

## Lesson: Post an NC File for Basic CNC Programming

In this lesson, you'll export a program's code and setup sheet.

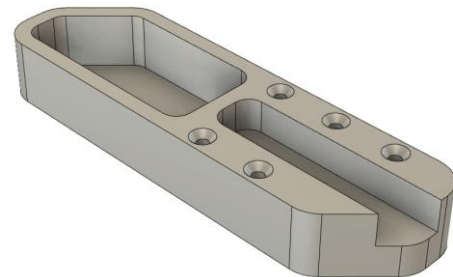
### Learning Objectives

- Create an NC file.

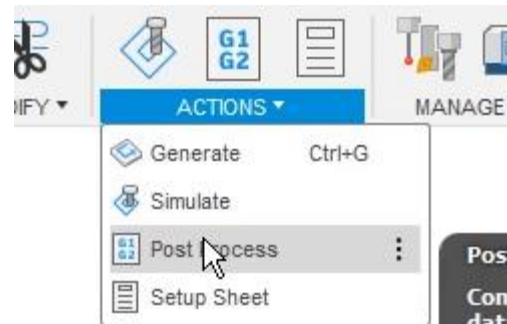
Operations			
Operation 1/8 Description: Face1 Strategy: Facing WCS: #0 TOLERANCE: 0.01 MAXIMUM STEP OVER: 3.016in	MAXIMUM Z: 0.6in MINIMUM Z: -0.25in MAXIMUM SPINDLE SPEED: 550rpm MAXIMUM FEEDRATE: 15in/min CUTTING DISTANCE: 11.739in RAPID DISTANCE: 0.932in ESTIMATED CYCLE TIME: 47s (2.8%) COOLANT: Flood	T3 D3 L3 Type: face mill DIAMETER: 3.175in TAPER ANGLE: 45° LENGTH: 1.965in FLUTES: 6 Description: Face Mill	
Operation 2/8 Description: 2D Contour Outside Strategy: Contour 2D WCS: #0 TOLERANCE: 0.01 STOCK TO LEAVE: 0in MAXIMUM STEP DOWN: 0.25in MAXIMUM STEP OVER: 0.25in	MAXIMUM Z: 0.6in MINIMUM Z: -1.35in MAXIMUM SPINDLE SPEED: 1140rpm MAXIMUM FEEDRATE: 100in/min CUTTING DISTANCE: 355.279in RAPID DISTANCE: 17.527in ESTIMATED CYCLE TIME: 15m: 10s (88.2%) COOLANT: Flood	T5 D5 L5 Type: flat end mill DIAMETER: 0.5in LENGTH: 2.75in FLUTES: 5 Description: long - roughing	
Operation 3/8 Description: 2D Adaptive Closed Pocket Strategy: Adaptive 2D WCS: #0 TOLERANCE: 0.004in STOCK TO LEAVE: 0.02in/0in MAXIMUM STEP DOWN: 0.375in OPTIMAL LOAD: 0.2in LOAD DEVIATION: 0.02in	MAXIMUM Z: 0.6in MINIMUM Z: -1.125in MAXIMUM SPINDLE SPEED: 1140rpm MAXIMUM FEEDRATE: 22.8in/min CUTTING DISTANCE: 148.839in RAPID DISTANCE: 9.48in ESTIMATED CYCLE TIME: 6m: 32s (23.7%) COOLANT: Flood	T5 D5 L5 Type: flat end mill DIAMETER: 0.5in LENGTH: 2.75in FLUTES: 5 Description: long - roughing	

The completed exercise

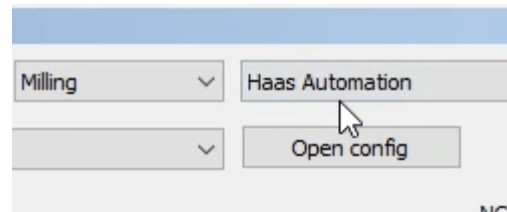
1. Continue with the *Introduction to Milling* file from the previous module.



2. Now that the operations to cut the part's geometry have been created, they can be converted to a code that a CNC machine can read. Make sure Setup1 is selected and activated inside the Browser. Click Actions> Post Process. Alternately, you can right-click Setup1 in the Browser and choose Post Process from the menu.



3. Inside the Post Process dialog's Post Configuration section, choose the Milling option from the menu, then choose the Haas Automation option from the vendor menu.



