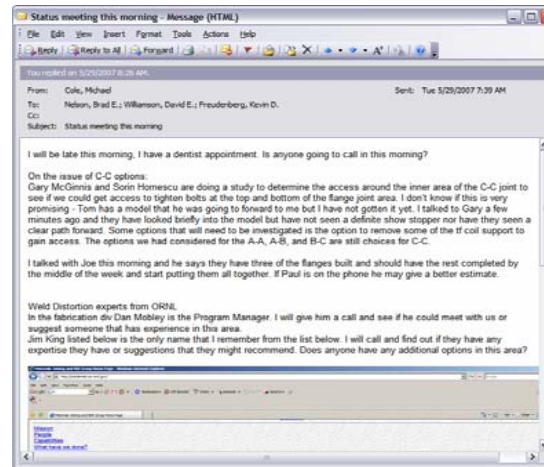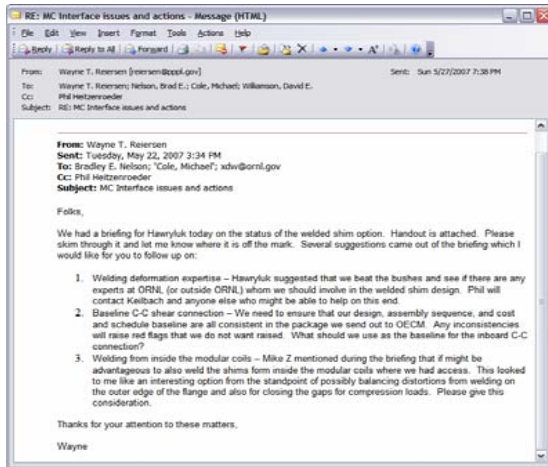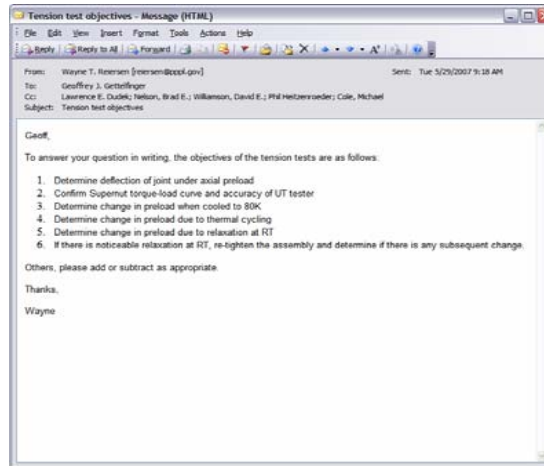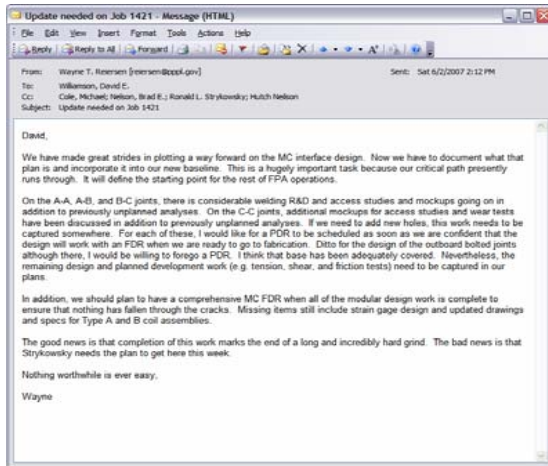**WBS Number: 142**
WBS Title: Windings and Assembly
Job Number: 1421
Job Title: Design of Modular Coil Interfaces
Job Manager:David Williamson

Assumptions
Bladder design remaining and testing are in Larry Dudek's job 1431. Still need method to retain bladder and to provide bladder at B-A interface where bladder is much thicker

