

Appendix A

Performance Analysis Calculations

The following table summarizes the initial and final number of parts and monthly hours of work for the cell. The supporting calculations are included in the following pages. Please note that the author has disguised some of the data as not to reveal any proprietary information.

Table A1. Initial and Final Number of Cell Parts and Required Monthly Hours/FWC

Factory Work Code (FWC)	Initial Total Hours per Month	Initial Total Number of Parts	Final Total Hours per Month	Final Total Number of Parts
Conventional Drills	241		236	
Conventional Mills	424		374	
Conventional Saws	92		85	
NC FWC No. 1	287	54	287	54
NC FWC No. 5	1260	23	631	15
NC FWC No. 7	441	48	441	48
NC FWC No. 9	454	9	309	6
Deburr	1646		1478	
		<i>134</i>		<i>123</i>

Table A2. Illustrative Commercial Programs Rates

Planes	Rate	Planes per Month
737	2	10
737X	15	1.33
747	5	4
757	5	4
767	5	4
777	4	5

Table A3. Illustrative Machine Variances to Standard used to Calculate Required Monthly Hours/FWC

FWC	Variance to Standard
Conventional Drills	1.8
Conventional Mills	1.8
Conventional Saws	1
NC FWC No.1	1.2
NC FWC No.5	2
NC FWC No.7	2
NC FWC No. 9	1.2
Deburr	2

The next tables present the initial cell capacity calculations. For the reader's information, the following table summarizes the meaning of the Factory Work Codes expressed numerically in these tables.

Table A4. Factory Work Codes Numerical Meanings

FWC	Numerical Equivalent	Comments
Conventional Drills	All FWC's in the 1000's	
Conventional Mills	All FWC's in the 1300's	
Conventional Saws	All FWC's in the 1500's	
NC FWC No.1	18K3	Vertical Mill, 3 Axis, 1 Spindle (FMS)
NC FWC No.5	1898	Vertical Mill, 4 Axis, 1 Spindle
NC FWC No.7	1966	Vertical Mill, 5 Axis, 3 Spindles
NC FWC No. 9	1949	Horizontal Mill, 5 Axis, 1 Spindle
Deburr	All FWC's in the 4000's and 0700's	All manual operations such as Deburr, Part Mark, and Protective Wrap are included under this heading

The tables contain the part routing, the standard set-up and run time, the variance to standard associated with the Factory Work Code at which each operation takes place (see first line in each table) and the part monthly demand.

Required time per operation is calculated as follows:

$$\text{Required Time} = (\text{Set-up Time} + (\text{Parts/Month}) * \text{Run Time}) * \text{Machine Variance to Standard}$$

The total required time per Factory Work Code is calculated by adding up all of the individual parts required time per operation. Note that although conventional milling, drilling, sawing and deburring have different Factory Work Codes in the part routings, they have been collapsed into four major Factory Work Codes.

Initial and Final Capacity Requirements for 46 Parts across NC FWC's No. 1 and No. 9