4. Choose the HAAS (pre-NGC) / haas option from the post configurator menu.

Post Configuration

Enter search text

HAAS (pre-NGC) / haas

5. In the Program Settings section, notice that the program name and comment are automatically imported from the setup's dialog. Make sure the Open NC file in editor option is checked.

Program Settings

Program name or number

30001

Program comment

Basic Part

Unit

Document unit

☐ Reorder to minimize tool changes

☒ Open NC file in editor

6. The Property window in the dialog's lower right corner shows many of the machine's properties. These can be adjusted in this dialog; inspect all the options but don't make any changes. Click the dialog's Post when you're finished. Select the location to save the file.

Property	Value
Write machine	Yes
Write tool list	Yes
<b>Write version</b>	<b>Yes</b>
Sequence number increment	5
Start sequence number	10
Use sequence numbers	Yes
<b>Use chip transport</b>	<b>Yes</b>
Fast tool change	No
Home position center	Yes
Optional stop	Yes

7. Inspect the code after it automatically opens in a text editor. The program number and comment are listed on line 2. The machine is described on lines 6 through 9 and the tools are described on lines 10 through 14.

```
1  %
2  030001 (Basic Part)
3  (Using high feed G1 F500.
4  (post version: 42700)
5  (post modified: 2020-03-24
6  (Machine)
7  ( vendor: HAAS)
8  ( model: VM-3 TR2105BX)
9  ( description: Update VM-3
10 (T1 D=0.5 CR=0. TAPER=82deg
11 (T2 D=0.1875 CR=0. TAPER=11
12 (T3 D=3.175 CR=0. TAPER=45
13 (T4 D=0.375 CR=0. - ZMIN=-1
```

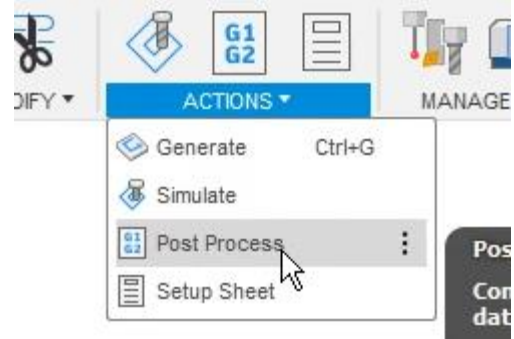
8. The program's first operation is the Face operation. Notice the custom name from the Browser is shown on line 20. On line 21, the tool is selected. On line 22 the spindle speed and rotation direction are specified. Line 23 references the WCS location.

```
20  (Face1)
21  N30 T3 M6
22  N35 S550 M3
23  N40 G54
24  N45 M11
25  N50 M13
26  N55 G0 A0. B0.
27  N60 M10
28  N65 M12
29  N70 M8
30  N75 G0 X10.1888 Y-0.8083
31  N80 G43 Z0.6 H3
32  N85 T5
```

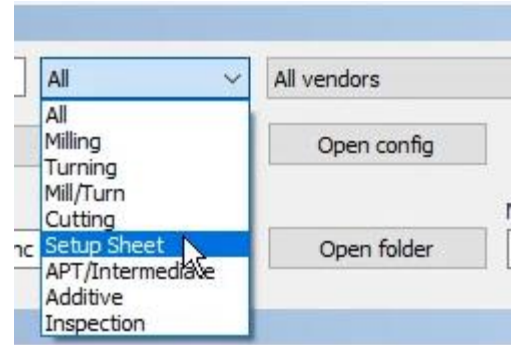
9. Inspect the rest of the code and note the information listed for each operation. Again, notice that the custom name you entered into the Browser is displayed for each operation. Renaming operations in the Browser is an important step for organizing your code. After you finish inspecting the code, close the text editor window.

```
46  (2D Contour Outside)
47  N150 M1
48  N155 T5 M6
49  N160 S1140 M3
50  N165 G54
51  N170 M11
52  N175 M13
53  N180 G0 A0. B0.
54  N185 M10
55  N190 M12
56  N195 M8
57  N200 G17
58  N205 G0 X8.199 Y-1.0381
```

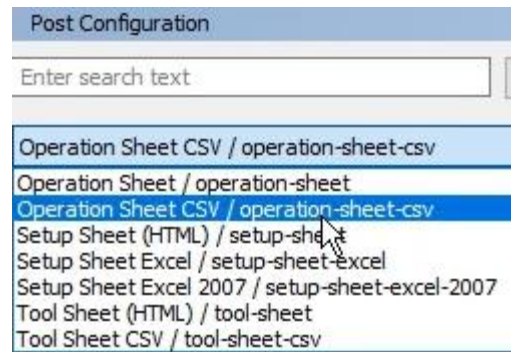
10. Fusion 360 can also generate setup sheets to help the machine operator prepare for the job. Setup sheets can be created by clicking Actions> Post Process. They can also be created from the Post Process dialog. Click Actions> Post Process.



