

	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	Complete design of MC interface hdw	80.00	1/22/07	5/11/07		15%										
2	Establish design criteria for bolted joints	10.00	1/22/07	2/2/07		100%	0.00	Fan								
3	Perform analyses to determine geometry and location of high COF shims and placement of new bolts	20.00	1/22/07	2/16/07		75%	0.00	Brooks	Need to update for new design criteria, updated assessment of preload. Look to add 4th bolt on BC interface.							
4	Re-measure the CTE of Stellalloy in PPPL samples	5.00	2/12/07	2/16/07		0%	7.00	Gettelfinger								
5	Update bolted joint design spreadsheet with revised desing criteria. Select shim material, load washer material, and spherical washer material. Consider performance impact the the CTEs.	5.00	2/12/07	2/16/07		0%	0.00	Williamson	Material selection is critical							
6	Conduct PDR to review requirements, design, and development plan	5.00	2/28/07	3/6/07	4, 5, 33	0%	3.00	Williamson								
7	Shims in unbolted region	20.00	2/5/07	3/2/07		0%										
8	<i>Resolve shim design in unbolted regions</i>	20.00	2/5/07	3/2/07	3FF+5.00	0%	0.00	Williamson								
9	Develop fabrication drawings of shims in unbolted regions	10.00	3/5/07	3/16/07	8	0%	0.00	Williamson								
10	Conduct FDR for inbd shims. Resolve issues.	5.00	3/19/07	3/23/07	9	0%	0.00									
11	Procure materials to install shims in inboard region.	30.00	3/26/07	5/4/07	10	0%	0.00									
12	Develop specs and drawings for Station 2 and 3 assemblies	15.00	3/12/07	3/30/07	6, 57	0%	25.00	Cole								
13	Conduct MC interface FDR	0.00	5/4/07	5/4/07	11, 12, 24, 48, 57, 74	0%	0.00	Williamson								
										J	F	M	A	M	J	J

	Activity Name	Duration (Work Days)	Start Date	Finish Date	Predecessors	% Complete	Free Float	Resources Assigned	Comments	2007						
										J	F	M	A	M	J	J
14	Resolve issues, release assembly spec and drawings	5.00	5/7/07	5/11/07	13	0%	5.00	Williamson								
15																
16	Bladder tests	61.00	1/15/07	4/9/07		20%										
17	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. Dudek to send out pictures, report on 2/12							
18	Review structural analyses to determine bladder performance requirements. Establish bladder test parameters, e.g. contact pressure.	15.00	1/22/07	2/9/07		100%	0.00	Fan	Fan reviewed analysis. Provided data to Dudek and Williamson. Williamson to modify bladder design with highest pressure.							
19	Set up test equipment to determine CTE and stiffness and to perform cyclic testing. Procure bladders for testing.	5.00	2/12/07	2/16/07	17, 21	0%	0.00	Gettelfinger	May conflict with COF testing							
20	Perform tests to determine bladder properties and qualify the design for the given load conditions	5.00	2/19/07	2/23/07	18, 19	0%	5.00	Gettelfinger								
21	Determine if "one size fits all". Modify bladder extent in region of highest pressure. Develop procurement drawings for bladder.	5.00	2/5/07	2/9/07		25%	0.00	Williamson	Delayed due to availability of only one designer							
22	Procure/fab prototype bladder for C-C installation	10.00	2/12/07	2/23/07	21	0%	0.00	Dudek	Installation to be prototyped by Viola							
23	Conduct FDR of bladder design	1.00	3/5/07	3/5/07	20, 96	0%	0.00	Williamson								
24	Resolve FDR issues, release procurement drawings for fabrication	5.00	3/6/07	3/12/07	23	0%	0.00	Williamson								
25	Procure bladders for first FPA (2 ea)	20.00	3/13/07	4/9/07	24	0%	0.00	Dudek								
26	Bladders available for FPA	0.00	4/9/07	4/9/07	25	0%	29.00									
										J	F	M	A	M	J	J

