

NCSX Work Approval Form (WAF)

WBS Number: 142

WBS Title: Windings and Assembly

Job Numbers: 1408, 1451, & 1459

Job Title: Modular Coil Winding Supplies (1408)

Job Title: Modular Coil Winding Operations (1451)

Job Title: Modular Coil Punch List Items (1459)

Job Manager: Jim Chrzanowski

Description:

Job 1408 consists of all the procured components for the modular coil windings, and includes the cable conductor, kapton and glass insulation, epoxy, coil clamps, cooling lines, lead blocks, fillers, etc. Job 1451 consists of all the labor required to wind conductor, vacuum bag, vacuum impregnate with epoxy, connect cooling lines, and inspect the modular coils. This WBS element consists of all punch list items need to finalize the fabrication of each modular coil.

Schedule:

Approvals:

_____	_____
Job Manager	Date
_____	_____
Responsible Line Manager	Date
_____	_____
Project Manager	Date
_____	_____
Engineering Department Head	Date

NCSX June 2007 ETC
TABLE I - DESIGN LABOR

WBS Number: 142																						
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Job Title: Modular Coil Winding Operations (1451)																						
Job Title: Modular Coil Punch List Items (1459)																						
Job Manager: Jim Chrzanowski																						
Description:																						
Title I and II Engineering for PF Coils and Title III Support of Fabrication Effort.																						
Task ID	Comments	HOURS														Basis of Estimate						
		41MS	48MS	37STK	35TRVL	31OT	FY07SK	ORNL EM	ORNL DSN	EMEM	EMSM	EMSB	EMTB	EAEM	EASB		EDEM	EESM	EESB	EETB	ECEM	ECSB
No Design Work Associated with This Job																						

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 TABLE II - Materials and Subcontracts

WBS Number: 142										
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Job Title: Modular Coil Winding Operations (1451)										
Job Title: Modular Coil Punch List Items (1459)										
Job Manager: Jim Chrzanowski										
Materials and Supplies										
All M&S included in Table III										

**NCSX June 2007 ETC
TABLE III - Fabrication and Assembly**

WBS Number: 142
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Job Numbers: 1408, 1451, & 1459
Job Title: Modular Coil Winding Supplies (1408)
Job Title: Modular Coil Winding Operations (1451)
Job Title: Modular Coil Punch List Items (1459)
Job Manager: Jim Chrzanowski

Fabrication and Assembly

Conditions and Basis for Estimate
1) All estimates are based on work performed from May 1, 2007 through the end of modular coil fabrication program
2) Estimates are based on actual in-field times as well as consultation with metrology personnel and technicians
3) M&S based upon actual contracts and monthly M&S supporting winding activities on first nine coils - see specifics in M&S below

TASK DESCRIPTION		EAEM	EAEM	EMSM	EMEM				
		Chr.	Raft.	Meighan	Languish				
		hours	hours	hours	hours				
Engineering and Oversight		70%	40%	70%	40%				
LOE	9450-1***-1451	120	70 hr/month through completion of winding	120 hr/month	70 hr/month				
nominal hours for 14mo. Production		1680	980	1680	980				

TASK DESCRIPTION	Job Number	Total Shifts	No. of Coil tech per shift	Coil Tech [hours per shift]	Coil Tech [hours per coil]	Tech Shop Support [hours]	No. of coils	Total Manhrs	COILS
RESA Building Activities									
Unload & unbox winding form	9450-1***-1459	0.5	0	0	0	12	5	60	B5 & B6; A5 & A6; C6
Inspect casting [surfaces, magnetic permeability]	9450-1***-1451	0.5	1	9	4.5	0	5	22.5	B5 & B6; A5 & A6; C6
Winding form modifications [grinding, welding, deburring, etc.]	9450-1***-1459	3	0	0	0	48	5	240	B5 & B6; A5 & A6; C6
Station 1a/4 Activities									
Position & mount WF to support ring	9450-1***-1451	2	3	9	54	32	6	516	B4 thru B6; A5 thru A6; C6
Install coil in station 4 turning fixture	9450-1***-1451	1	3	9	27	16	6	258	B4 thru B6; A5 thru A6; C6
Install weights and balance casting and ring assembly	9450-1***-1451	1	2	10	20	0	6	120	B4 thru B6; A5 thru A6; C6
Weld monuments, stud adapters & lead nuts	9450-1***-1451	2.5	1	9	22.5	16	7	269.5	B3 thru B6; A5 thru A6; C6
Measure casting wings using metrology equipment	9450-1***-1451	2	2	8	32	0	5	160	B5 thru B6; A5 thru A6; C6
Install studs for winding clamps	9450-1***-1451	2	3	9	54	0	7	378	B3 thru B6; A5 thru A6; C6
Electrical test poloidal break	9450-1***-1451	0.5	1	9	4.5	0	7	31.5	B3 thru B6; A5 thru A6; C6
Clean casting [inspect and clean all holes]	9450-1***-1451	1	2	9	18	0	7	126	B3 thru B6; A5 thru A6; C6
Install Kapton edging and mold release winding surface	9450-1***-1451	2	2	9	36	0	7	252	B3 thru B6; A5 thru A6; C6
Fitup Lead blocks and terminals [Remove lead blocks]	9450-1***-1451	1	2	9	18	0	7	126	B3 thru B6; A5 thru A6; C6
Cladding final clean & Kapton [Parallel activity]	9450-1***-1451	7	1	9	63	0	6	378	B4 thru B6; A5 thru A6; C6
Install inner cladding plates and cooling Tubes	9450-1***-1451	5	3	9	135	0	7	945	B3 thru B6; A5 thru A6; C6
		27			488.5	124		3882.5	TOTALS hours