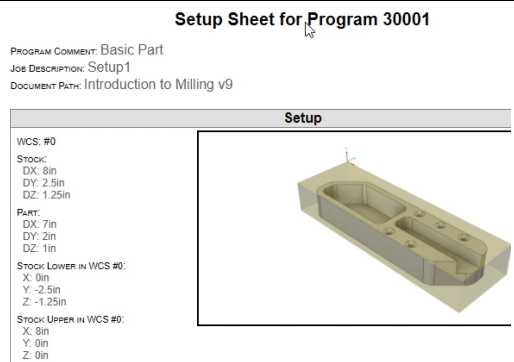
11. Select the Setup Sheet option from the Post Configuration section's menu.



12. The type of setup sheet you want to generate can be selected from the menu. Click the dialog's Cancel.








13. Click Actions> Setup Sheet, then choose a location to save the file. Open the file in a web browser. Basic information for the program is listed at the top of the document. The program name and number are at the very top, then the comment and description are below them. The stock's dimensions and WCS location are listed inside the Setup section. The model's current position in the Canvas is used as a screenshot to help visually locate the WCS.





**14.** In the Total section, you can see general information about the program such as the maximum travel, maximum feedrate, and the estimated cycle time.

**NUMBER OF OPERATIONS:** 8  
**NUMBER OF TOOLS:** 5  
**TOOLS:** T1 T2 T3 T4 T5  
**MAXIMUM Z:** 0.6in  
**MINIMUM Z:** -1.406in  
**MAXIMUM FEEDRATE:** 100in/min  
**MAXIMUM SPINDLE SPEED:** 4000rpm  
**CUTTING DISTANCE:** 569.782in  
**RAPID DISTANCE:** 79.319in  
**ESTIMATED CYCLE TIME:** 27m:31s

**15.** Detailed information for every tool the program uses is listed in the Tools section. This can help the machine operator select the correct tools and place them in the tool turret. Inspect this information to learn about each tool.

Tools			
<b>T1 D1 L1</b> Type: spot drill Diameter: 0.5in Tip Angle: 82° Length: 1.125in Flutes: 2 Description: 1/2 Csrink	<b>MAXIMUM Z:</b> -0.465in <b>MAXIMUM FEED:</b> 9.12in/min <b>MAXIMUM SPINDLE SPEED:</b> 2200rpm <b>CUTTING DISTANCE:</b> 1.539in <b>RAPID DISTANCE:</b> 10.418in <b>ESTIMATED CYCLE TIME:</b> 10s (0.1%)	<b>Holder:</b> Big Kaiser Dual Contact 1/4" x 3.5" <b>Vendor:</b> Big Kaiser <b>Product:</b> BGV40-SF-250-3.5	
<b>T2 D2 L2</b> Type: drill Diameter: 0.187in Tip Angle: 118° Length: 2.5in Flutes: 2 Description: 3/16 Drill	<b>MAXIMUM Z:</b> -1.406in <b>MAXIMUM FEED:</b> 18in/min <b>MAXIMUM SPINDLE SPEED:</b> 4000rpm <b>CUTTING DISTANCE:</b> 7.184in <b>RAPID DISTANCE:</b> 14.833in <b>ESTIMATED CYCLE TIME:</b> 24s (0.1%)	<b>Holder:</b> Marfilool CAT40-ER32-2.35 <b>Vendor:</b> Marfilool <b>Product:</b> CAT40-ER32-2.35	
<b>T3 D3 L3</b> Type: face mill Diameter: 3.175in Taper Angle: 45° Length: 1.995in Flutes: 6 Description: Face Mill	<b>MAXIMUM Z:</b> -0.25in <b>MAXIMUM FEED:</b> 15in/min <b>MAXIMUM SPINDLE SPEED:</b> 550rpm <b>CUTTING DISTANCE:</b> 11.739in <b>RAPID DISTANCE:</b> 0.932in <b>ESTIMATED CYCLE TIME:</b> 47s (0.1%)	<b>Holder:</b> Accupro face mill arbor	
<b>T4 D4 L4</b> Type: flat end mill Diameter: 0.375in Length: 2.063in Flutes: 5 Description: long - finishing	<b>MAXIMUM Z:</b> -1.125in <b>MAXIMUM FEED:</b> 100in/min <b>MAXIMUM SPINDLE SPEED:</b> 1520rpm <b>CUTTING DISTANCE:</b> 16.871in <b>RAPID DISTANCE:</b> 3.8in <b>ESTIMATED CYCLE TIME:</b> 1m:57s (0.1%)	<b>Holder:</b> Big Kaiser Dual Contact 3/8" x 3.5" <b>Vendor:</b> Big Kaiser <b>Product:</b> BGV40-SF-375-3.5	
<b>T5 D5 L5</b> Type: flat end mill Diameter: 0.5in Length: 2.75in Flutes: 5 Description: long - roughing	<b>MAXIMUM Z:</b> -1.35in <b>MAXIMUM FEED:</b> 100in/min <b>MAXIMUM SPINDLE SPEED:</b> 1140rpm <b>CUTTING DISTANCE:</b> 29.537in <b>RAPID DISTANCE:</b> 0.932in <b>ESTIMATED CYCLE TIME:</b> 22m:57s (0.1%)	<b>Holder:</b> Big Kaiser Dual Contact 1/2" x 3.5" <b>Vendor:</b> Big Kaiser <b>Product:</b> BGV40-SF-500-3.5	

