

The following tables summarize the time estimations detailed in the "Mill - Detailed" and "Lathe - Detailed" sheets. Use these to guide how long is spent on each step of manufacturing the milling machine and lathe assigned parts. Push students toward the "Goal Time," ensure the "Max Time" is not exceeded, and spend, on average, the "Typ. Time" on each step.

Assigned Parts - Estimated Times				
Milling Machine Part				
Step	Action	Goal Time	Max Time	Typ. Time
0	Setup (first time)	10	28	21
1	Face off 1/2" x 4" sides (both)	17	42	32
2	Face off 2" x 4" sides (both)	12	27	21
3,4	Square off/cut to length the 1/2" x 4" ends (both)	11.5	31	23
5	Cut 1/4" slot in plate	10	22	18
6	Demo edgefinder and get x, y zeros	6	16	12
7	Center drill all 9 holes	6.5	21	15
8	Tap drill 4 holes	4	11	8
9	Drill remaining 5 holes to 0.196 diameter	4.5	13	10
10	Ream center hole	4	9	7
11	Countersink	4	7	6
12	Tap 4 holes	7	21	15
13	Tap side hole	5.5	16	12
Total Estimated Time (no cleanup):		102	264	201
Lathe Part				
Step	Action	Goal Time	Max Time	Typ. Time
0	Setup (first time)	9	24	18
1	Clamp part	1	3	2
2	Face end of workpiece	8	15	13
3	Finish turn OD	2.5	5	4
4	Turn Shoulder (discuss rad vs. diam)	11	19	17
5	Turn chamfers	2	4	3
6	Cut off on Marvel	6.5	14	11
7	Cut down to proper length (2"OD = 0.5" long)	11.5	20	17
8,9,10	Drill and ream center hole	9	21	17
11	CNC demo	18	27	25
12	Move to milling machines	0	0	0
13	Clamp part, zero, and drill set screw holes	11.5	30	23
14	Tap set screw holes	5	13	10
Total Estimated Time (no cleanup):		95	195	160

Machine Cleanup - Estimated Times				
Machine	Action	Goal Time	Max Time	Typ. Time
Mill	Clean up - (Milling Machine)	6	21	15
Lathe	Clean up lathe - (not incl. tool/part removal)	4.5	16	11

The following tables summarize what a group should accomplish during each lab. These times are minimums; if a group is slower, encourage them to come prepared next week AND, as their TA, (micro)manage their lab time more efficiently.

Groups NEED to finish during the dedicated labs or they WILL be behind on the project. If an individual is holding the group back, make a mental note and, a few minutes after the hold-up, suggest to the group that they come in to office hours to become more proficient. If it happens twice with the same student, instruct him/her (in "private" during clean up) to come in to the TA hours.

Fall/Spring

Lab Duration: 115 minutes

Starting On Milling Machine (similar when reversed):		Additional Time at Start	Estimated Work Time	Clean Up	Additional Time at End	TOTAL
Lab 1	Begin mill part (steps 0-4) and cleanup.	0	98	15	0	113
Lab 2	Complete mill part and cleanup.	1	103	10	0	115
Lab 3	Begin lathe part (steps 0-7) and cleanup.	0	86	11	20	117
Lab 4	Finish lathe part and cleanup (mill and lathe).	1	74	18	20	113

Note that you should be able to move more quickly than the times listed above; especially on the lathe part.

Summer

Lab Duration: 165 minutes

Starting On Milling Machine:		Additional Time at Start	Estimated Work Time	Clean Up	Additional Time at End	TOTAL
Lab 1	Begin mill part (steps 0-7) and cleanup.	0	143	15	0	158
Lab 2	Complete mill part, begin lathe part (steps 0-5) and cleanup.	1	115	22	20	158
Lab 3	Finish lathe part and cleanup.	1	103	18	20	142

Note that you should be able to move more quickly than the times listed above; especially on the lathe part.

Starting On Lathe:		Additional Time at Start	Estimated Work Time	Clean Up	Additional Time at End	TOTAL
Lab 1	Begin lathe part (steps 0-11), mill part step 0, and cleanup.	0	148	11	0	159
Lab 2	Finish lathe part, begin mill part (steps 1-5), and cleanup.	0	128	15	20	162
Lab 3	Finish mill part and cleanup.	1	86	10	20	117

Note that you should be able to move more quickly than the times listed above; especially on the milling machine part.