TASK DESCRIPTION	Job Number	Total Shifts	No. of Coil tech per shift	Coil Tech [hours per shift]	Coil Tech [hours per coil]	Tech Shop Support [hours]	No. of coils	Total Manhrs Revised	COILS
Coil Winding Station 2 and 3									
Prep for Winding									
Prepare coil for transfer	9450-1***-1451	0.5	2	9	9	0	7	63	B3 thru B6; A5 thru A6; C6
Install winding form in turning fixture	9450-1***-1451	1	3	8	24.0	16.0	7	280	B3 thru B6; A5 thru A6; C6
Install upper Tee for coil clamps	9450-1***-1451	2	2	9	36.0	0.0	7	252	B3 thru B6; A5 thru A6; C6
Install/set winding clamps side bars A & B	9450-1***-1451	4	3	9	108.0	0.0	7	756	B3 thru B6; A5 thru A6; C6
Prep groundwrap insulation [Parallel activity]	9450-1***-1451	6	1	9	54.0	0.0	7	378	B3 thru B6; A5 thru A6; C6
Re-install G-11 lead blocks- sides A & B	9450-1***-1451	1	2	9	18.0	0.0	8	144	B3 thru B6; A4 thru A6; C6
Position inner GW insulation onto winding form (sides A & B)	9450-1***-1451	7	2	9	126.0	0.0	8	1008	B3 thru B6; A4 thru A6; C6
Position lacing strips sides A & B	9450-1***-1451	2	2	9	36.0	0.0	8	288	B3 thru B6; A4 thru A6; C6
Wind Side "A"									
Braze & secure 1st. coil lead set [inc. brazing]	9450-1***-1451	2	2	9	36.0	0.0	8	288	B3 thru B6; A4 thru A6; C6
Position leads & Wind side A	9450-1***-1451	12	2.5	10	300.0	0.0	8	2400	B3 thru B6; A4 thru A6; C6
Reposition coil from side A to side B	9450-1***-1451	1	3	8	24.0	16.0	8	320	B3 thru B6; A4 thru A6; C6
Wind Side "B"									
Braze & secure 1st. coil lead set [inc. brazing]	9450-1***-1451	2	2	9	36.0	0.0	8	288	B3 thru B6; A4 thru A6; C6
Position leads & Wind side B	9450-1***-1451	12	2.5	10	300.0	0.0	8	2400	B3 thru B6; A4 thru A6; C6
Final coil winding activities									