**16.** Detailed information for every operation is listed in the Operations section. Inspect the operations and notice the types of information listed for each. Return to Fusion 360 and save the file.

Operations			
<b>Operation 1/8</b> Description: Face1 Strategy: Facing VCS: #0 Tolerance: 0in Maximum Stepover: 3.016in	<b>MAXIMUM Z:</b> 0.6in <b>MAXIMUM Z:</b> -0.25in <b>MAXIMUM SPINDLE SPEED:</b> 550rpm <b>MAXIMUM FEEDRATE:</b> 15in/min <b>CUTTING DISTANCE:</b> 11.739in <b>RAPID DISTANCE:</b> 0.932in <b>ESTIMATED CYCLE TIME:</b> 47s (0.1%) Coolant: Flood	<b>T3 D3 L3</b> Type: face mill Diameter: 3.175in Taper Angle: 45° Length: 1.995in Flutes: 6 Description: Face Mill	
<b>Operation 2/8</b> Description: 2D Contour Outside Strategy: Contour 2D VCS: #0 Tolerance: 0in Stock to Leave: 0in Maximum Stepdown: 0.25in Maximum Stepover: 0.25in	<b>MAXIMUM Z:</b> 0.6in <b>MAXIMUM Z:</b> -1.35in <b>MAXIMUM SPINDLE SPEED:</b> 1140rpm <b>MAXIMUM FEEDRATE:</b> 100in/min <b>CUTTING DISTANCE:</b> 355.279in <b>RAPID DISTANCE:</b> 17.527in <b>ESTIMATED CYCLE TIME:</b> 15m:10s (0.2%) Coolant: Flood	<b>T5 D5 L5</b> Type: flat end mill Diameter: 0.5in Length: 2.75in Flutes: 5 Description: long - roughing	
<b>Operation 3/8</b> Description: 2D Adaptive Closed Pocket Strategy: Adaptive 2D VCS: #0 Tolerance: 0.004in Stock to Leave: 0.02in Maximum Stepdown: 0.375in Optimal Load: 0.2in Load Deviation: 0.02in	<b>MAXIMUM Z:</b> 0.6in <b>MAXIMUM Z:</b> -1.125in <b>MAXIMUM SPINDLE SPEED:</b> 1140rpm <b>MAXIMUM FEEDRATE:</b> 22.8in/min <b>CUTTING DISTANCE:</b> 148.839in <b>RAPID DISTANCE:</b> 9.46in <b>ESTIMATED CYCLE TIME:</b> 6m:32s (0.1%) Coolant: Flood	<b>T5 D5 L5</b> Type: flat end mill Diameter: 0.5in Length: 2.75in Flutes: 5 Description: long - roughing	