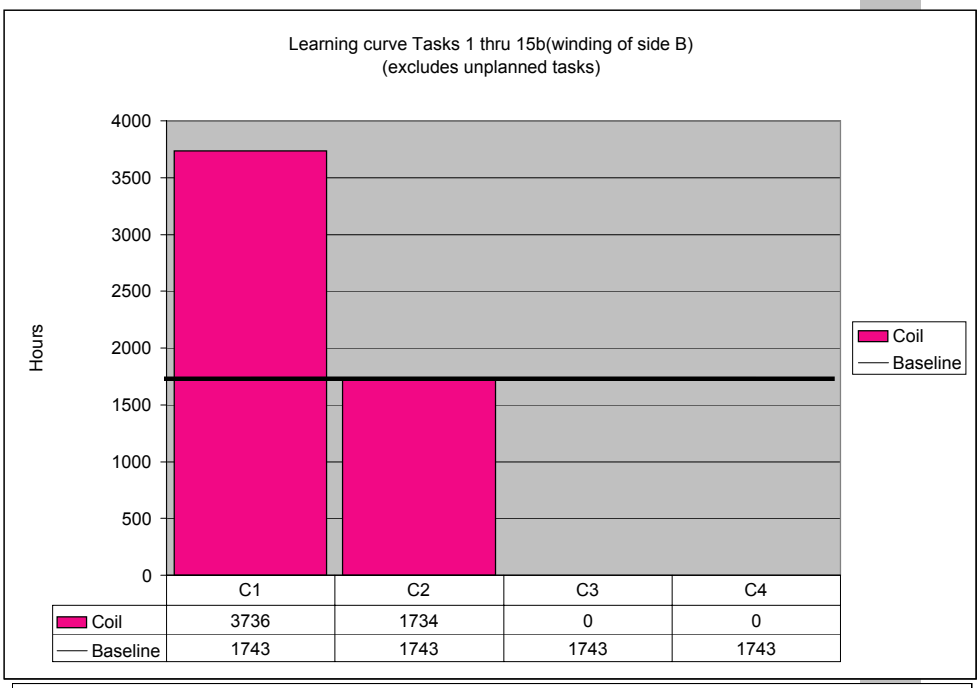
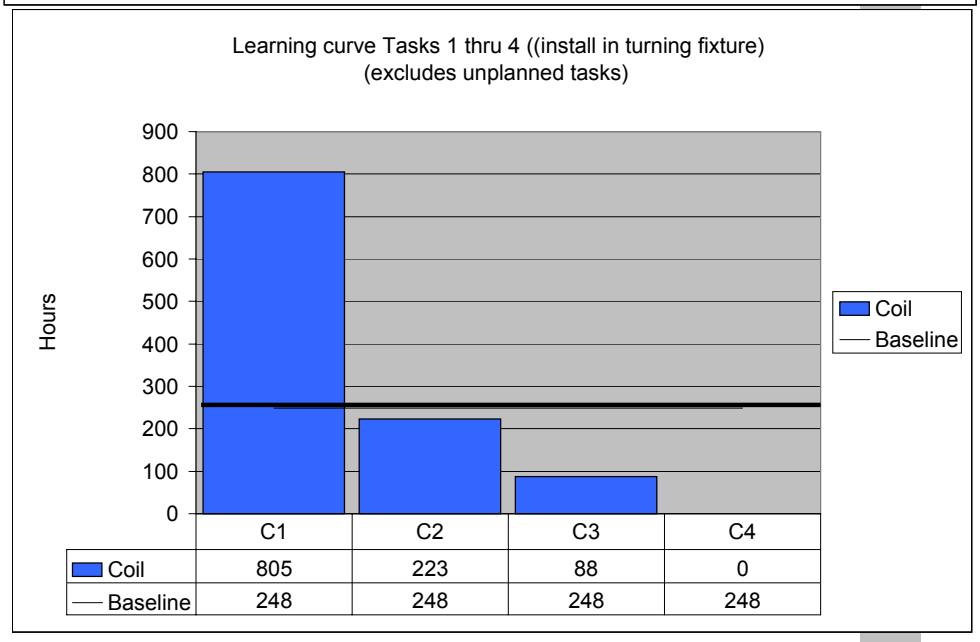
Modular Coil Manufacturing Times