Variance	1.2	1.2	1.0	1.8	1.8	1.2	1.0	1.8	1.8	1.8	2.0	2.0	2.0	2.0	1.5	Total		Parts/	Plane	Parts/
Part No./FWC	18K3	18K3	1563	1000	1000	1949	1500	1300	1000	1000	4000	4000	4000	4000	9000	Touch	Pgm	Plane	Rate	Month
PART 1	18K3	18K3	1563			1949			1081	1081	4035	701				757		1	5	6
Set-Up Time	22	22	10			40			29	10	7	7			0					
Run Time	5	28	7			37			7	7	42	1			30					
Total	64	227	53			311			127	93	521	26			270	28				
PART 2	18K3	18K3	1563			1949			1081	1081	4035	701				757		1	5	6
Set-Up Time	22	22	10			40			29	10	7	7								
Run Time	5	28	7			37			7	7	42	1								
Total	64	227	53			311			127	93	521	26				24				
PART 3	18K3	18K3	1563	1081	1081	1949					4035	4035	701			757		1	5	6
Set-Up Time	22	22	10	29	10	40					7	7	7							
Run Time	5	19	9	7	7	22					34	34	1							
Total	64	164	61	127	93	203					421	421	25			26				
PART 4	18K3	18K3	1563	1081	1081	1949					4035	4035	701			757		1	5	6
Set-Up Time	22	22	10	29	10	40					7	7	7							
Run Time	5	17	9	7	7	22					34	34	1							
Total	60	152	61	127	93	203					421	421	25			26				
PART 5	18K3	18K3	1563	1081	1081	1949					4035	709	701			757		1	5	6
Set-Up Time	22	22	10	29	10	40					7	7	7							
Run Time	5	24	4	4	4	23					32	8	1							
Total	64	199	33	97	63	212					394	110	25			20				
PART 6	18K3	18K3	1563	1081	1081	1949					4035	709	701			757		1	5	6
Set-Up Time	22	22	10	29	10	40					7	7	7							
Run Time	5	25	4	4	4	32					32	8	1							
Total	64	204	33	97	63	282					394	110	25			21				
PART 7	18K3	18K3	1563			1949					4035	4035	701			757		1	5	6
Set-Up Time	22	22	10			38					7	7	7							
Run Time	6	20	7			31					44	4	1							
Total	67	171	53	0	0	271					546	59	26			20				
PART 8	18K3	18K3	1563			1949					4035	4035	701			757		1	5	6
Set-Up Time	22	22	10			38					7	7	7							
Run Time	6	20	7			31					44	4	1							
Total	67	170	53	0	0	270					546	59	26			20				
PART 9	18K3	18K3	1563			1949					4035	4035	701			757		1	5	6
Set-Up Time	22	22	10			38					7	7	7							
Run Time	6	18	7			31					35	3	1							
Total	66	157	53	0	0	267					439	55	25			18				
PART 10	18K3	18K3	1563			1949					4035	4035	701			757		1	5	6
Set-Up Time	22	22	10			38					7	7	7							
Run Time	6	18	7			31					35	3	1							
Total	66	156	53	0	0	267					439	55	25			18				
PART 11	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	701			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	7							
Run Time	5	21				28	3	3	4	4	36	36	0							
Total	59	180				255	28	198	91	56	446	446	19			30				
PART 12	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	701			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	7							
Run Time	4	23				28	3	3	4	4	36	36	0							
Total	57	192				254	28	198	91	56	446	446	19			30				
PART 13	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	4060			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	0							
Run Time	8	25				27	3	3	4	4	36	36	1							
Total	82	205				248	28	198	91	56	446	446	9			30				
PART 14	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	4060			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	0							
Run Time	5	25				27	3	3	4	4	36	36	1							
Total	61	205				249	28	198	91	56	446	446	9			30				
PART 15	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	701			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	7							
Run Time	5	36				28	3	3	3	3	36	36	0							
Total	62	284				253	28	198	82	47	446	446	19			31				
PART 16	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	701			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	7							
Run Time	6	36				28	3	3	3	3	36	36	0							
Total	66	284				258	28	198	82	47	446	446	19			31				
PART 17	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	701			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	7							
Run Time	5	27				29	3	3	3	3	23	23	0							
Total	62	217				262	30	199	88	54	288	288	19			25				
PART 18	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	701			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	7							
Run Time	5	30				29	3	3	3	3	23	23	0							
Total	62	240				260	30	199	88	54	288	288	19			25				
PART 19	18K3	18K3				1949	1563	1348	1081	1081	4035	4035	701			757		1	5	6
Set-Up Time	22	22				44	10	93	29	10	7	7	7							
Run Time	5	27				29	3	3	3	3	38	23	0							