	Activity Name	Duration (Work Days)	Start Date	Finish Date	Predecessors	% Complete	Free Float	Resources Assigned	Comments	2007								
										J	F	M	A	M	J	J		
27																		
28	Shims and bushings (under bolts)	82.00	1/22/07	5/15/07		18%												
29	Coefficient of friction (COF) tests	42.00	2/5/07	4/3/07		7%												
30	Complete testing of diamond coatings (Ekagrip). Test shear strength of glass-epoxy joint. Set up test fixture for G11 shear tests.	5.00	2/5/07	2/9/07		50%	0.00	Gettelfinger										
31	Perform shear tests of G11 shim material from Franklin.	5.00	2/12/07	2/16/07	30	0%	5.00											
32	Prepare alumina samples. Complete friction testing of alumina samples.	10.00	2/12/07	2/23/07		0%	0.00	Gettelfinger										
33	Select shim design, material, and surface coating for qualification testing.	2.00	2/26/07	2/27/07	5, 31, 32	0%	0.00	Williamson	Alumina v. G11 v. glass-epoxy impacts the procurement path									
34	Set up test fixture for qualification testing. Prepare samples for qualification testing.	10.00	2/28/07	3/13/07	33	0%	0.00											
35	Perform qualification tests (shear capacity and cyclic testing)	10.00	3/14/07	3/27/07	34	0%	0.00	Gettelfinger										
36	Document and conduct peer review of test results.	5.00	3/28/07	4/3/07	35	0%	33.00	Gettelfinger										
37	Bushings	5.00	2/12/07	2/16/07		100%												
38	Provide drawings bushing drawings for tension and shear tests.	5.00	2/12/07	2/16/07		100%	0.00	Williamson										
39	Complete shim (and surrogate flange) and bushing design	42.00	1/22/07	3/20/07		22%												

	Activity Name	Duration (Work Days)	Start Date	Finish Date	Predecessors	% Complete	Free Float	Resources Assigned	Comments	2007						
										J	F	M	A	M	J	J
40	<i>Develop drawings to fabricate surrogate flanges from Stلالloy in bolt tension tests</i>	5.00	2/5/07	2/9/07		100%	0.00	Williamson								
41	<i>Develop drawings to fabricate surrogate flanges for shear tests</i>	5.00	2/12/07	2/16/07		0%	0.00									
42	<i>Develop drawings to fabricate shims for test specimens</i>	3.00	2/28/07	3/2/07	33	0%	0.00									
43	<i>Measure flanges on (2) finished coils to determine range of shim thicknesses required.</i>	10.00	2/12/07	2/23/07		0%	2.00	Viola	Thought to be 0.5+/-0.025". Brooks suggested 3mil increments in thickness. Need second LT to proceed.							
44	<i>Define thickness increments required. Finalize drawings for shims.</i>	10.00	2/28/07	3/13/07	33, 43	0%	0.00	Williamson	Need to choose surface coating and insulating material							
45	<i>Identify candidate schemes for getting a bushing the fits tightly into the hole and around a stud. Prepare sketches.</i>	5.00	1/22/07	1/26/07		100%	0.00	Fogarty	Fogarty concept a winner							
46	<i>Measure holes on castings. Required to characterize OOT for bushings.</i>	10.00	2/12/07	2/23/07	45	0%	0.00	Fogarty								
47	<i>Finalize drawings for bushings.</i>	5.00	2/26/07	3/2/07	46	0%	7.00	Williamson								
48	<i>Conduct FDR of shim and bushing design. Resolve issues.</i>	5.00	3/14/07	3/20/07	44, 47	0%	0.00	Williamson								
49	Procure shims and bushings	40.00	3/21/07	5/15/07	48	0%	0.00	Dudek								
50	Shims and bushings available for FPA.	0.00	5/15/07	5/15/07	49	0%	3.00									
51																
52	Nuts, bolts, and washers	90.00	1/15/07	5/18/07		14%										
										J	F	M	A	M	J	J

