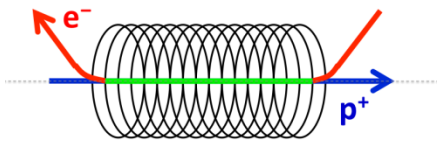
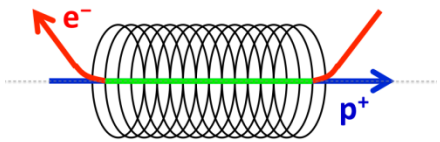


Electron Lens Superconducting Solenoid Status

Michael Anerella

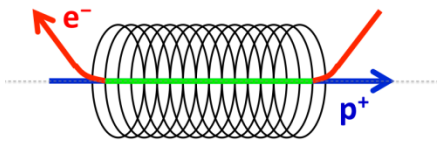
October 11, 2011

E-Lens - General



- All parts for vertical cold test assembly in process in CS, expected delivery 10/28 (SP)
- Cold mass, cryostat drawing work continues (LR/SP/PK/SS)
- Yoke material – received, in CS for machining
- Cryostatting fixture Mods in CS – PK
- Vertical cold test top hat, hanging support design complete, released to CS
- Magnetic Needle Tooling – all parts in CS, some parts complete, expected delivery ~ 10/30 (PK)
- Coil status – following slides

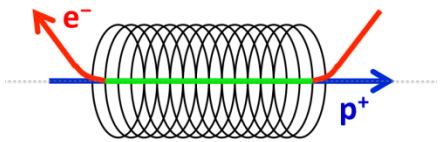
Corrector coils



- 1st Corrector:
- Electrical tests complete
- Needs helium holes in FG

- 2nd Corrector:
- (20) 0.5 m coil electrical tests complete (JE)
- (4) 2.5 m coils wound (DM)

Main Solenoid Coils



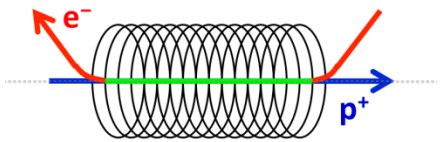
1st main solenoid

- All stainless steel support sleeve installed
- Fillers welded
- Final shimming underway (RC/AM)

2nd main solenoid

- 7 double layers wound (by end of today)
- Working Saturdays until finished

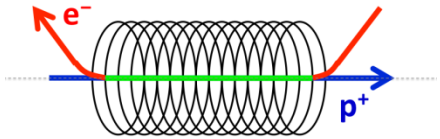
AFF, FF Solenoid coils



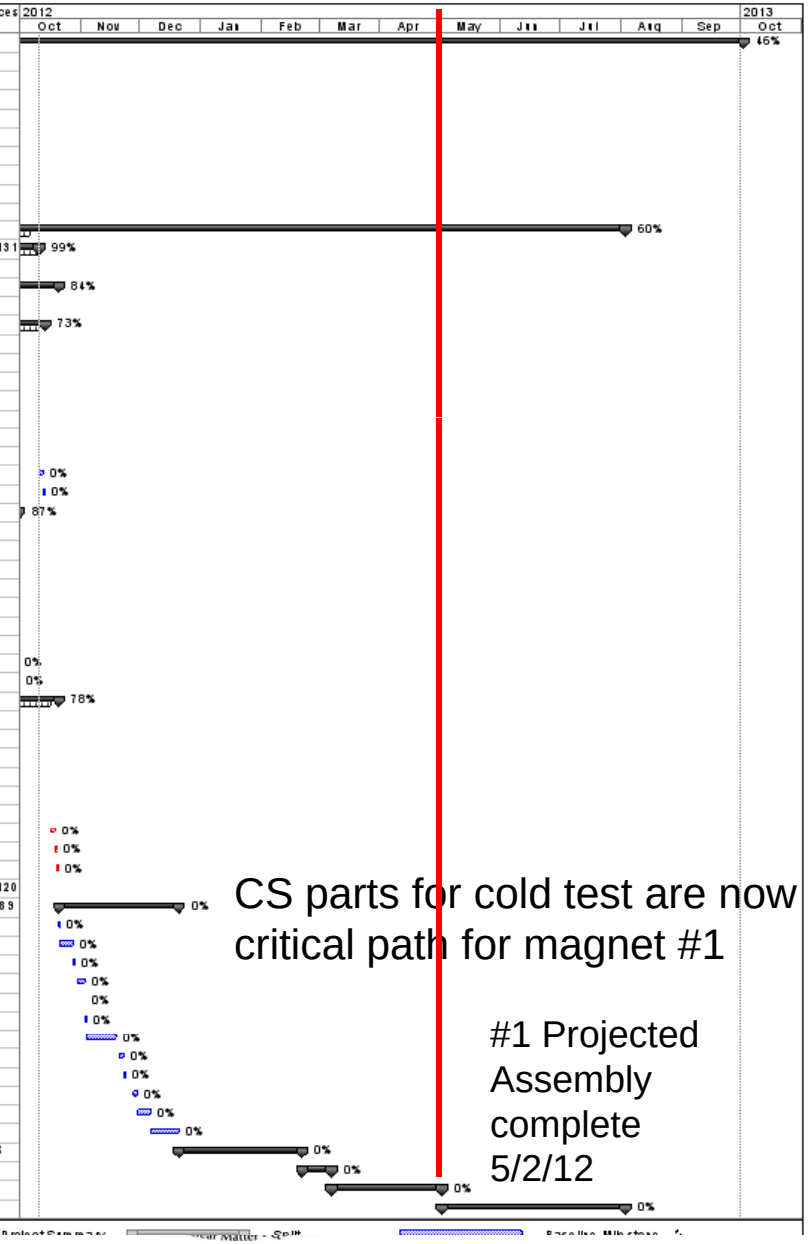
- FF coil #1 – winding complete, issue with exiting lead being investigated (DR written, coil designated for magnet #2).
- FF coil #2 machining complete.
- FF coil #3 – winding, overwrap complete. Machining to be completed 10/17. (needed for magnet #1)
- FF coil #4 to be wound.
- All FF coils – stainless steel support sleeves to be installed