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Job Title: Modular Coil Winding Operations (1451)									
Job Title: Modular Coil Punch List Items (1459)									
Job Manager: Jim Chrzanowski									
Fabrication and Assembly									
Conditions and Basis for Estimate									
1) All estimates are based on work performed from May 1, 2007 through the end of modular coil fabrication program									
2) Estimates are based on actual in-field times as well as consultation with metrology personnel and technicians									
3) M&S based upon actual contracts and monthly M&S supporting winding activities on first nine coils - see specifics in M&S below									
Measure, reposition & re-measure coil bundle [sides A & B]	9450-1****-1451	8	3	9	216.0	0.0	8	1728	B3 thru B6; A4 thru A6; C6
Secure Lacing	9450-1****-1451	2	2	9	36.0	0.0	8	288	B3 thru B6; A4 thru A6; C6
Complete groundwrap installation	9450-1****-1451	6	2	9	108.0	0.0	8	864	B3 thru B6; A4 thru A6; C6
<i>Unanticipated Delays/Rework Activities</i>									
Tasks TBD	9450-1****-1451	3	3	9	81.0	0	8	648	
		35.75			1548	32		12393	TOTALS hours
					1580				
Final Coil prep & Mold Application [Stations 2 & 3]									
TASK DESCRIPTION	Job Number	Total Shifts	No. of Coil tech per shift	Coil Tech [hours per shift]	Coil Tech [hours per coil]	Tech Shop Support [hours]	No. of coils remaining	Total Manhrs Revised	COILS
<i>Final Coil Prep</i>									
Clean chill plates [Parallel activity]	9450-1****-1451	4	1	9	36	0	8	288	Coils A4-A6; B3-B6 and C6
Install chill plates & Tubing	9450-1****-1451	12	2.5	9	270	0	8	2160	Coils A4-A6; B3-B6 and C6
Cut, braze, silverplate and position 2nd. coil lead set [side A]	9450-1****-1451	3	2	9	54	0.0	8	432	Coils A4-A6; B3-B6 and C6
Cut, braze, silverplate and position 2nd. Coil lead set [side B]	9450-1****-1451	3	2	9	54	0.0	8	432	Coils A4-A6; B3-B6 and C6
Soft solder and clean all lead joints	9450-1****-1451	2	1	9	18	0.0	8	144	Coils A4-A6; B3-B6 and C6
Install outer co-wound Diagnostic loops	9450-1****-1451	2	2	9	36	0	8	288	Coils A4-A6; B3-B6 and C6
Measure position of co-wound diagnostic loops	9450-1****-1451	1	2	9	18	0	8	144	Coils A4-A6; B3-B6 and C6
<i>Perform pre-VPI elect. & pressure tests</i>									
Pressure test cryo lines	9450-1****-1451	1	2	9	18	0	8	144	Coils A4-A6; B3-B6 and C6
Perform preliminary [pre-vpi] electrical tests	9450-1****-1451	0.5	2	10	10	0	8	80	Coils A4-A6; B3-B6 and C6
<i>Install bag mold around modular coil</i>									
Prep sprue sub-assemblies [Parallel activity]	9450-1****-1451	1	1	9	9	0	8	72	Coils A4-A6; B3-B6 and C6
Prep lead sprue sub-assemblies [Parallel activity]	9450-1****-1451	0.5	1	9	4.5	0	8	36	Coils A4-A6; B3-B6 and C6
Install G-11 final clamp pads & sprue bases	9450-1****-1451	1	2	9	18	0	8	144	Coils A4-A6; B3-B6 and C6
Finalize and secure G-11 lead box	9450-1****-1451	1	1	9	9	0	8	72	Coils A4-A6; B3-B6 and C6
Install glass roving and sheet over chill plates	9450-1****-1451	1	2	9	18	0	8	144	Coils A4-A6; B3-B6 and C6
Install silicone bag & sprues	9450-1****-1451	5	2	9	90	0	8	720	Coils A4-A6; B3-B6 and C6
Vacuum pumpdown/ RTV overcoat & leak repair	9450-1****-1451	2	3	9	54	0	9	486	Coils A4-A6; B2-B6 and C6
Install epoxy shell	9450-1****-1451	2.5	3	9	67.5	0	9	607.5	Coils A4-A6; B2-B6 and C6
		21.25			784	0		6393.5	TOTALS hours
VPI Activities (Station 5)									
TASK DESCRIPTION	Job Number	Total Shifts	No. of Coil tech per shift	Coil Tech [hours per shift]	Coil Tech [hours per coil]	Tech Shop Support [hours]	No. of coils remaining	Total Manhrs	COILS
<i>Final VPI Prep</i>									
Prepare MC for transfer	9450-1****-1451	0.5	2	9	9	0	9	81	Coils A4-A6; B2-B6 and C6
Transfer modular coil to Autoclave	9450-1****-1451	1	3	8	24	16	9	360	Coils A4-A6; B2-B6 and C6
Prepare MC for VPI [Connect fill lines & TC; leak check]	9450-1****-1451	3	3	8	72	0	9	648	Coils A4-A6; B2-B6 and C6
Vacuum pumpdown & preheat mold and autoclave	9450-1****-1451	2	3	10	60	0	9	540	Coils A4-A6; B2-B6 and C6
<i>VPI modular coil</i>									
Epoxy mix and fill coil	9450-1****-1451	1	4	12	48	0	9	432	Coils A4-A6; B2-B6 and C6
Temperature rampup and Cure	9450-1****-1451	3	2	12	72	0	9	648	Coils A4-A6; B2-B6 and C6
Temperature rampup and Post cure	9450-1****-1451	2	2	12	48	0	10	480	Coils A4-A6; B1-B6 and C6
Temperature rampdown	9450-1****-1451	1	1	10	10	0	10	100	Coils A4-A6; B1-B6 and C6
Cleanup & ready autoclave for coil removal	9450-1****-1451	2	3	10	60	0	10	600	Coils A4-A6; B1-B6 and C6
Rebuild manifolds and prep autoclave for next VPI	9450-1****-1451	5	3	10	150	0	10	1500	Coils A4-A6; B1-B6 and C6
		20.5			553	16		5389	TOTALS hours
					569				
Post VPI Activities (Station 1)									
TASK DESCRIPTION	Job Number	Total Shifts	No. of Coil tech per shift	Coil Tech [hours per shift]	Coil Tech [hours per coil]	Tech Shop Support [hours]	No. of coils remaining	Total Manhrs	COILS
Prepare coil for transfer	9450-1****-1451	0.5	2	9	9	0	10	90	Coils A4-A6; B1-B6 and C6
Transfer modular coil from Autoclave to Station #1	9450-1****-1451	1	3	8	24	16	10	400	Coils A4-A6; B1-B6 and C6
Remove studs, structural shell & sprues	9450-1****-1451	8	2	9	144	0	11	1584	Coils A3-A6; B1-B6 and C6

