils onto support tube	0.5 days	5/19/11	5/19/11	NA	NA	0%	
95		install corrector coil assembly	0.5 days	5/19/11	5/19/11	NA	NA	0%	94
96		install yoke, outer support shell	3.5 days	5/20/11	5/25/11	NA	NA	0%	95
97		install NLE bus	0.25 days	5/25/11	5/25/11	NA	NA	0%	96
98		install wiring boards (2)	0.25 days	5/25/11	5/25/11	NA	NA	0%	97
99		wire main solenoid leads (22), vt's (46),	10 days	5/26/11	6/9/11	NA	NA	0%	98
100		wire AFF leads (4), vt's (3)	2 days	6/10/11	6/13/11	NA	NA	0%	99
101		install FF coils	1 day	6/14/11	6/14/11	NA	NA	0%	100
102		wire FF leads (4), vt's (3)	2 days	6/15/11	6/16/11	NA	NA	0%	101
103		electrical tests	5 days	6/17/11	6/23/11	NA	NA	0%	102
104		magnetic / polarity tests	10 days	6/24/11	7/8/11	NA	NA	0%	103
105		**Vertical Cold Test**	**39.5 days**	**7/11/11**	**9/2/11**	**NA**	**NA**	**0%**	**12,93**
113		**Cold Mass Assembly**	**11 days**	**9/2/11**	**9/19/11**	**NA**	**NA**	**0%**	**7,105**
118		**Magnet Assembly**	**40 days**	**9/19/11**	**11/14/11**	**NA**	**NA**	**0%**	**113**
136		**Final Magnet Test**	**64 days**	**11/14/11**	**2/10/12**	**NA**	**NA**	**0%**	**118**
137		power supply, helium connections	9 days	11/14/11	11/25/11	NA	NA	0%	
138		300K elect test & integ. field msmt	5 days	11/25/11	12/2/11	NA	NA	0%	137
139		cooldown	5 days	12/2/11	12/9/11	NA	NA	0%	138
140		4.5K elect, heater, quench, DC loop	15 days	12/9/11	12/30/11	NA	NA	0%	139
141		magnetic measurements	20 days	12/30/11	1/27/12	NA	NA	0%	140
142		warmup	5 days	1/27/12	2/3/12	NA	NA	0%	141
143		disconnect electrical, plumbing	5 days	2/3/12	2/10/12	NA	NA	0%	142