PART 21	18K3	18K3		1949	1563	1348	1081	1081	4035	4035	4060					757	1	5	6
Set-Up Time	22	22		44	10	93	29	10	7	7	0								
Run Time	5	29		30	3	3	3	3	23	23	1								
Total	62	232		267	30	199	88	54	292	292	11				25				
PART 22	18K3	18K3		1949	1563	1348	1081	1081	4035	4035	4060					757	1	5	6
Set-Up Time	22	22		44	10	93	29	10	7	7	0								
Run Time	5	30		29	3	3	3	3	23	23	1								
Total	62	245		263	30	199	88	54	292	292	11				26				
PART 23	18K3	18K3		1949	1563	1348	1081	1081	4035	4035	701					757	1	5	6
Set-Up Time	22	22		44	10	93	29	10	7	7	7								
Run Time	5	26		42	3	4	3	3	34	23	0								
Total	62	214		355	30	216	88	54	422	292	19				29				
PART 24	18K3	18K3		1949	1563	1348	1081	1081	4035	4035	701					757	1	5	6
Set-Up Time	22	22		44	10	93	29	10	7	7	7								
Run Time	5	46		43	3	4	3	3	34	23	0								
Total	62	356		360	30	216	88	54	422	292	19				32				
PART 25	18K3	18K3		1949	1563	1348			4035	4035	4060	701				757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	0	7							
Run Time	5	17		28	3	3			27	23	1	0							
Total	62	152		254	27	198	0	0	344	294	8	18			23				
PART 26	18K3	18K3		1949	1563	1348			4035	4035	4060	701				757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	0	7							
Run Time	5	17		27	3	3			27	23	1	0							
Total	62	150		250	27	198	0	0	344	294	8	18			23				
PART 27	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	19		27	3	3			27	27	0								
Total	62	162		250	27	198	0	0	343	343	18				23				
PART 28	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	19		27	3	3			27	27	0								
Total	62	162		249	27	198	0	0	343	343	18				23				
PART 29	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	19		28	3	3			31	31	0								
Total	62	167		256	27	198	0	0	388	388	19				25				
PART 30	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	19		27	3	3			31	31	0								
Total	62	165		248	27	198	0	0	388	388	19				25				
PART 31	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	21		28	3	3			35	35	0								
Total	61	175		256	28	198	0	0	437	437	19				27				
PART 32	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	20		28	3	3			35	35	0								
Total	61	174		253	28	198	0	0	437	437	19				27				
PART 33	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	20		30	3	3			35	35	0								
Total	62	173		269	28	198	0	0	437	437	19				27				
PART 34	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	22		29	3	3			35	35	0								
Total	62	184		265	28	198	0	0	437	437	19				27				
PART 35	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	3	22		29	3	3			22	22	0								
Total	49	184		265	29	199	0	0	279	279	19				22				
PART 36	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	3	22		29	3	3			22	22	0								
Total	49	181		263	29	199	0	0	279	279	19				22				
PART 37	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	22		31	3	3			22	22	0								
Total	62	181		277	29	199	0	0	279	279	19				22				
PART 38	18K3	18K3		1949	1563	1348			4035	4035	701					757	1	5	6
Set-Up Time	22	22		46	10	93			7	7	7								
Run Time	5	21		30	3	3			22	22	0								
Total	62	176		271	29	199	0	0	279	279	19				22				
PART 39	18K3	18K3	1563	1949					4035	701						757	1	5	6
Set-Up Time	22	22	10	44					7	7									
Run Time	12	12	7	27					34	1									
Total	114	110		244	0	0	0	0	420	26	0				15				
PART 40	18K3	18K3	1563	1949					4035	701						757	1	5	6
Set-Up Time	22	22	10	46					7	7									
Run Time	12	12	7	28					34	1									
Total	114	110		258	0	0	0	0	420	26	0				15				

PART 41	18K3	18K3	1563		1949					4035	701				757	1	5	6
Set-Up Time	22	22	10		42					7	7							
Run Time	12	11	7		27					34	1							
Total	113	104			244	0	0	0	0	420	26	0			15			
PART 42	18K3	18K3	1563		1949					4035	701				757	1	5	6
Set-Up Time	22	22	10		44					7	7							
Run Time	12	11	7		28					34	1							
Total	114	104			254	0	0	0	0	420	26	0			15			
PART 43	18K3	18K3	1563		1949					4035	701				757	1	5	6
Set-Up Time	22	22	10		42					7	7							
Run Time	13	9	7		29					34	1							
Total	117	90			256	0	0	0	0	420	26	0			15			
PART 44	18K3	18K3	1563		1949					4035	701				757	1	5	6
Set-Up Time	22	22	10		44					7	7							
Run Time	13	9	7		30					34	1							
Total	117	94			266	0	0	0	0	420	26	0			15			
PART 45	18K3	18K3	1563		1949					4035	701				757	1	5	6
Set-Up Time	22	22	10		42					7	7							
Run Time	12	11	7		29					34	1							
Total	112	105			259	0	0	0	0	420	26	0			15			
PART 46	18K3	18K3	1563		1949					4035	701				757	1	5	6
Set-Up Time	22	22	10		42					7	7							
Run Time	12	11	7		29					34	1							
Total	112	104			259	0	0	0	0	420	26	0			15			