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Job Title: Modular Coil Punch List Items (1459)
Job Manager: Jim Chrzanowski

Fabrication and Assembly

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1) All estimates are based on work performed from May 1, 2007 through the end of modular coil fabrication program
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Install final coil clamps	9450-1****-1451	3	2	9	54	0	11	594	Coils A3-A6; B1-B6 and C6
Perform (room temperature) electrical & Pressure Tests	9450-1****-1451	1	2	9	18	0	11	198	Coils A3-A6; B1-B6 and C6
Remove coil from ring assembly	9450-1****-1451	1	3	10	30	16	11	506	Coils A3-A6; B1-B6 and C6
		14.5			279	32		3372	TOTALS hours
					311				

Punch List Items	Job Number	Total Shifts	No. of Coil tech per shift	Coil Tech [hours per shift]	Coil Tech [hours per coil]	Tech Shop Support [hours]	No. of coils remaining	Total Manhrs	COILS
Mount diagnostic boxes	9450-1****-1459	0.5	2	9	9	0	18	162	All coils
Route and secure diagnostic wires to box	9450-1****-1459	0.5	2	9	9	0	18	162	All coils
Install final clamps [coils previously finished]	9450-1****-1459	3	2	9	54	0	6	324	Coils A1; C1 thru C5
Finalize cooling tubes	9450-1****-1459	1	2	9	18	0	18	324	All coils
Install Rogowski coils	9450-1****-1459	2	2	9	36	0	2	72	Coils A3 and A4
Test thermocouples & strain gages [15 min/unit]	9450-1****-1459	0	0	0	0	134	1	134	[134 strain gauges/ 600 TC]
Install strain gauges and thermocouples [2 hrs./SG or TC]	9450-1****-1459	0	1	0	41	0	18	738	[134 strain gauges/ 600 TC]
Measure final coil clamp surfaces	9450-1****-1459	1.5	2	9	27	0	18	486	All coils
Install Thermal Insulation over coil	9450-1****-1459	3	2	9	54	0	18	972	All coils
Replace co-wound loop on C4	9450-1****-1459	1	2	9	18	0	1	18	Coil C4
Install additional flange holes [12 per type "C" winding form]	9450-1****-1459	0	0	0	0	192	6	1152	[16 hr/hole]
Measure as built coils as required	9450-1****-1459	2	2	9	36	0	18	648	
Ground Poloidal Break Hardware	9450-1****-1459	0	0	0	0	2	18	36	All coils
Ground lead jumper studs	9450-1****-1459	0.2	1	8	1.6	0	18	28.8	All coils
Grind flange pockets for hardware	9450-1****-1459	0	0	0	0	440	1	440	[60] holes @ 2hr ea. & [20] holes @ 16hr ea.
Grind winding form wings/clearances	9450-1****-1459	0	0	0	0	24	18	432	All coils
insert repair						200		200	A1(2 holes) B2(8 holes)
								6328.8	TOTALS hours