- AFF #1 – completed, ready for installation
- AFF #2 – completed, needs 1 access hole in bottom of bobbin added ~ now for coil lead routing at NLE (needed for magnet #1) (DR needed – AM)
- AFF #3 & #4 – to be wound after FF #4

schedule p.1



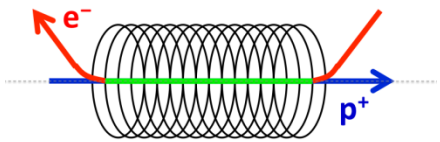
ID	Task Name	Duration	Baseline Start	Baseline Finish	Actual Start	Actual Finish	% Complete	Predecessors
1	electron lens solenoid	626.8 days	4/5/10	5/22/12	4/5/10	NA	46%	
2	Preliminary Design	80 days	4/5/10	7/27/10	4/5/10	7/27/10	100%	
3	Final Design	143.75 days	7/28/10	3/4/11	7/28/10	NA	74%	2
4	Coils	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	383.5 days	1/21/11	2/10/12	1/24/11	NA	60%	
12	Solenoid Coil Assembly	142 days	2/7/11	5/2/11	3/21/11	NA	99%	7SS+131
49								
50	Fringe Field Solenoid Coils	155 days	2/7/11	5/18/11	3/14/11	NA	84%	
51	AFF Coil #1	12 days	2/7/11	2/23/11	3/14/11	3/29/11	100%	
59	AFF Coil #2	138 days	2/24/11	3/11/11	3/30/11	NA	73%	
60	Insulate lub	1 day	2/24/11	2/24/11	3/30/11	3/30/11	100%	58
61	splice, insulate start lead / install l	1 day	2/25/11	2/25/11	3/31/11	3/31/11	100%	60
62	wind 24 layers	2 days	2/28/11	3/3/11	4/1/11	4/4/11	100%	61
63	splice, insulate exiting lead	1 day	3/4/11	3/4/11	4/5/11	4/5/11	100%	62
64	cure	1 day	3/7/11	3/7/11	4/6/11	4/6/11	100%	63
65	overwrap / cure	1 day	3/8/11	3/8/11	4/7/11	4/7/11	100%	64
66	electrical tests	1 day	3/11/11	3/11/11	4/8/11	4/8/11	100%	65
67	add lead access hole at turn bus	2 days	NA	NA	10/11/11	NA	0%	66
68	electrical tests	1 day	NA	NA	NA	NA	0%	67
69	FF Coil #1	72 days	3/14/11	4/14/11	6/20/11	NA	87%	
70	rework / insulate lub	6 days	3/14/11	3/14/11	6/20/11	6/27/11	100%	68
71	splice, insulate start lead / install l	2 days	3/15/11	3/15/11	6/28/11	6/29/11	100%	70
72	wind 70 layers	7 days	3/16/11	3/31/11	6/30/11	7/12/11	100%	71
73	splice, insulate exiting lead	1 day	4/1/11	4/1/11	7/13/11	7/13/11	100%	72
74	cure	1 day	4/4/11	4/4/11	7/14/11	7/14/11	100%	73
75	overwrap / cure	1 day	4/5/11	4/5/11	7/15/11	7/15/11	100%	74
76	machine OD	2 days	4/6/11	4/7/11	7/18/11	7/19/11	100%	75
77	install supports sleeve	2 days	NA	NA	9/28/11	NA	0%	76
78	electrical tests	1 day	4/14/11	4/14/11	NA	NA	0%	77
79	FF Coil #2	135 days	4/15/11	5/18/11	4/11/11	NA	78%	
80	insulate lub	2 days	4/15/11	4/15/11	4/11/11	4/12/11	100%	66
81	splice, insulate start lead / install l	2 days	4/18/11	4/18/11	4/13/11	4/14/11	100%	80
82	wind 70 layers	7 days	4/19/11	5/4/11	7/14/11	7/22/11	100%	73
83	splice, insulate exiting lead	1 day	5/5/11	5/5/11	7/25/11	7/25/11	100%	82
84	cure	1 day	5/6/11	5/6/11	7/26/11	7/26/11	100%	83
85	overwrap / cure	1 day	5/9/11	5/9/11	7/27/11	7/27/11	100%	84
86	machine OD	2 days	5/10/11	5/11/11	10/17/11	NA	0%	
87	install supports sleeve	1 day	NA	NA	NA	NA	0%	86
88	electrical tests	1 day	5/18/11	5/18/11	NA	NA	0%	87
89	Block Corrector Coils	152 days	1/21/11	4/7/11	1/24/11	NA	99%	7SS+120
106	Yoke Assembly	40 days	5/19/11	7/8/11	NA	NA	0%	12,50,89
107	install AFF coils onto support tube	0.5 days	5/19/11	5/19/11	NA	NA	0%	68
108	wait for CS parts	5 days	NA	NA	NA	NA	0%	107
109	install corrector coil assembly	0.5 days	5/19/11	5/19/11	NA	NA	0%	108
110	install yoke, outer support shell	3.5 days	5/20/11	5/25/11	NA	NA	0%	109
111	install NLE bus	0.25 days	5/25/11	5/25/11	NA	NA	0%	110
112	install wiring boards (2)	0.25 days	5/25/11	5/25/11	NA	NA	0%	111
113	wire main solenoid leads (22), vts (46),	10 days	5/26/11	6/9/11	NA	NA	0%	112
114	wire AFF leads (4), vts (3)	2 days	6/10/11	6/13/11	NA	NA	0%	113
115	install FF coils	1 day	6/14/11	6/14/11	NA	NA	0%	114
116	wire FF leads (4), vts (3)	2 days	6/15/11	6/16/11	NA	NA	0%	115
117	electrical tests	5 days	6/17/11	6/23/11	NA	NA	0%	116
118	magnetic / polarity tests	10 days	6/24/11	7/8/11	NA	NA	0%	117
119	Vertical Cold Test	39.5 days	7/11/11	9/2/11	NA	NA	0%	12,106
127	Cold Mass Assembly	11 days	9/2/11	9/13/11	NA	NA	0%	7,119
132	Magnet Assembly	40 days	9/13/11	11/14/11	NA	NA	0%	127
150	Final Magnet Test	64 days	11/14/11	2/10/12	NA	NA	0%	132