FWC	18K3	18K3	1500	1000	1000	1949	1500	1300	1000	1000	4000	4000	4000	4000	9000
Total Minutes	3284	8333	502	448	311	12080	799	5585	1485	938	18632	11455	670	37	270
Total Hours	55	139	8	7	5	201	13	93	25	16	311	191	11	1	5

FWC	Required Hours per Month per FWC
18K3	194
Pre 1949 1500	8
Pre 1949 1000	13
1949	201
Post NC 1500	13
Post NC 1300	93
Post NC 1000	40
Post NC 4000	513
Post NC 9000	5

Initial Capacity Requirements for 8 Parts across NC FWC No. 1

Variance	1.0	1.0	2.0	1.8	1.2	1.2	1.0	1.8	2.0	2.0	2.0	2.0	2.0	Total		Parts/	Plane	Parts/
Part No./FWC	1500	1500	1891	1000	18K3	18K3	1500	1300	4000	4000	4000	4000	4000	Touch	PGM	Plane	Rate	Month
PART 47	1584	1584	1891	0498	18K3	18K3			0709	4035	4060	4110	0701	737	2	2	20	
Set-Up Time	10	10	52	0	22	22			7	7	0	4	7					
Run Time	2	1	48	0	47	54			0	24	1	0	1					
Total	50	37	2019	0	1142	1330	0	0	33	965	43	10	49	94.6				
PART 48	1584	1584	1891	0498	18K3	18K3	1563		0708	4035	4060	4110	0701	737	1	2	0	
Set-Up Time	10	10	54	0	22	22	10		5	7	0	4	7					
Run Time	2	1	73	0	27	53	3		1	24	1	0	1					
Total	10	10	108	0	26	26	10	0	10	14	0	8	14	3.95				
PART 49						18K3			4035	4060			0701	737	1	2	10	
Set-Up Time						22			7	0			7					
Run Time						39			6	1			0					
Total						489	0	0	127	11	0	0	21	10.8				
PART 50						18K3			4035	4060			0701	737	1	2	10	
Set-Up Time						22			7	0			7					
Run Time						39			6	1			0					
Total						489	0	0	127	11	0	0	21	10.8				
PART 51	1584	1584	1891	1081	18K3				1334	4035	4060	4110	0701	737	1	2	10	
Set-Up Time	10	10	50	29	22				71	7	0	4	7					
Run Time	1	2	7	7	42				4	9	1	0	0					
Total	20	29	231	175	533	0	0	208	192	11	9	0	21	23.8				
PART 52	1584	1584	1891	1081	18K3				1334	4035	4060	4110	0701	737	1	2	10	
Set-Up Time	10	10	50	29	22				71	7	0	4	7					
Run Time	1	2	7	7	42				4	9	1	0	0					
Total	20	29	231	175	536	0	0	208	192	11	9	0	21	23.9				
PART 53	1584	1584	1891		18K3				1334	4035	4110	4060	0701	737	1	2	10	
Set-Up Time	10	10	62		22				77	7	4	0	7					
Run Time	4	2	18		49				8	28	0	1	0					
Total	52	26	490	0	620	0	0	283	580	9	17	0	22	35				
PART 54	1584	1584	1891		18K3				1334	4035	4110	4060	0701	737	1	2	10	
Set-Up Time	10	10	62		22				77	7	4	0	7					
Run Time	4	2	18		31				8	28	0	1	0					
Total	52	26	490	0	403	0	0	283	580	9	17	0	22	31.4				

FWC	1500	1500	1891	1000	18K3	18K3	1500	1300	4000	4000	4000	4000	4000
Total Minutes	203	157	3571	350	3261	2334	10	981	1841	1042	94	18	192
Total Hrs	3	3	60	6	54	39	0	16	31	17	2	0	3

FWC	Required Hours per Month per FWC
Pre NC 1500	6
Pre NC 1000	6
18K3	93
Post NC 1500	0
Post NC 1300	16
Post NC 4000	53
1891	60