MATERIAL & SUPPLIES	Job Number	Coil Tech [hours per shift]	Coil Tech [hours per coil]	Tech Shop Support [hours]	No. of coils remaining	TOTAL Tech Hours	M&S w/o G&A	COILS
Coil Supplies								
1) Insulation	9450-1****-1408		0	0	9		\$8,000.00	
2) Epoxy- CTD-101 [\$4500.00 per coil @ assume 9 injections]	9450-1****-1408		0	0	9		\$45,000.00	Coils A4-A6; B2-B6 and C6
3) Miscellaneous and safety supplies [@ \$7000/month]	9450-1****-1408		0	0	9		\$63,000.00	
4) Strain gages and thermocouples	9450-1****-1459						\$90,000.00	TC.\$80each x600=\$48k; SG \$290 each x 62=\$18k FB SG \$277eachx72=\$20k;misc \$4k
5) Cutting hardware for flange bolts	9450-1****-1459						\$3,000.00	
VPI Supplies								
1) Epoxy/glass for mold shell [Hysol]	9450-1****-1408		0	0	9		\$13,000.00	
2) VPI clean manifold contract [\$1100.00 per VPI]	9450-1****-1408		0	0	9		\$10,000.00	
Tech Shop Support-								
Miscellaneous activities- TBD	9450-1****-1408		0	80	8	640		Coils A4-A6; B3-B6 and C6
	9450-1****-1459							
							\$232,000.00	TOTALS

	\$/ Gallon	Gal/coil	per coil	No. coils	
Hysol 2039 Resin	\$82.00	4.5	\$369.00	9	\$3,321.00
Hysol 3561 Hardener	\$211.00	1.5	\$316.50	9	\$2,848.50
	\$/Box	Bx/coil	per coil	No. coils	
Glass	\$350.00	2	\$700.00	9	\$6,300.00

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						*	\$12,469.50		

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TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

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Uncertainty of the Estimate					
	<u>High</u>	<u>Medium</u>	<u>Low</u>	<u>Uncertainty Range (%)</u>	<u>Comments/Other Considerations</u>
Job 1408				-15%/+25%	
Design Maturity			X		Unknowns of equipment reliability
Design Complexity			X		Mostly off-the-shelf items
Job 1451				-15%/+25%	
Design Maturity	X				Known and proven procedures and processes
Design Complexity	X				Have built 12 coils and have proven processes even with tight metrology and tolerances.
Job 1459				-10%/+15%	
Design Maturity		X			Still uncertainty on number of field changes (e.g., number of holes, etc.)
Design Complexity			X		Standard field work.

Note: High/Medium/Low uncertainty assessment from Job Manager. Uncertainty range based on ACEI recommended practice 18R-97 as amended for NCSX.

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TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

Residual Impacts

Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact		Schedule Impact	
					Low	High	Low	High
1408 - NONE								
1451	Damage or loss of modular coil during VPI or testing requiring the conductor to be stripped off and re-wound	U	Continue to use same rigorous process used for first 12 coils during which there were no fabrication mishaps requiring re-winding a coil	~\$35K in materials; ~\$380K in labor. 7.5 months to do work with the potential for a 2 month re-impact on the critical path.	+ \$400	+ \$450	+ 0.00	+ 2.00
	Failure of major piece of winding equipment (e.g., motor, gear box, etc.) resulting in extended downtime in a winding station	U	Use three remaining winding stations to continue MC fabrication while fourth station is being repaired	~\$10K for equipment plus repair costs	+ \$10	+ \$30	+ 0.00	+ 0.00

Notes:

- [1] Low cost and schedule impacts are considered the minimum (0-percentile) impacts should the event occur. High cost and schedule impacts are considered the maximum (100-percentile) impacts should the event occur
- [2] Cost impacts should be entered as man-hours (by demographic) and M&S direct cost under basis of estimate. Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact. Project control is responsible for quantifying the low and high cost impacts based on the labor hours and M&S identified
- [3] The schedule impacts should be entered as the min and max impacts on the critical path. If there is no critical path impact then the schedule entries should be zero.
- [4] Likelihood of occurrence should be entered consistent with our risk classification methodology, i.e. VL= Very Likely (P>80%), L=Likely (80%>P>40%), U=Unlikely (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)

Assumptions

Cost: Would need ~\$4.5K of Epoxy + ~\$3K of insulation + \$1.5K of shell + ~\$5K of other misc components/materials + cost of new lead blocks of ~\$15K => round off to ~\$35K. Labor ~\$380K assuming ~4.5 months to rework and redo coil.

Schedule: To redo the coil: Need 138 shifts x 3 men/shift x 8 hours/shift => 3 months + To rework of ~65 shifts x 3 men/shift x 8 hours/shift => 1.5 months. Need an additional ~3 months to order lead blocks if needed. Anticipate ~3 months to re-order and obtain new lead blocks. If Type B coil is the one to fail, could add 1-2 months to critical path at an added "standing army" cost of ~\$260K/months or ~\$520K.