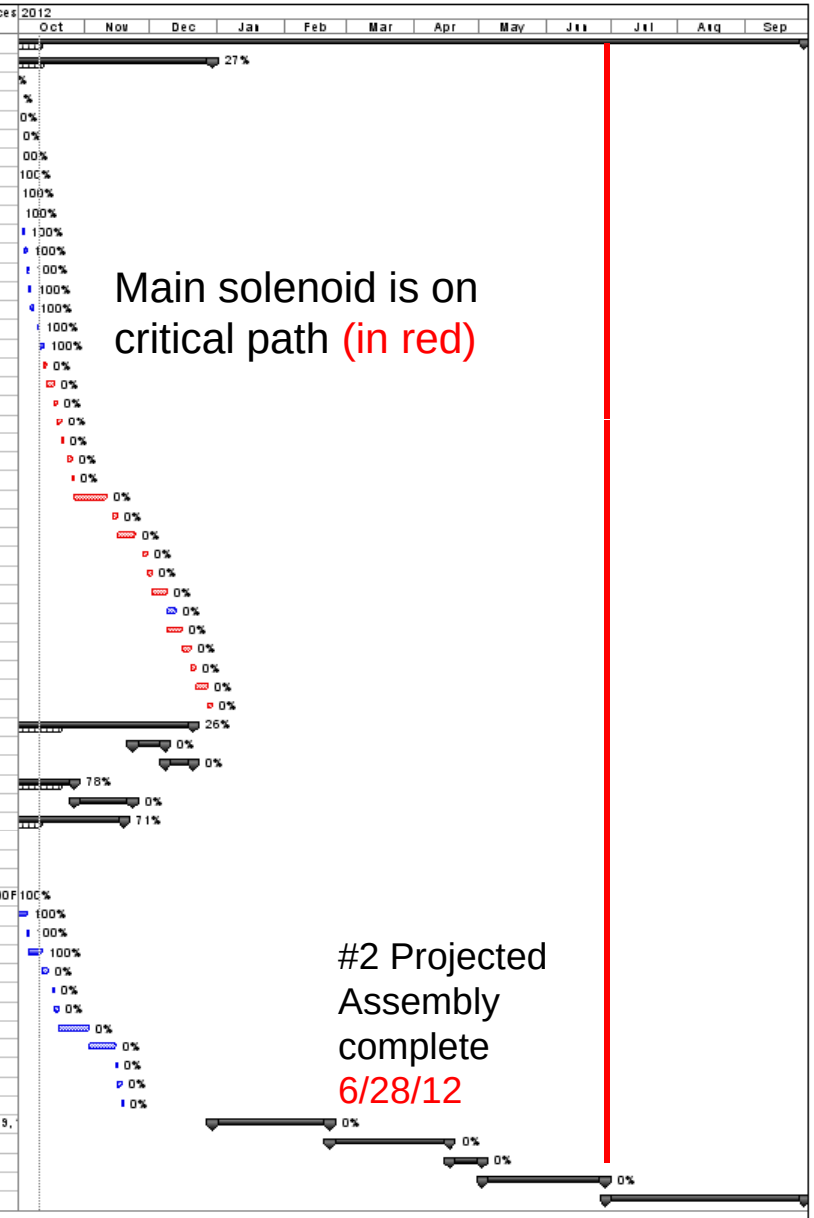
CS parts for cold test are now critical path for magnet #1