Variance	1.8	2.0	2.0	1.8	1.0	2.0	1.5	2.0	2.0	2.0	2.0	1.8	1.0	1.8	2.0	1.8	2.0	2.0	2.0	2.0	Total		Parts/	Plane	Parts/	
Part No./FWC	1000	1100	1100	1300	1500	2700	CELE	1891	1898	1898	1898	1000	1500	1300	4000	1000	4000	4000	4000	4000	Touch		Pgm	Plane	Rate	Month
PART 201					1584				1898	1898								4035	4110	701		747	4	5	50	
Set-Up Time					10				40	47								7	4	7						
Run Time					1				6	18								4	0	0						
Total	0	0	0	0	57	0	0	0	723	1885	0	0	0	0	0	0	0	439	14	50	0	53				
PART 202					1584				1898	1898								4035	4110	701		747	12	5	50	
Set-Up Time					10				40	47								7	4	7						
Run Time					1				7	18								5	0	0						
Total	0	0	0	0	57	0	0	0	750	1939	0	0	0	0	0	0	0	488	14	50	0	55				
PART 203					1584				1898	1898								4035	4110	701		747	4	5	50	
Set-Up Time					10				40	47								7	4	7						
Run Time					1				7	19								5	0	0						
Total	0	0	0	0	57	0	0	0	750	1979	0	0	0	0	0	0	0	538	14	50	0	56				
PART 204					1584				1898	1898								4035	4060	4110	701	747	3	5	50	
Set-Up Time					10				40	47								7	0	4	7					
Run Time					1				7	13								5	1	0	0					
Total	0	0	0	0	53	0	0	0	750	1372	0	0	0	0	0	0	0	538	56	14	50	47				
PART 205					1584				1898	1898								4035	4110	701		747	3	5	50	
Set-Up Time					10				40	53								7	4	7						
Run Time					1				7	40								5	0	0						
Total	0	0	0	0	65	0	0	0	750	4087	0	0	0	407	0	0	0	543	14	50	0	99				
PART 206									1898									4035	4060	4110		767	1	5	12	
Set-Up Time									50																	
Run Time									24																	
Total	0	0	0	0	0	0	0	0	666	0	0	131	0	0	0	0	0	0	0	0	0	13				
PART 207					1334				1898									4035		4060	4110	747	4	5	32	
Set-Up Time					80				38									7								
Run Time					16				94									31								
Total	0	0	0	1088	0	0	0	0	6061	0	0	0	0	0	1982	0	0	0	0	0	0	152				
PART 208					1332		3602		1898	1898	1898							4035	4060	4110		737-300	1	2	10	
Set-Up Time					77		0		39	49	41							7	0	4						
Run Time					14		0		61	140	175							60	2	0						
Total	0	0	0	389	0	0	0	0	1304	2890	3578	0	0	0	0	0	0	1216	33	9	157					
PART 209					1332		3602		1898	1898	1898							4035	4060	4110		737-300	1	2	10	
Set-Up Time					77		0		39	46	41							7	0	4						
Run Time					14		0		60	145	171							60	2	0						
Total	0	0	0	389	0	0	0	0	1283	2992	3502	0	0	0	0	0	0	1216	33	9	157					
PART 210					1334				1898	1898	1898							4035	4060	4110	701	737-300	1	2	10	
Set-Up Time					77				39	37	43							7	0	4	7					
Run Time					9				39	45	102							26	1	0	0					
Total	0	0	0	300	0	0	0	0	849	973	2134	0	0	0	0	0	0	536	16	9	22	81				
PART 211					1333				1898	1898								4035	4060	4110	701	737-300	1	2	10	
Set-Up Time					77				39	37	43							7	0	4	7					
Run Time					9				39	58	141							26	1	0	0					
Total	0	0	0	300	0	0	0	0	849	1228	2904	0	0	0	0	0	0	536	16	9	22	98				
PART 212					1334		CELE		1898	1898			1563	1334				4035	4110	701		767	1	5	8	
Set-Up Time					71		50		36	37			10	74				7	4	7						
Run Time					8		15		20	30			10	8				39	0	1						
Total	0	0	0	245	0	0	251	0	396	550	0	0	92	253	0	0	0	639	9	31	0	41				
PART 213	1020				1334			1891	1898	1898			1563	1334				4035	4110	701		767	1	5	8	
Set-Up Time	41				71			46	37	37			10	74				7	4	7						
Run Time	3				8			13	22	37			10	8				39	0	1						
Total	112	0	0	245	0	0	0	307	429	660	0	0	92	253	0	0	0	639	9	31	0	46				
PART 214	1020				1334			1891	1898	1898			1563	1334				4035	4110	701		767	1	5	8	
Set-Up Time	41				71			48	37	37			10	74				7	4	7						
Run Time	3				8			13	22	39			10	8				39	0	1						
Total	112	0	0	245	0	0	0	311	431	699	0	0	92	253	0	0	0	639	9	31	0	47				
PART 215					1333				1898				1563	1345				4035	4110	4060	701	747	2	5	20	
Set-Up Time					77				43				6	49				7	4	0	7					
Run Time					7				96				2	5				9	0	1	0					
Total	0	0	0	396	0	0	0	0	3907	0	0	0	45	266	0	0	0	385	10	22	28	84				
PART 216		1138	1138					1891	1898	1898								4035	4110	701		767	1	5	8	
Set-Up Time		22	10					46	39	36								7	4	7						
Run Time		8	8					5	18	44								7	0	1						
Total	0	166	142	0	0	0	0	176	365	778	0	0	0	0	0	0	0	121	9	28	0	30				