	Activity Name	Duration (Work Days)	Start Date	Finish Date	Predecessors	% Complete	Free Float	Resources Assigned	Comments	2007						
										J	F	M	A	M	J	J
53	Define reference geometry for bolted joint	5.00	1/15/07	1/19/07		100%	0.00	Williamson	Done. ORNL has provided drawings (SE140-190).							
54	Modify drawing to accommodate a hydraulic tensioner and to perform UT inspection. Release drawings to procure nuts and studs for testing.	5.00	2/12/07	2/16/07		0%	5.00		High priority.							
55	Release drawings to procure washer assemblies for testing.	5.00	2/19/07	2/23/07	5	0%	0.00									
56	Modify reference drawings to accommodate full complement of hydraulic tensioners (and other tightening devices) and UT inspection. Document number required for each part.	10.00	2/19/07	3/2/07	84	0%	0.00	Williamson	Choice of tools is critical							
57	Conduct FDR of nuts, studs, and washers. Resolve issues.	5.00	3/5/07	3/9/07	5, 56	0%	0.00	Williamson	Need to settle on washer material.							
58	Procure nuts studs and washers for start of FPA	50.00	3/12/07	5/18/07	57	0%	0.00	Dudek								
59	Nuts, studs, and washers available for FPA	0.00	5/18/07	5/18/07	58	0%	0.00									
60																
61	<b>Bolted joint tests</b>	<b>60.00</b>	<b>2/12/07</b>	<b>5/4/07</b>		<b>0%</b>										
62	Fabricate surrogate flanges for bolt tension tests	15.00	2/12/07	3/2/07	40	0%	15.00	Dudek								
63	Fabricate surrogate flanges for shear tests	15.00	2/19/07	3/9/07	41	0%	10.00									
64	Fabricate shims for bolted joint tests	15.00	3/5/07	3/23/07	42	0%	0.00	Dudek								
65	Procure bushing materials. Fabricate bushings for testing.	15.00	2/19/07	3/9/07	38	0%	10.00	Dudek								
										J	F	M	A	M	J	J

	Activity Name	Duration (Work Days)	Start Date	Finish Date	Predecessors	% Complete	Free Float	Resources Assigned	Comments	2007						
										J	F	M	A	M	J	J
66	Procure nuts, studs, and washer assemblies for bolted joint tests.	15.00	2/26/07	3/16/07	54, 55	0%	0.00	Dudek	Includes all planned development activities, e.g. shear tests at							
67	Procure tools for tightening nuts	15.00	2/19/07	3/9/07	84	0%	0.00	Dudek								
68	Tension tests	48.00	2/28/07	5/4/07		0%										
69	<i>Develop design of test fixture and instrumentation</i>	5.00	2/28/07	3/6/07	33, 54	0%	3.00	Gettelfinger	Follows friction tests. May conflict with bladder test							
70	<i>Set up test fixture and equipment. Perform JHA and pre-job brief prior to proceeding.</i>	5.00	3/12/07	3/16/07	67, 69	0%	10.00	Gettelfinger								
71	<i>Assemble test specimens</i>	5.00	3/26/07	3/30/07	62, 64, 65, 66, 67	0%	0.00	Gettelfinger								
72	<i>Perform bolt tension tests. Measure joint deflection and bolt preload. Test parameters include pre-tensioning, temperature, cycles, time (28 days), etc.</i>	20.00	4/2/07	4/27/07	70, 71	0%	0.00	Gettelfinger								
73	<i>Perform pullout tests for tapped</i>	3.00	4/2/07	4/4/07	70, 71	0%	0.00	Gettelfinger								
74	<i>Document and conduct peer review of test results</i>	5.00	4/30/07	5/4/07	72, 73	0%	0.00	Gettelfinger								
75	Shear tests of a bolted joint	50.00	2/19/07	4/27/07		0%										
76	<i>Assemble test specimens, ship to ORNL</i>	10.00	3/26/07	4/6/07	63, 64, 65, 66, 67	0%	0.00	Dudek								
77	<i>Develop design of test fixture and instrumentation</i>	5.00	2/19/07	2/23/07		0%	20.00	Freudenberg	Follows friction tests. May conflict with bladder test							
78	<i>Set up test fixture at ORNL</i>	10.00	3/26/07	4/6/07	76SS, 77	0%	0.00	Freudenberg								
79	<i>Measure joint deflection versus shear load. Conduct cyclic tests. Pull to failure.</i>	10.00	4/9/07	4/20/07	78	0%	0.00	Freudenberg								
80	<i>Document test results. Conduct peer review of test results.</i>	5.00	4/23/07	4/27/07	79	0%	5.00	Freudenberg								
										J	F	M	A	M	J	J