#1 Projected Assembly complete 5/2/12

schedule p.2



ID		Task Name	Duration	Baseline Start	Baseline Finish	Actual Start	Actual Finish	% Complete	Predecessors
158		Magnet #2	498.5 days	4/8/11	5/22/12	10/1/10	NA	24%	
159		Solenoid Coil Assembly	71 days	5/3/11	7/27/11	9/15/11	NA	27%	
160	✓	Insulate tube / cure	2 days	5/3/11	5/4/11	9/15/11	9/16/11	100%	
161	✓	Install cable spool, support tube	1 day	5/5/11	5/5/11	9/19/11	9/19/11	100%	160
162	✓	wind double layer 1	2 days	5/6/11	5/9/11	9/20/11	9/21/11	100%	161
163	✓	wrap, cure	1 day	5/10/11	5/10/11	9/22/11	9/22/11	100%	162
164	✓	wind double layer 2	2 days	5/11/11	5/12/11	9/23/11	9/26/11	100%	163
165	✓	wrap, cure	1 day	5/13/11	5/13/11	9/27/11	9/27/11	100%	164
166	✓	wind double layer 3	2 days	5/16/11	5/17/11	9/28/11	9/29/11	100%	165
167	✓	wrap, cure	1 day	5/18/11	5/18/11	9/30/11	9/30/11	100%	166
168	✓	wind double layer 4	1 day	5/19/11	5/20/11	10/3/11	10/3/11	100%	167
169	✓	wrap, cure	1 day	5/23/11	5/23/11	10/4/11	10/4/11	100%	168
170	✓	wind double layer 5	1 day	5/24/11	5/25/11	10/5/11	10/5/11	100%	169
171	✓	wrap, cure	1 day	5/26/11	5/26/11	10/6/11	10/6/11	100%	170
172	✓	wind double layer 6	1 day	5/27/11	5/31/11	10/7/11	10/7/11	100%	171
173	✓	wrap, cure	1 day	6/1/11	6/1/11	10/10/11	10/10/11	100%	172
174	✓	wind double layer 7	2 days	6/2/11	6/3/11	10/11/11	10/12/11	100%	173
175		wrap, cure	1 day	6/6/11	6/6/11	NA	NA	0%	174
176		wind double layer 8	2 days	6/7/11	6/8/11	NA	NA	0%	175
177		wrap, cure	1 day	6/9/11	6/9/11	NA	NA	0%	176
178		wind double layer 9	2 days	6/10/11	6/13/11	NA	NA	0%	177
179		wrap, cure	1 day	6/14/11	6/14/11	NA	NA	0%	178
180		wind double layer 10	2 days	6/15/11	6/16/11	NA	NA	0%	179
181		wrap, cure	1 day	6/17/11	6/17/11	NA	NA	0%	180
182		wind double layer 11, including 4 layer 1	11 days	6/20/11	6/22/11	NA	NA	0%	181
183		wrap, cure	2 days	6/23/11	6/24/11	NA	NA	0%	182
184		over-wrap fiberglass	6 days	6/27/11	6/28/11	NA	NA	0%	183
185		cure	2 days	6/29/11	6/30/11	NA	NA	0%	184
186		riggers to CS	2 days	NA	NA	NA	NA	0%	185
187		machine OD	5 days	7/1/11	7/8/11	NA	NA	0%	186
188		riggers from CS	2 days	NA	NA	NA	NA	0%	187