Initial Capacity Requirements for 23 Parts across NC FWC No. 5 (Con't)

PART 217	1138	1138					1891	1898	1898						4035	4110	701		767	1	5	8		
Set-Up Time	22	10					46	39	36						7	4	7							
Run Time	8	8					5	18	44						7	0	1							
Total	0	166	142	0	0	0	0	176	365	778	0	0	0	0	121	9	28	0	30					
PART 218							1891	1898				1563	1334	4035	1018	4035	4060	4110	701		747	1	5	15
Set-Up Time							50	43				10	71	7	35	6	0	4	7					
Run Time							24	61				5	6	37	7	1	1	0	0					
Total	0	0	0	0	0	0	807	1923	0	0	0	87	299	1132	253	31	26	10	27	77				
PART 219							1891	1898				1333			4035	4060	4110	701		747	1	5	15	
Set-Up Time							54	44				77			7	0	4	7						
Run Time							28	141				5			32	1	0	0						
Total	0	0	0	0	0	0	941	4321	0	0	0	0	267	0	0	964	26	10	27	109				
PART 220							1891	1898				1563	1334		4035	4060	4110	701		747	1	5	8	
Set-Up Time							54	44				10	71		7	0	4	7						
Run Time							26	137				5	6		37	1	0	0						
Total	0	0	0	0	0	0	531	2275	0	0	0	51	219	0	0	610	14	9	21	62				
PART 221				1584	2703	CELE	1898	1898								4035	4060	701		737	2	2	20	
Set-Up Time				10	2	20	38	41								7	0	7						
Run Time				1	2	2	36	22								8	1	0						
Total	0	0	0	28	88	101	0	1504	978	0	0	0	0	0	0	337	22	28	51					
PART 222				1584	2703	CELE	1898	1898								4035	4060	701		737	3	2	30	
Set-Up Time				10	2	20	38	41								7	0	7						
Run Time				1	2	2	41	30								8	1	0						
Total	0	0	0	37	131	137	0	2560	1858	0	0	0	0	0	0	499	34	36	88					
PART 223				1584	2703	CELE	1898	1898								4035	4060	701		737	1	2	40	
Set-Up Time				10	2	20	38	41								7	0	7						
Run Time				1	3	2	31	25								4	1	0						
Total	0	0	0	49	243	172	0	2538	2084	0	0	0	0	0	0	344	45	43	92					

FWC	1000	1100	1100	1300	1500	2700	CELE	1891	1898	1898	1898	1000	1500	1300	4000	1000	4000	4000	4000	4000	4000
Total Minutes	223	332	284	3597	403	462	661	3247	35747	27729	12118	131	459	2218	3114	253	7768	3877	599	322	
Total Hours	4	6	5	60	7	8	11	54	596	462	202	2	8	37	52	4	129	65	10	5	

FWC		Required Hours per Month per FWC	
Pre NC 1000		4	
Pre NC 1100		10	
Pre NC 1300		60	
Pre NC 1500		7	
1891		54	
1898		1260	
Post NC 1000		6	
Post NC 1300		37	
Post NC 1500		8	
Post NC 4000		261	

