

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

Creating the Left Side Smooth Finish Tool Path.

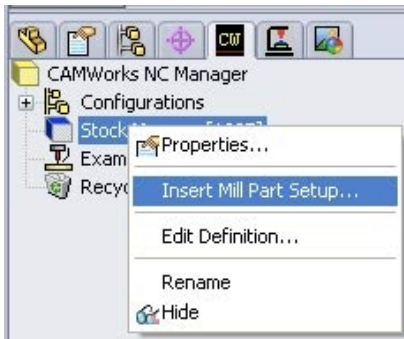
This chapter will focus on the steps for creating the left side smooth finish tool path. The objective of this chapter is to create to an accurate and highly refined tool path for the CO2 Dragster that does not require a lot of sanding and preparation work to get the CO2 Dragster body ready to paint. It is the more refinement and fidelity of the tool path, the better the results of the CNC milling process.

The process for the right side smooth finish tool path is the same as the left side. As such, we will not repeat these steps and create a chapter for the right side.

V.1.

Open the left side smooth you created earlier, named: Dragster left 001.sldprt. Rename the file to Dragster left 001 smooth.sldprt.

V.2.

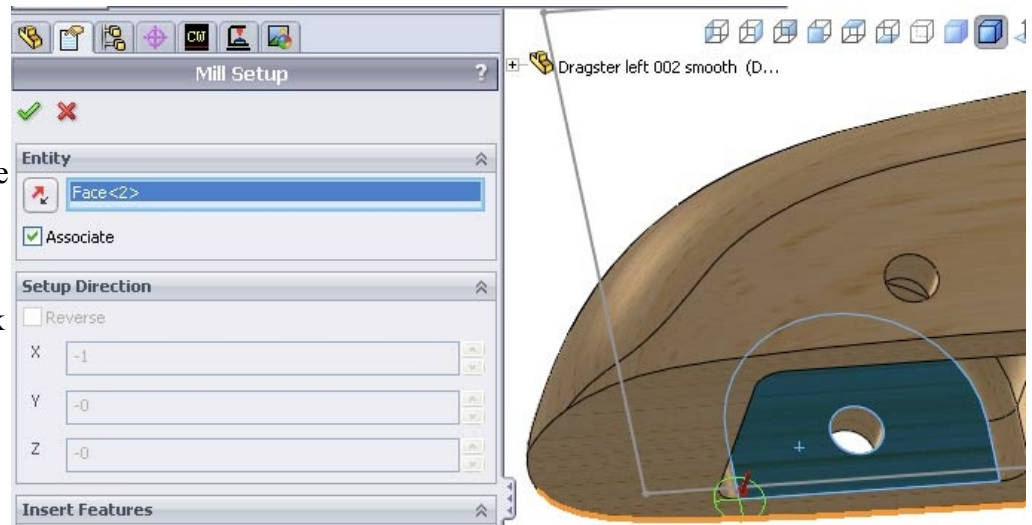


Select the Stock Manager and right click and then click on Insert Mill Part Setup...

V.3.

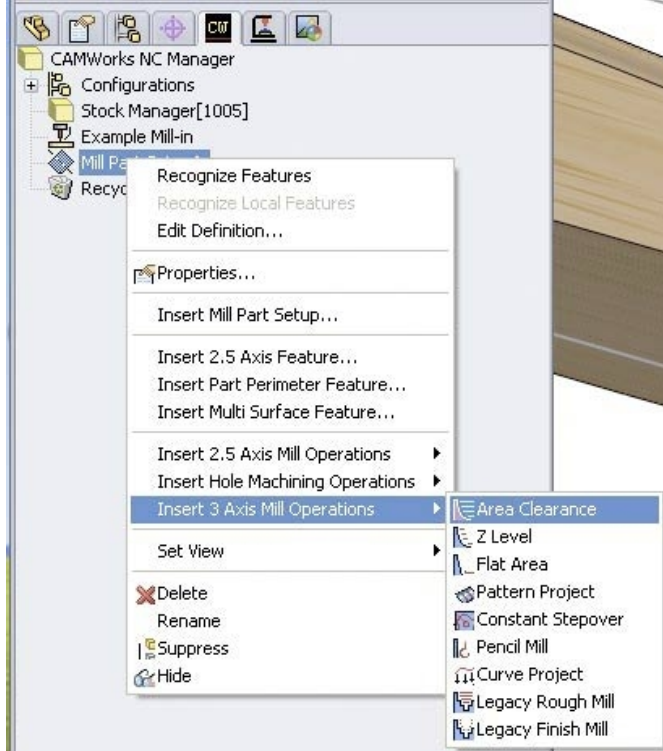
Select the face of the wheel well wall. This is a flat surface and it will orient our Mill or Router 90 degrees to the surface we need to mill out.

