

	Activity Name	Duration (Work Days)	Start Date	Finish Date	Predecessors	% Complete	Free Float	Resources Assigned	Comments	2007							
										J	F	M	A	M	J	J	
1	Bladder tests	56.00	1/15/07	4/2/07		8%											
2	Develop fill procedure for bladder. Document results of bladder testing (SS and Teflon) to date.	5.00	1/15/07	1/19/07		75%	0.00	Dudek	Documentation remains to be done.								
3	Determine if "one size fits all". Develop procurement drawings for bladder.	10.00	1/22/07	2/2/07		0%	0.00	Williamson									
4	Set up test equipment to determine CTE and stiffness and to perform cyclic testing. Procure bladders for testing.	5.00	2/5/07	2/9/07	2, 3	0%	0.00	Gettelfinger	May conflict with COF testing								
5	Review structural analyses to determine bladder performance requirements. Establish bladder test parameters, e.g. contact pressure.	5.00	1/22/07	1/26/07		0%	10.00	Fan									
6	Perform tests to determine bladder properties and qualify the design for the given load conditions	5.00	2/12/07	2/16/07	4, 5	0%	5.00	Gettelfinger									
7	Procure/fab prototype bladder for C-C installation	10.00	2/5/07	2/16/07	3	0%	0.00	Dudek	Installation to be prototyped by Viola								
8	Conduct FDR of bladder design	1.00	2/26/07	2/26/07	6, 90	0%	0.00	Williamson									
9	Resolve FDR issues, release procurement drawings for fabrication	5.00	2/27/07	3/5/07	8	0%	0.00	Williamson									
10	Procure bladders for first FPA (2 ea)	20.00	3/6/07	4/2/07	9	0%	0.00	Dudek									
11	Bladders available for FPA	0.00	4/2/07	4/2/07	10	0%	34.00										
12																	
13	Shims	99.00	1/2/07	5/18/07		12%											
14	Coefficient of friction (COF) tests	54.00	1/2/07	3/16/07		7%											
											J	F	M	A	M	J	J

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15	Order candidate materials for screening tests. Perform screening tests. Pick shim surfaces.	19.00	1/2/07	1/26/07		50%	0.00	Gettelfinger								
16	Prepare standard shims for additional testing.	5.00	1/29/07	2/2/07	15	0%	0.00	Gettelfinger	"Standard" shims have a lower COF than "High COF" shims and do not require special materials to be ordered. May be moot.							
17	Perform additional COF tests (LN2 testing, cyclic tests, COF versus normal pressure, etc) for standard shims	5.00	2/5/07	2/9/07	16	0%	5.00	Gettelfinger								
18	Procure material for high COF shims.	15.00	1/29/07	2/16/07	15	0%	0.00	Gettlefinger								
19	Perform additional COF tests (LN2 testing, cyclic tests, COF versus normal pressure, etc) for high COF shims	10.00	2/19/07	3/2/07	17, 18	0%	0.00	Gettelfinger								
20	Assess implications of pressure-dependent COF for shim design	5.00	3/5/07	3/9/07	19	0%	0.00	Brooks								
21	Document and conduct peer review of test results.	5.00	3/12/07	3/16/07	20	0%	0.00	Gettlefinger								
22	Define geometry of standard shim	1.00	1/19/07	1/19/07		100%	0.00	Williamson	Done. Gary McGinnis prepared this concept for an individual shim with a surface area of ~11-in <sup>2</sup> . Special shims may be required around midplane port.							
23	Measure flanges on finished coils to determine range of shim thicknesses required.	10.00	1/22/07	2/2/07		0%	30.00	Viola	Thought to be 0.5+/-0.025". Brooks suggested 3mil increments in							
										J	F	M	A	M	J	J