	Activity Name	Duration (Work Days)	Start Date	Finish Date	Predecessors	% Complete	Free Float	Resources Assigned	Comments	2007								
										J	F	M	A	M	J	J		
81																		
82	Perform assembly trials. Procure tools and tooling.	80.00	1/22/07	5/11/07		8%												
83	Survey each coil type using templates. Determine stud length constraints based on access limitations for torquing/tensioning.	10.00	1/22/07	2/2/07	53	0%	0.00	Viola										
84	Choose tools for tightening nuts. Define features needed to tighten nut (including measuring preload). Determine which holes have adequate space to tighten nuts using templates. Repeat for special cases where inadequate space exists. Tabulate results.	10.00	2/5/07	2/16/07	83	0%	0.00	Viola	Iterative process with 80									
85	Identify areas that need to be measured in post-VPI and ground	25.00	1/22/07	2/23/07		8%												
86	Identify "close points" when assembling	5.00	1/22/07	1/26/07		25%	0.00	Brown	As are done									
87	Perform gross (generic) fits of C-C, C-B, B-A, and A-A	20.00	1/22/07	2/16/07		0%	0.00	Viola	C-C done. Work paced by Station1 . Needs 2nd LT.									
88	Provide guidance to revise post-VPI procedure to include measurement points	5.00	2/19/07	2/23/07	86, 87	0%	60.00	Brown										
89	Establish alignment mechanisms, metrology equipment complement and positioning requirements, etc. Conduct peer review.	5.00	2/5/07	2/9/07		75%	0.00	Viola										
90	Procure alignment mechanisms, fiducials, lifting equipment, etc. for assembly operations	40.00	2/12/07	4/6/07	89	0%	25.00	Dudek										
										J	F	M	A	M	J	J		

	Activity Name	Duration (Work Days)	Start Date	Finish Date	Predecessors	% Complete	Free Float	Resources Assigned	Comments	2007							
										J	F	M	A	M	J	J	
91	Develop procedures for torquing bolts	5.00	3/12/07	3/16/07	67	0%	0.00	Viola									
92	Determine fiducial types and locations	10.00	3/19/07	3/30/07	91	0%	0.00	Ellis	Ellis and Raftopoulos working on planr for fiducials.								
93	Perform trial x-y-z alignments. Use protoypical shims. Demonstrate capability to satisfy alignment requirements with individual shims of uniform thickness.	10.00	3/19/07	3/30/07	66, 67	0%	30.00	Viola									
94	Procure monuments and related metrology equipment	30.00	4/2/07	5/11/07	92	0%	0.00	Dudek									
95	Tools and tooling available for FPA operations	0.00	5/11/07	5/11/07	67, 90, 93, 94	0%	5.00										
96	Prototype bladder installation.	5.00	2/26/07	3/2/07	22	0%	0.00	Viola									
97																	
98	Finalize preparations for assembly operations	20.00	4/5/07	5/2/07		0%											
99	Document assembly sequence	5.00	4/5/07	4/11/07	23, 73	0%	0.00	Brown									
100	Finalize dimensional control plan	5.00	4/12/07	4/18/07	99	0%	0.00	Ellis									
101	Finalize assembly procedure	5.00	4/19/07	4/25/07	100	0%	0.00	Viola									
102	Establish back office support requirements and data flow	5.00	4/26/07	5/2/07	101	0%	0.00	Viola									
103	Train technicians in operation of the metrology equipment and measurement procedures	5.00	4/26/07	5/2/07	101	0%	0.00	Viola									
104	RLM authorization for assembly operations	0.00	5/2/07	5/2/07	102, 103	0%	12.00	Dudek									
105																	
106	Start Station 2 assembly operations	0.00	5/18/07	5/18/07	13, 26, 50, 59, 95, 10	0%	0.00	Viola									
										J	F	M	A	M	J	J	