Doing Vertical Milling

- Select stock
 - material, dimension
- Select workholding
 - usually vice or strap clamps
- Select tools & create toolpath
 - FeatureCAM for CNC, by hand for manual
- Set work and tool offsets (for CNC)
- Determine feeds, speeds, and cutting depth
 - FeatureCAM helps with this for CNC

Vertical Milling



Coordinate System



Work Offsets

- Work Offsets
 - G54-G59
 - G54 X & Y aligned with vice step jaw left front
 Set G54 Z to height of top of work (type number, press F1)



Offsets



Setting Work Offset

	HORK ZER	O OFFSET		A STREET	17 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	
	G CODE	×	Y	Z		
	G 52	0.	0.	8.		
	G 54	-18.4871	-8, 1975	6.4515		
	G 55	-10.9700	-8.5000	8.		
	G 56	-22.6680	-6.8000	0.		
	G 57	-16.3900	-2.6288	6.0000		
	G 58	-12.4185	-8.8782	5.8248		
	G 59	-18.4071	-8.0782	5.2285		
	G154 P1	0.	8.	0.	(G118)	
	G154 P2	0.	0.	0.	(G111)	
-	G154 P3	θ.	0.	8.	(G112)	
	G154 P4	0.	8.	8.	(6113)	
	G154 P5	8.	8.	8.	(G114)	
	G154 P6	0.	0.	8.	(6115)	
15 500 80	G154 P7	8.	8.	8.	(6116)	
S C C	G154 P8	θ,	8.	0.	(6117)	10
11_154	0.154 P9	8.	8.		(6118)	AP.
100000000000000000000000000000000000000	3154 P18	θ.	8.	8.	(6119)	
	G154 P11	8.	0.	8.	(G128)	
2. 130 41	G154 P12	8.	8.	8.	(6121)	
	G154 P13	8.	0.	8.	(6122)	
	G154 P14	0.	8.	8.	(6123)	
	G154 P15	8.	8.	в.	(6124)	
	G154 P16	8.	8.	8.	(6125)	24
	G154 P17	8.	8.	8.	(6126)	
	Z POSITI	OH : -5.8343	WRITE ADD/F1	SET/OFSET	TOCCLE	
	and the second s					
	RAPID SBR					
	JOGGING Y AXIS HANDLE . 8081					Let 1
	March 1 March					
	0675					

Tool Offsets

Select tool #							
 Jog until 	touch	55	36-				
Press "Tool Offset Measure"							
Subtract 2.000" (-2.0 Enter)							
TOOL POSITION GEOMETRY -16.1442 -16.7966 3 -16.7883 4 -12.2747 5 -13.9795 6 -16.2011 7 -14.4871 8 -14.4289 9 -16.9389 10 -17.0816 11 0. 12 0. 13 0. 14 0. 15 0. 16 0. 17 0. 18 0. 19 0. 20 0.	HEAR GEOMETRY 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.3750 0. 0.3750 0. 0.3125 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.1250 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. 0.0625 0. <td>HEAR FLUT 0. 2 0. 2 0. 2 0. 2 0. 2 0.</td> <td></td> <td>2.0000"</td> <td></td>	HEAR FLUT 0. 2 0. 2 0. 2 0. 2 0. 2 0.		2.0000"			

CNC Programming

- Example CNC program bores a center hole and drills bolt circle
- Haas manual at: k:\class\engr\480\haas\usermanual.pdf

```
2
000100
(Maxon motor bolt circle program);
(center hole 0.256R);
T3 M06;
600 690 654 X0.74 Y0.63; (Move to 0.74,0.63 in G54 coord sys);
S1100 M03; (Set spindle speed at 1100 RPM and start CW);
G43 H03 Z0.3 M08; (Compensate for tool length, Set return height);
G12 G91 Z0.95 I0.1 K0.256 Q0.01 L3 D03 F1.0; (Bore center hole);
G00 G90 Z1. M09; (return to 1" above surface, turn off coolant);
(bolt circle - 0.374R, peck 0.05);
G70 I0.374 J60.0 L6; (0.374R, 60deg, 6 holes);
(Get tool T1);
G00 G90 G54 X0.74 Y0.63; (Get tool T1);
G00 G90 G54 X0.74 Y0.63; (Set spindle to 1050 RPM);
G43 H01 Z1. M08; (Compensate for tool len, set ret height, coolant on);
G43 H01 Z1. M08; (Compensate for tool len, set ret height, coolant on);
G43 H01 Z1. M08; (Compensate for tool len, set ret height, coolant on);
G43 H01 Z1. M09; (Return home, turn off coolant);
G43 G91 Z0 M05; (Return home, turn off spindle);
G43 G91 Z0 M05; (Return home, turn off spindle);
G43 G91 Z0 M05; (End of program);]
```

Loading CNC Program from Floppy

- Name program with 8 or fewer letters
- Copy to a: drive
- Put in Haas
 - press List Prog, type in name, press F3



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	088182	(p: Senior	Project	Prototype3\sa	1)
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Mill/Turn Video