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WBS Title: Windings and Assembly
Job Numbers: 1408, 1451, & 1459
Job Title: Modular Coil Winding Supplies (1408)
Job Title: Modular Coil Winding Operations (1451)
Job Title: Modular Coil Punch List Items (1459)
Job Manager: Jim Chrzanowski

PPPL Princeton Plasma Physics Laboratory Procurement Card System

Home Reconciliation Net ID : tmeighan

P-Card Log # : TM-116292 1/8 and 1/4 Dia. fiber glass rope
 Requestor: Eugene F Keams Status: New Cardholder: tmeighan Created: 5/7/2007

P-Card Log Line Item

Line Items Signature Authority Other Requirements Reviews Attachments Change Delivery/Requestor Info

Line	Quantity	UOM	Unit Price	Extended	Receipt Date	Receipt Comment
1	11250	FT	\$1.11	\$1237.50	8/3/2004	
Enter Complete Description - include make, model, items specifications, etc. 789- 50-4710 GLR125HD AMI Glsaa rope 1/8" dia 3,750 FT/CS						
2	5100	FT	\$1.13	\$583.00	8/3/2004	
Enter Complete Description - include make, model, items specifications, etc. 789- 50-4720 GLR188HD AMI Glsaa rope 3/16" dia 2,550 FT/CS						

Cost Center Distribution Accounts for this Line Item

Cost Ctr	Wrk Pkg	Job Pkg	Expense Class	Dollar Amount	Delete
9450	1***	1408	4301 -MATERIALS & SERVICES	\$1,900.50	

Add 0 Line Items Add 0 Cost Centers Add Lines

Vendor Name: Auburn MFG. Co 1-800-264-6689 Date Ordered: 5/7/2007 Date Expected:

Purchased Amount:	\$1900.50
Shipping/Handling:	\$0.00
Sales Tax:	\$0.00
Other Charges:	\$0.00
Total Charges:	\$1900.50

Other Charges Comment:

Save Without Submitting Submit for Approval Copy Log Delete Log

PPPL Princeton Plasma Physics Laboratory Procurement Card System

Home Reconciliation Net ID : tmeighan

P-Card Log # : TM-116077 RE 2039 Hysol Epoxy and HD 3561 Hardner
 Requestor: Eugene F Keams Status: Approved Cardholder: tmeighan Created: 3/21/2007

P-Card Log Line Item

Line Items Signature Authority Other Requirements Reviews Attachments Change Delivery/Requestor Info

Line	Quantity	UOM	Unit Price	Extended	Receipt Date	Receipt Comment
1	8	EA	\$80.77	\$646.16	3/4/2007	
Enter Complete Description - include make, model, items specifications, etc. RE 2039 Hysol Resin						
2	8	EA	\$210.89	\$1687.12	1/4/2007	
Enter Complete Description - include make, model, items specifications, etc. HD-3561 Hysol Hardner						
3	2	EA	\$5.00	\$10.00	3/4/2007	
Enter Complete Description - include make, model, items specifications, etc. Certificate of Compliance for RE-2039-850 and HD3561						

Cost Center Distribution Accounts for this Line Item

Cost Ctr	Wrk Pkg	Job Pkg	Expense Class	Dollar Amount	Delete
9450	1***	1408	4301 -MATERIALS & SERVICES	\$2,386.62	

Add 0 Line Items Add 0 Cost Centers Add Lines

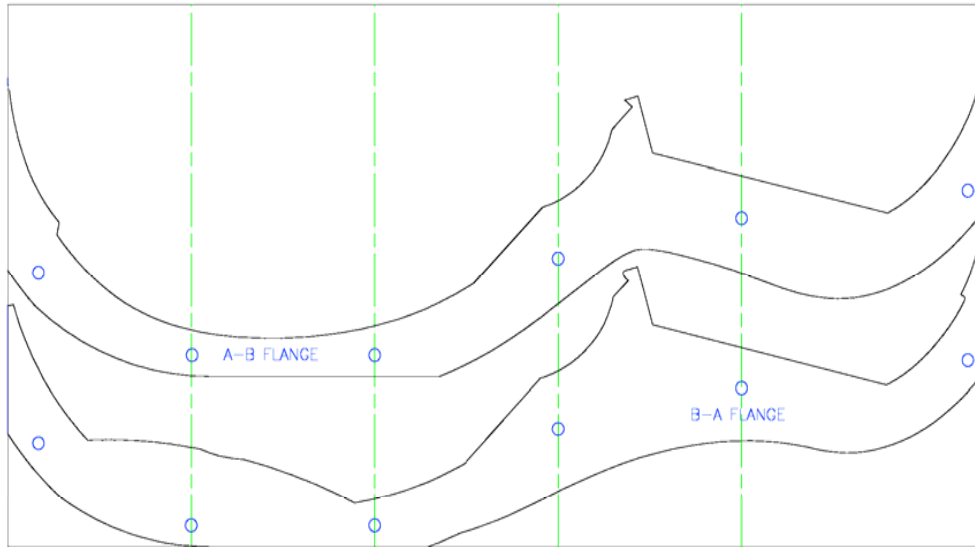
Vendor Name: R.S. Morrison Co. 401-295-3100 Date Ordered: 3/21/2007 Date Expected:

Purchased Amount:	\$2343.28
Shipping/Handling:	\$43.34
Sales Tax:	\$0.00
Other Charges:	\$0.00
Total Charges:	\$2386.62

Other Charges Comment:

Submit for Approval Copy Log Delete Log

WBS Number: 142
WBS Title: Windings and Assembly
Job Numbers: 1408, 1451, & 1459
Job Title: Modular Coil Winding Supplies (1408)
Job Title: Modular Coil Winding Operations (1451)
Job Title: Modular Coil Punch List Items (1459)
Job Manager: Jim Chrzanowski



Mod Coil Test Flange
Assuming A-B joints with 18 inch centers => 6 holes per joint vs. assumed 2-3
estimated by Task Force.

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmlpt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Job: 1408 - MC Winding Supplies-CHRZANOWSKI																
1408-1		Procure Batt insulation	22*	01MAY07*	31MAY07		99		10,208.00							
1408-2		Epoxy (existing order)	187	23MAY07*	25FEB08		125		58,166.95							
1408-3		Misc and safety supplies (\$7k/mo.)	188	23MAY07*	26FEB08		189		81,438.89							
1408-4		Procure & Deliver Thermocouples	50	02JUL07*	11SEP07		16		66,352.00							
1408-4.1		Procure & Deliver Strain Gages	65	03DEC07*	11MAR08		137		49,704.00							
1408-5		Epoxy/glass for mold shell	164	23MAY07*	23JAN08		126		16,775.71							
1408-6		VPI clean manifold contract	210	23MAY07*	27MAR08		128		12,942.86							
1408-7		Misc tech shop support	250	23MAY07*	22MAY08		127		50,127.62							
1408-8		Cutting hardware for flange bolts	250	23MAY07*	22MAY08		1,089		3,889.44							
Subtotal			266	01MAY07	22MAY08		1,089		349,605.47							

41=08\$K ;
 41=45\$K ;
 41=63\$K ;
 41=52\$K ;
 41=38\$K ;
 41=13\$K ;
 41=10\$K ;
 EMT/TB =640 ;
 41=3k

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	FY07				FY08				FY09				FY10							
										A	M	J	J	A	S	O	N	A	M	J	J	A	S	O	N	D	J	F	M

cc 9450 - NCSX Fabrication (MIE)

1 - Stellarator Core Systems

14 - Modular Coils

Job: 1451 - Mod Coil Winding-CHRZANOWSKI

Station 1a/4 Casting Prep

P1-061		Receive A5, Prep& Instl Cladding	24*	19APR07A	22MAY07	2*	68			47,982.05	
P3-061		Receive B5, Prep& Instl Cladding	27	16JUL07*	21AUG07	1.5	37			47,906.90	
P1-151		Receive A6, Prep& Instl Cladding	27	19SEP07*	25OCT07	1.5	56			50,132.70	
P2-031		Receive C6, Prep& Instl Cladding	27	21JAN08*	26FEB08	1.5	37			51,069.88	
P3-151		Receive B6, Prep& Instl Cladding	27	27FEB08*	03APR08	1.5	37			51,069.88	

EM//TB =245hr ; EMT/TB =124 ; EM2/TB =245 ;
EM//TB =244hr ; EMT/TB =124 ; EM2/TB =245 ;
EM//TB =244hr ; EMT/TB =124 ; EM2/TB =245 ;
EM//TB =244hr ; EMT/TB =124 ; EM2/TB =245 ;
EM//TB =244hr ; EMT/TB =124 ; EM2/TB =245 ;

Station 2-Winding, Instl Chill Plates,Tubing,Bag

P2-161		Wind coil B4	41*	16APR07A	12JUN07	2	64			124,549.74	
P2-170		Instl Chill Plates,Tubing,Bag B4	22	13JUN07	13JUL07	1	64			61,861.52	
P3-071		Wind coil B5	76	22AUG07	10DEC07	1	37			129,851.92	
P3-080		Instl Chill Plates,Tubing,Bag B5	22	11DEC07	18JAN08	2	37			65,946.16	
P2-041		Wind coil C6	38	27FEB08	18APR08	2	49			132,773.54	
P2-050		Instl Chl Plates,Tubing, Bag C6	22	21APR08	20MAY08	2	49			65,946.16	