Final Capacity Requirements for 15 Parts across NC FWC No. 5

Variance	1.8	1.8	1.0	1.5	2.0	2.0	2.0	2.0	1.8	1.0	1.8	2.0	2.0	2.0	2.0	2.0	Total		Parts/	Plane	Parts/		
Part No./FWC	1000	1300	1500	CELE	1891	1898	1898	1898	1000	1500	1300	4000	4000	4000	4000	4000	Touch	Pgm	Plane	Rate	Month		
PART 201			1584			1898	1898						4035	4110	701		747		4	5	16		
Set-Up Time			10			40	47						7	4	7								
Run Time			1			6	18						4	0	0								
Total	0	0	25	0	0	286	667	0	0	0	0	0	150	10	26	0	19						
PART 202			1584			1898	1898						4035	4110	701		747		12	5	50		
Set-Up Time			10			40	47						7	4	7								
Run Time			1			7	18						5	0	0								
Total	0	0	57	0	0	750	1939	0	0	0	0	0	488	14	50	0	55						
PART 203			1584			1898	1898						4035	4110	701		747		4	5	16		
Set-Up Time			10			40	47						7	4	7								
Run Time			1			7	19						5	0	0								
Total	0	0	25	0	0	294	697	0	0	0	0	0	182	10	26	0	21						
PART 204			1584			1898	1898						4035	4060	4110	701	747		3	5	12		
Set-Up Time			10			40	47						7	0	4	7							
Run Time			1			7	13						5	1	0	0							
Total	0	0	20	0	0	241	401	0	0	0	0	0	140	13	9	23	14						
PART 205			1584			1898	1898					1333	4035	4110	701		747		3	5	12		
Set-Up Time			10			40	53					77	7	4	7								
Run Time			1			7	40					3	5	0	0								
Total	0	0	23	0	0	241	1061	0	0	0	203	0	141	9	23	0	28						
PART 206						1898				1081				4035	4060	4110		767		1	5	4	
Set-Up Time						50				30													
Run Time						24				4													
Total	0	0	0	0	0	289	0	0	0	80	0	0	0	0	0	0	6						
PART 207		1334				1898							4035		4060	4110		747		4	5	16	
Set-Up Time		80				38							7										
Run Time		16				94							31										
Total	0	616	0	0	0	3068	0	0	0	0	0	998	0	0	0	0	78						
PART 208		1332		3602		1898	1898	1898						4035	4060	4110		737-300		1	2	10	
Set-Up Time		77		0		39	49	41						7	0	4							
Run Time		14		0		61	140	175						60	2	0							
Total	0	389	0	0	0	1304	2890	3578	0	0	0	0	0	1216	33	9	157						
PART 209		1332		3602		1898	1898	1898						4035	4060	4110		737-300		1	2	10	
Set-Up Time		77		0		39	46	41						7	0	4							
Run Time		14		0		60	145	171						60	2	0							
Total	0	389	0	0	0	1283	2992	3502	0	0	0	0	0	1216	33	9	157						
PART 210		1334				1898	1898	1898						4035	4060	4110	701		737-300		1	2	10
Set-Up Time		77				39	37	43						7	0	4	7						
Run Time		9				39	45	102						26	1	0	0						
Total	0	300	0	0	0	849	973	2134	0	0	0	0	0	536	16	9	22	81					
PART 211		1333				1898	1898							4035	4060	4110	701		737-300		1	2	10
Set-Up Time		77				39	37	43						7	0	4	7						
Run Time		9				39	58	141						26	1	0	0						
Total	0	300	0	0	0	849	1228	2904	0	0	0	0	0	536	16	9	22	98					
PART 212		1334		CELE		1898	1898			1563	1334			4035	4110	701		767		1	5	4	
Set-Up Time		71		50		36	37			10	74			7	4	7							
Run Time		8		15		20	30			10	8			39	0	1							
Total	0	187	0	163	0	234	312	0	0	51	193	0	0	327	8	23	0	25					
PART 213	1020	1334			1891	1898	1898			1563	1334			4035	4110	701		767		1	5	4	
Set-Up Time	41	71			46	37	37			10	74			7	4	7							
Run Time	3	8			13	22	37			10	8			39	0	1							
Total	93	187	0	0	199	251	367	0	0	51	193	0	0	327	8	23	0	28					
PART 214	1020	1334			1891	1898	1898			1563	1334			4035	4110	701		767		1	5	4	
Set-Up Time	41	71			48	37	37			10	74			7	4	7							
Run Time	3	8			13	22	39			10	8			39	0	1							
Total	93	187	0	0	203	252	386	0	0	51	193	0	0	327	8	23	0	29					
PART 215		1333				1898				1563	1345			4035	4110	4060	701		747		2	5	8
Set-Up Time		77				43				6	49			7	4	0	7						
Run Time		7				96				2	5			9	0	1	0						
Total	0	242	0	0	0	1614	0	0	0	21	159	0	0	162	9	9	20	37					