189		final machine tapered sleeve	5 days	NA	NA	NA	NA	0%	187
190		riggers from CS	2 days	NA	NA	NA	NA	0%	189
191		install tapered sleeve	2 days	NA	NA	NA	NA	0%	190
192		install end sleeves	2 days	NA	NA	NA	NA	0%	191
193		electrical tests	2 days	7/26/11	7/27/11	NA	NA	0%	192
194		Fringe Field Solenoid Coils	97 days	5/19/11	8/30/11	8/2/11	NA	26%	
195		AFF Coil #1	9 days	5/19/11	6/6/11	NA	NA	0%	221
203		AFF Coil #2	9 days	6/7/11	6/22/11	NA	NA	0%	
211		FF Coil #1	61 days	6/23/11	7/27/11	8/2/11	NA	78%	
221		FF Coil #2	18 days	7/28/11	8/30/11	NA	NA	0%	
231		Block Corrector Coils	284 days	4/8/11	6/23/11	10/1/10	NA	71%	
232	✓	deburr / clean tube	0.5 days	4/8/11	4/8/11	10/1/10	10/1/10	100%	
233	✓	form pusters	0.5 days	4/8/11	4/8/11	10/1/10	10/1/10	100%	232
234	✓	insulate 0.5m/2.5m grooves (20 blocks)	10 days	4/11/11	4/22/11	10/4/10	10/15/10	100%	233
235	✓	wind 4 layer 0.5m coilblocks (20)	45 days	4/25/11	5/6/11	7/26/11	9/27/11	100%	234,100F
236	✓	stabilize / insulate 40 leads	5 days	5/9/11	5/13/11	9/28/11	10/4/11	100%	235
237	✓	electrical tests	1 day	5/16/11	5/16/11	10/5/11	10/5/11	100%	236
238	✓	wind 1 layer 2.5m coilblocks (4)	4 days	5/17/11	5/18/11	10/6/11	10/11/11	100%	237
239		fit, install pusters	3 days	NA	NA	NA	NA	0%	238
240		stabilize / insulate 8 leads	1 day	5/19/11	5/19/11	NA	NA	0%	239
241		electrical tests	2 days	5/20/11	5/23/11	NA	NA	0%	240
242		kevlar wrap / cure	10 days	5/24/11	5/25/11	NA	NA	0%	241
243		strip /pot leads / wrap / prep for cure	7 days	5/26/11	5/27/11	NA	NA	0%	242
244		final cure	1 day	5/31/11	5/31/11	NA	NA	0%	243
245		electrical tests	2 days	6/1/11	6/2/11	NA	NA	0%	244
246		magnetic measurements not done	1 day	6/3/11	6/23/11	NA	NA	0%	245
247		Yoke Assembly	35 days	8/31/11	10/18/11	NA	NA	0%	231, 159,
259		Vertical Cold Test	39.5 days	10/19/11	12/13/11	NA	NA	0%	247
267		Cold Mass Assembly	11 days	12/13/11	12/28/11	NA	NA	0%	259
272		Magnet Assembly	40 days	12/28/11	2/22/12	NA	NA	0%	267
290		Final Magnet Test	64 days	2/22/12	5/22/12	NA	NA	0%	272



Main solenoid is on critical path (in red)

#2 Projected Assembly complete 6/28/12