EM//TB =774hr ; EM2/TB =774 ; EMT/TB =32 ;
EM//TB =392hr ; EM2/TB =392 ;
EM//TB =774hr ; EM2/TB =774 ; EMT/TB =32 ;
EM//TB =392hr ; EM2/TB =392 ;
EM//TB =774hr ; EM2/TB =774 ; EMT/TB =32 ;
EM//TB =392hr ; EM2/TB =392 ;

Station 4-Winding, Instl Chill Plates,Tubing,Bag

P2-080		Instl Chill Plates,Tubing,Bag B3	28*	01APR07A	09MAY07	2	77			61,861.52	
P2-131		Wind coil A5	53	23MAY07	07AUG07	1	68			124,549.74	
P2-140		Instl Chl Plates,Tubing, Bag A5	44	08AUG07	09OCT07	1	68			62,511.35	
P1-161		Wind coil A6	38	26OCT07	20DEC07	2	56			132,773.54	
P1-170		Instl Chill Plates,Tubing,Bag A6	22	21DEC07	30JAN08	2	56			65,946.16	
P3-161		Wind coil B6	38	04APR08	28MAY08	2	37			132,773.54	
P3-170		Instl Chill Plates,Tubing,Bag B6	22	29MAY08	27JUN08	2	37			65,946.16	

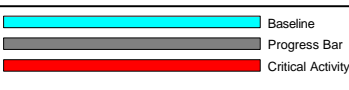
EM//TB =392hr ; EM2/TB =392 ;
EM//TB =774hr ; EM2/TB =774 ; EMT/TB =32 ;
EM//TB =392hr ; EM2/TB =392 ;
EM//TB =774hr ; EM2/TB =774 ; EMT/TB =32 ;
EM//TB =392hr ; EM2/TB =392 ;
EM//TB =774hr ; EM2/TB =774 ; EMT/TB =32 ;
EM//TB =392hr ; EM2/TB =392 ;

Station 5-VPI

P2-081V		VPI (Station 5) B3	11	10MAY07	24MAY07	2	164			44,840.62	
P3-081V		VPI (Station 5) B4	11	16JUL07	30JUL07	2	202			44,840.62	
P1-081V		VPI (Station 5) A5	11	10OCT07*	24OCT07	2	179			47,801.36	

EM//TB =276hr ; EM2/TB =277 ; EMT/TB =16 ;
EM//TB =276hr ; EM2/TB =277 ; EMT/TB =16 ;
EM//TB =276hr ; EM2/TB =277 ; EMT/TB =16 ;

Run Date 30JUL07 10:47
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ETCL
NCSX Project
Resource Loaded Schedule
JULY 3,2007
Sheet 1 of 3

SUMMARY

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	FY07 FY08 FY09 FY10												
										FY07			FY08			FY09			FY10			
										A	M	J	A	M	J	A	M	J	A	M	J	
P2-171V		VPI (Station 5) B5	11	21JAN08	04FEB08	2	129		47,801.36													
P1-171V		VPI (Station 5) A6	11	01FEB08*	15FEB08	2	134		47,801.36													
P2-051V		VPI (Station 5) C6	11	21MAY08	05JUN08	2	49		47,801.36													
P3-171V	2	VPI (Station 5) B6	11	30JUN08	15JUL08	2	37		47,801.36													
Station 1 Post VPI																						
P3-141C		Final Clamps & Warm Test (Station1) A4	15	06JUL07*	26JUL07	1	121		24,415.54													
P2-081C		Final Clamps & Warm Test (Station1) B3	15	27JUL07	16AUG07	1	121		24,415.54													
P3-081C		Final Clamps & Warm Test (Station1) B4	15	17AUG07	07SEP07	1	189		24,415.54													
P1-081C		Final Clamps & Warm Test (Station1) A5	15	02NOV07*	22NOV07	1	173		26,027.60													
P3-171C		Final Clamps & Warm Test (Station1) B5	15	05FEB08	25FEB08	1	129		26,027.60													
P1-171C		Final Clamps & Warm Test (Station1) A6	15	18FEB08	07MAR08	1	134		26,027.60													
P2-051C		Final Clamps & Warm Test (Station1) C6	15	06JUN08	26JUN08	1	49		26,027.60													
P2-171C		Final Clamps & Warm Test (Station1) B6	15	16JUL08	05AUG08	1	37		26,027.60													
LOE Oversight & Supervision																						
145XSPRV-1		Winding Engineering oversight and supervision	298*	01MAY07	09JUL08		1,057	LOE	531,562.91													
145XSPRV-2		Winding Engineering oversight and supervision	250*	01MAY07	30APR08		1,105	LOE	151,931.88													
145XSPRV-3		Winding Engineering oversight and supervision	337*	01MAY07	03SEP08		1,018	LOE	176,572.52													
Subtotal			358	01APR07A	03SEP08		1,018		2,867,592.43													