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24	Add measurement of flanges to post-VPI procedure	5.00	1/22/07	1/26/07		0%	35.00	Chrzanowski									
25	Finalize procurement drawings of shim. Conduct FDR	5.00	3/19/07	3/23/07	21, 22, 23, 24	0%	0.00	Williamson									
26	Procure shims	40.00	3/26/07	5/18/07	25	0%	0.00	Dudek									
27	Shims available for FPA	0.00	5/18/07	5/18/07	26	0%	0.00										
28																	
29	Tension tests of a bolted joint	90.00	1/15/07	5/18/07		6%											
30	Procure nuts, studs, and washers ASAP	90.00	1/15/07	5/18/07		14%											
31	<i>Define reference geometry for bolted joint</i>	5.00	1/15/07	1/19/07		100%	0.00	Williamson	Done. ORNL has provided drawings (SE140-190).								
32	<i>Develop cost and lead time estimates for nuts, studs, and washers of different materials.</i>	10.00	1/22/07	2/2/07	31	0%	10.00	Williamson									
33	<i>Perform analyses to determine geometry and location of high COF shims and placement of new studs. Characterize performance impacts of low CTE washers.</i>	5.00	1/22/07	1/26/07		0%	0.00	Brooks									
34	<i>Modify reference drawings to accommodate hydraulic tensioners (and other tightening devices) and UT inspection. Document number required for each part.</i>	10.00	2/5/07	2/16/07	33, 77	0%	0.00	Williamson									
35	<i>Conduct peer review prior to procurement. Resolve issues.</i>	5.00	2/19/07	2/23/07	32, 34	0%	0.00	Williamson									
36	<i>Procure nuts studs and washers for start of FPA</i>	60.00	2/26/07	5/18/07	35	0%	0.00	Dudek									
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50	Identify candidate schemes for getting a bushing the fits tightly into the hole and around a stud. Prepare sketches.	5.00	1/22/07	1/26/07		0%	0.00	Williamson									
51	Measure holes on castings. Required to characterize OOT conditions.	10.00	1/22/07	2/2/07		0%	5.00	Phelps, Viola									
52	Procure bushing materials for tests.	10.00	1/29/07	2/9/07	50	0%	0.00	Dudek									
53	Fabricate bushings.	5.00	2/12/07	2/16/07	51, 52	0%	65.00	Dudek									
54	Procure tools and materials required for bushing assembly.	15.00	1/29/07	2/16/07	50	0%	0.00	Dudek									
55	Perform trial bushing installations (short of gluing them in) on a production coil.	10.00	2/19/07	3/2/07	52, 54	0%	0.00	Viola									
56	Document test results. Select bushing configuration. Conduct peer review of test results and bushing selection.	5.00	3/5/07	3/9/07	55	0%	0.00	Viola									
57	Procure bushing materials for assembly operations. Fabricate bushings.	30.00	3/12/07	4/20/07	56	0%	0.00	Dudek									
58	Bushings available for FPA operations	0.00	4/20/07	4/20/07	57	0%	20.00										
59																	
60	Shear tests of a bolted joint	25.00	3/12/07	4/13/07		0%											
61	Assemble test specimens, ship to ORNL	10.00	3/12/07	3/23/07	38, 39, 56	0%	0.00	Dudek									
62	Set up test fixture at ORNL	10.00	3/12/07	3/23/07	61SS	0%	0.00	Freudenberg									
63	Measure joint deflection versus shear load. Pull to failure.	10.00	3/26/07	4/6/07	62	0%	0.00	Freudenberg									
64	Document test results. Conduct peer review of test results.	5.00	4/9/07	4/13/07	63	0%	15.00	Freudenberg									
										J	F	M	A	M	J	J	



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78	Survey each coil type using templates. Determine stud length constraints based on access limitations for torquing/tensioning.	10.00	2/5/07	2/16/07	77	0%	65.00	Viola									
79	Identify areas that need to be measured in post-VPI and ground	25.00	1/22/07	2/23/07		0%											
80	Identify "close points" when assembling	5.00	1/22/07	1/26/07		0%	15.00	Brown									
81	Perform fits of C-C, C-B, B-A, and A-A	20.00	1/22/07	2/16/07		0%	0.00	Viola									
82	Provide guidance to revise post-VPI procedure to include measurement points	5.00	2/19/07	2/23/07	80, 81	0%	60.00	Brown									
83	Perform trial x-y-z alignments on C1-C2. Demonstrate capability to satisfy alignment requirements with individual shims of uniform thickness.	10.00	1/22/07	2/2/07		0%	0.00	Viola									
84	Establish alignment mechanisms, metrology equipment complement and positioning requirements, etc. Conduct peer review.	5.00	2/5/07	2/9/07	83	0%	0.00	Viola									
85	Procure alignment mechanisms, fiducials, lifting equipment, etc. for assembly operations	40.00	2/12/07	4/6/07	84	0%	15.00	Dudek									
86	Develop procedures for torquing bolts	5.00	2/26/07	3/2/07	39, 83	0%	0.00	Viola									
87	Determine fiducial types and locations	10.00	3/5/07	3/16/07	86	0%	0.00	Viola									
88	Procure monuments and related metrology equipment	30.00	3/19/07	4/27/07	87	0%	0.00	Dudek									
89	Tools and tooling available for FPA operations	0.00	4/27/07	4/27/07	39, 85, 88	0%	15.00										
90	Prototype bladder installation.	5.00	2/19/07	2/23/07	7	0%	0.00	Viola									
										J	F	M	A	M	J	J	