FWC	1000	1300	1500	CELE	1891	1898	1898	1898	1000	1500	1300	4000	4000	4000	4000	4000
Total Minutes	185	2794	150	163	403	11806	13914	12118	80	175	942	998	3315	2555	294	105
Total Hours	3	47	3	3	7	197	232	202	1	3	16	17	55	43	5	2

FWC	Required Hours per Month per FWC	FWC	Required Hours per Month per FWC
Pre NC 1000	3	Post NC 1000	1
Pre NC 1300	47	Post NC 1300	16
Pre NC 1500	3	Post NC 1500	3
1891	7	Post NC 4000	121
1898	631		

Initial and Final Capacity Requirements for 48 Parts across NC FWC No. 7 (Con't)

PART 140	1966	1966	1563	1334	1081	4035	709	4110	701	757	1	5	4.00	2.00	6			
Set-Up Time	120	111	10	71	31	7	7	4	7									
Run Time	24	30	12	34	8	46	1	1	1									
Total	0	338	0	341	0	84	0	493	141	0	561	26	23	25	0	0	0	34
PART 141	1966	1966	1563	1334	1081	4035	709	4110	701	757	1	5	4.00	2.00	6			
Set-Up Time	120	111	10	71	31	7	7	4	7									
Run Time	25	31	12	34	8	46	1	1	1									
Total	0	339	0	346	0	84	0	493	141	0	561	26	23	25	0	0	0	34
PART 142	4110	1966	1563	1334	1081	4035	709	4110	701	757	1	5	4.00	2.00	6			
Set-Up Time	9	120	114	10	71	31	7	7	4	7								
Run Time	3	24	35	12	10	8	46	1	1	1								
Total	29	335	0	368	0	84	0	238	141	0	561	26	23	25	0	0	0	31
PART 143	4110	1966	1563	1334	1081	4035	709	4035	4110	701	757	1	5	4.00	2.00	6		
Set-Up Time	9	126	117	10			7	7	4	7								
Run Time	3	37	50	12			2	94	1	1								
Total	29	401	0	435	0	84	0	0	0	0	34	1136	23	28	0	0	0	36
PART 144	1966	1966	1563	1334	1081	4035	709	4035	4110	701	757	1	5	4.00	2.00	6		
Set-Up Time	126	117	10				7	7	4	7								
Run Time	37	48	12				2	94	1	1								
Total	0	401	0	426	0	84	0	0	0	0	34	1136	19	28	0	0	0	35
PART 145	1966	1966	1563	1334	1081	4035	709	4035	4110	701	757	1	5	4.00	2.00	6		
Set-Up Time	126	117	10				7	7	4	7								
Run Time	37	50	12				2	94	1	1								
Total	0	401	0	433	0	84	0	0	0	0	34	1136	19	28	0	0	0	36
PART 146	4110	1966	1563	1334	1081	4035	709	4035	4110	701	757	1	5	4.00	2.00	6		
Set-Up Time	9	126	117	10			7	7	4	7								
Run Time	3	37	50	12			2	94	1	1								
Total	29	401	0	433	0	84	0	0	0	0	34	1136	23	28	0	0	0	36
PART 147	1966	1966	1563	1334	1081	4035	709	4035	709	4110	701	757	1	5	4.00	2.00	6	
Set-Up Time	117		10				7	7	7	4	7							
Run Time	34		12				2	90	1	0	1							
Total	0	370	0	0	0	84	0	0	0	0	34	1092	25	9	26	0	0	27
PART 148	1966	1966	1563	1334	1081	4035	709	4035	709	4110	701	757	1	5	4.00	2.00	6	
Set-Up Time	117		10				7	7	7	4	7							
Run Time	34		12				2	90	1	0	1							
Total	0	370	0	0	0	84	0	0	0	0	34	1092	25	9	26	0	0	27

FWC	4000	1966	4000	1966	4000	1500	4000	1300	1000	1000	4000	4000	4000	4000	4000	4000	
Total Minutes	349	13345	29	13104	1777	3094	40	5239	3510	779	12871	17555	625	704	307	201	183
Total Hours	6	222	0	218	30	52	1	87	58	13	215	293	10	12	5	3	3

FWC	Required Hours per Month per FWC
Pre NC 4000	6
1966	441
Post NC 1500	52
Post NC 1300	87
Post NC 1000	71
Post NC 4000	571