Estimate 8 hr shift 10 hr shift

TASK DESCRIPTION	Total Shifts	No. of Tech./Shift	Budgeted Hours /coil	C1 Hours	C1 cpi	C1 Shifts	Learning curve C2 vs C1	C2 Hours	C2 cpi	C2 Shifts
Station No. 1- Casting Preparation	**27**	**Total Shifts per Coil**		**Delivery =**		**10/3/05**		**Delivery =**		**12/15/05**
1 Winding form rework activities										
Includes grinding, hole drilling, etc	1	2	16	550	0.03		-90%	55	0.29	2
2 Electrical test poloidal break	1	1	8	30	0.27	1	-87%	4	2.00	0.5
3 Position & mount casting to support ring	5	4	200	160	1.25	4	-60%	64	3.13	2
4 Install coil in station 1b turning fixture	1	3	24	65	0.37	2	54%	100	0.24	2
4a Balance coil in Fixture	1	3	24	101	0.24		-70%	30	0.80	
5 Weld monuments, stud adapters & lead nuts										
TIG weld actvities	2	2	32	30	1.07	1	100%	60	0.53	2
6 Install studs for winding clamps										
6a Position and weld studs for winding clamps	3	3	72	90	0.80	3	33%	120	0.60	4
7 Fitup Lead blocks and terminals [Remove lead blocks]	2	2	32	80	0.40	3	-38%	50	0.64	2
8 Inspect casting										
Label, Inspect surfaces, & magnetic permeability Measure casting using metrology equipment	3	2	48	48	1.00	3	4%	50	0.96	2
9 Clean casting										
Clean casting using acceptable solvents and inspect/clean all threaded holes	1	2	16	30	0.53	1	-47%	16	1.00	1
10 Install edge Kapton and Mold release	1	2	16	30	0.53	1	-33%	20	0.80	1
11 Install inner cladding plates										
Position and secure copper cladding plates	6	4	192	360	0.53	9	-28%	260	0.74	8
	27		***680***	***1574***	***0.43***			***829***	***0.82***	
			248	**805**				**223**		
Coil Winding Station 2 and 4	**57**	**Total shifts per coil**								
12 Prepare coil for winding										
12a Install coil in turning fixture	1	3	24	32	0.75	1	56%	50	0.48	1
12b Install/set winding clamps sides A & B	3	2.5	60	300	0.20	10	-68%	96	0.63	4
12c Position Ground wrap sides A&B	9	2.5	225	620	0.36	20	-44%	345	0.65	15
12d Position lacing strips sides A & B **[Metrology require't]**	2	2.5	50	120	0.42	4	-58%	50	1.00	2
12e Dimensional measure surface [First coil] **[Metrology require't]**	2	2	40	30	1.33	1				
13 Wind Side "A"										
13a Position & secure 1st. coil lead set [inc. brazing	2	2.5	50	160	0.31	5		100	0.50	2
13b Type C-Wind layer #1 - [10] turns of conductors (4-in-hand	11	2.5	275	450	0.61	15	-88%	56	4.91	
14 Prepare station for Side "B" -Total Shifts (1)										
14a Reposition coil from side A to side B	1	3	24	30	0.80	1	-7%	28	0.86	
15 Wind Side "B"										
15a Position & secure 1st. coil lead set [inc. brazing	2	2.5	40	90	0.44	3	-78%	20	2.00	
15b Type C-Wind layer #1 - [10] turns of conductors (4-in-hand	11	2.5	275	330	0.83	11	-52%	160	1.72	
16 Final coil winding activities										
16a Reposition coil bundle [sides A & B] **[Metrology require't]**	4	2	80	270	0.30	9				
16b Secure Lacing **[Metrology require't]**	2	2	40	90	0.44	4.5				
16cRemeasure after lacing is secured **[Metrology require't]**	1	2	16	20	0.80	1				
16e Complete groundwrap installatio	6	2.5	150	275	0.55	11				
	57	34	1349	2817						
			1063	***2162***	***0.49***			***905***	***1.17***	
17 Install chill plates & Tubing	12	2.5	300	475	0.63	19				
18 Install outer Diagnostic loops	2	2	32	120	0.27	4				
18a Position & secure 2nd. coil lead set sides A&B [inc. brazing]	4	2.5	100	244	0.41	9				
19 Perform pre-VPI elect. & press. Tests	1	2	16	16	1					
20 Install bag mold around modular coil										
20a Install silicone bag & sprues	4	2.5	80	220	0.3636	5				
20b Vacuum pumpdown & leak repair	2	2.5	40	128	0.3125					
20c Install epoxy shel	2	2.5	40	152	0.2632					
	27	16.5	608	1355						
VPI Activities (Station 5)	**16**	**Total Shifts per Coil**								
21 Transfer modular coil to Autoclave	1	3	24	82	0.2927					
22 Prepare MC for VPI (internal plumbing, etc)	3	3	72	84	0.8571					
23 VPI modular coil	12									
23aVacuum pumpdown & preheat mold and autoclave	2	3	48							
23b Epoxy fill coi	2	3	48							
23c Temperature rampup and Cure	3	2	48							
23d Temperature rampup and Post cure	2	2	32							
23e Temperature rampdown	1	1	8							
23f Cleanup & ready autoclave	2	3	48	174	0.2759					
	28	20	328							
Post VPI Activities (Station 1)	**9**	**Total Shifts per Coil**								
24 Transfer MC from Autoclave to Station #1	1	3	24							
25 Remove sprues & structural shell & studs	2	2	32							
26 Finalize coil & install final clamps (40-50 clamps/per coil)	3	2	48							
27 Perform (RT) **electrical & Pressure Tests**	1	2	16							
28 Remove coil from ring assembly	2	2	32							
	9	11	152							
X0 Unplanned tasks										
X3 Cladding, ground wrap and chill plate deburring and prep thru 1/15/06				1045		40				
X4 Cladding, ground wrap and chill plate deburring and prep thru 2/12/06				40		3				
X5 General VPI prep incl dismantle VPI pump thru 1/15/06										
X6 General VPI prep incl dismantle VPI pump thru 2/15/06				440		23				
One timemods/rework; fixtures,VIP h/w, training, other				319						
Estimated hours accounted oct thru Feb payroll (2/12/06) Job 1451,1459				**8200**						
Actual hours Thru feb (2/12/06) (job 1451,1459)				**8200**						
			unaccounted hours =	**0**	**0.0%**					
cost of unplanned tasks =	**$ 149,032**									



	C1	C2	C3	C4
Coil	3736	1734	0	0
Baseline	1743	1743	1743	1743



	C1	C2	C3	C4
Coil	805	223	88	0
Baseline	248	248	248	248