Engineering and Technician Hours

Color Key	Task	Total Engr hours	Total Tech hours	Pro-E models (avg) hrs/model	Pro-E models (complex) hrs/model	assy dwgs hrs/dwg	Detail drawings hrs/dwg	installation dwg hrs/dwg	cooling schematic hrs/dwg	electrical schematic hrs/dwg	I&C schematic hrs/dwg	stress analysis hrs/calc	thermal analysis hrs/calc	special analysis (electromagnetics) hrs/calc	assy/install specs and procedures hrs/proc	procurement and associated specifications hrs/spec	R&D reports hrs/report	peer, preliminary and final design reviews hrs/rev	Planning hrs/wk	misc engr tasks hrs	Comments for Engineering labor	crew size	shifts hrs/shift	Comments for Technician labor
ORNL	multiplier unit			40	80	100	60	40	0	0	20	240	40	160	40	40	80	40	16	1			8	
PPPL																								
Outboard Interface Design																								
IH4-020	Prepare outboard shim dwgs and release	60	0				1																	
INTRF-045	FDR outboard shims	40	0															1						
	resolve and issue shim drawings	60	0				1																	
Bolted Joint Tests																								
Tension Tests of Bolted Joint																								
1421-3067	Procure 2 studs f/joint test.Use existing part	8	48																		8 engineering judgement	2	3	
1421-3075	Setup test fixture &perform JHA & pre-job brief	8	16																		8 engineering judgement	2	1	
1421-3077	Meas joint deflect vs preload & loss of preload	24	24																		24 engineering judgement	1	3	
1421-3079	Measure joint deflec & preload v. temp @80K	24	24																		24 engineering judgement	1	3	
1421-3084	Measure joint deflection&preload v. cooldown cyc	24	24																		24 engineering judgement	1	3	
1421-3087	Perform pullout tests for tapped holes	24	24																		24 engineering judgement	1	3	
1421-3081	Meas joint deflect & preload v. time (days) at R	160	160																		160 engineering judgement	1	20	
1421-3090	Document&conduct review of test results	40	0															1						
Bolt Shear Test at 77k																								
1421-3112B	Procure/fab parts for test&initial assembly	40	0														1							
1421-3115B	Assemble & test	320	100																		320 full time for 2 engr following test	2.5	5	
1421-3119B	Document test results	80	0															1						
Inboard Interface Design																								
IH1-001	Coil to coil analysis	520	0									2							1					
1421-3125	Determine geometry&location of high COF shims&pl	80	0		1																			
1421-3127	Structural analyses to performance rqmts for bol	240	0									1												
1421-3132	PDR to review requirements, design,&development	40	0																1					
AB/BC/AA welded joints																								
	prepare winding form mods for weld clamping bolts	300		3			3																	
INTRF-050	Complete Shim fabrication drawings (ORNL)	240	0				4																	
	Release information for procurement of shim material	24																			No hours included - RTS added 24 hours			
INTRF-055	FDR AB/BC/AA inboard shims	40	0																1					
CC bolted joint																								
IH1-000	ESTABLISH CONCEPT	680	0	5	3		2												3					
IH1-0000	PEER REVIEW OF JOINT CONCEPT	80	0																2					
	Add bolt holes to C winding form for CC interface	140	0		1		1																	
	Bolt Reach and Access study (mockup)	200	0	2			2																	
	Prepare CC shim drawings and release	360	0		1	1	3																	
	FDR CC inboard shims	40	0																1					
Welded Joint Tests																								
Procedure																								
INTRF-035	PPPL Determine shim material	40	0																	40				
INTRF-001	PPPL buy SS plate for weld trials	8	0																	8				
INTRF-005	Weld distortion trials at PPPL on SS plate	40	0																	40				
INTRF-025	ORNL build pywood mockup of flange	140	0	1			1																	
INTRF-030	ORNL verify weld access, develop alternate welding method	40	0																	40				
INTRF-010	Develop Weld Geometry Procedure	40	0													1								
Test																								
INTRF-015	Weld trials on two MCWF's at PPPL	80	600																	80				665 see detail below
INTRF-020	Document results and update weld procedure	120	0														1	1						
Overall interface design																								
INTRF-040	Analysis of tensil loads (ORNL)	320	0		1																			
1421-3134	Issue interface drawings for comment	300	0				3								0						AA, AB, BC only			
1421-3136	Conduct MC interface FDR incl job 1416	40	0																1					
1421-3138	Resolve issues, release assembly spec&drawings	240	0												1						200			
FY07 Rebaseline exercise																								
ECP53RBX05	FY07 Rebaseline Exercise	256	0																	16				
	Subtotal	5560	1020																					
	scheduled and unscheduled meetings/reporting/presentations (25%)	1390																						
	TOTAL	6950																						

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