Your model should look like what you see to the right.



CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.4.



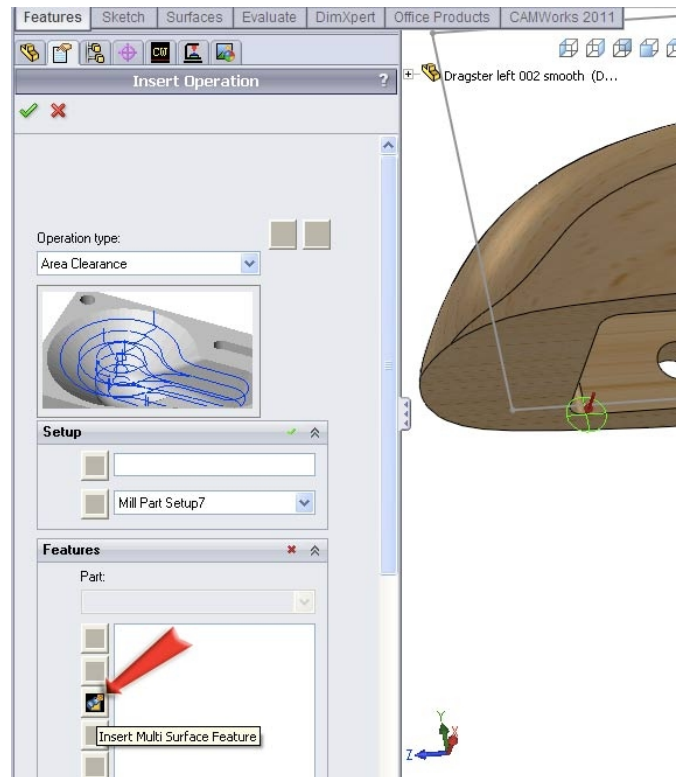
Click on the newly created Mill Part Setup, then right click, move your mouse pointer down to Insert 3 Axis Mill Operations and then drag over and click on Area Clearance command.

We will use the same Area Clearance to fine mill out this CO2 Dragster. However, the cut will be very different than the roughing pattern.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

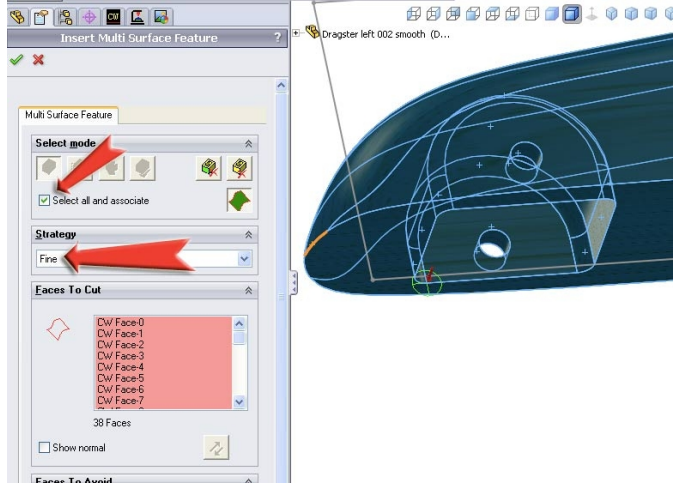
V.5.

Click on the Insert Multi Surface Feature button. This will highlight the CO2 Dragster in blue. Remember your mill is oriented to 90 degrees based on the Mill Part Setup.



CAMWorks – How To Create CNC G-Code for CO2 Dragsters

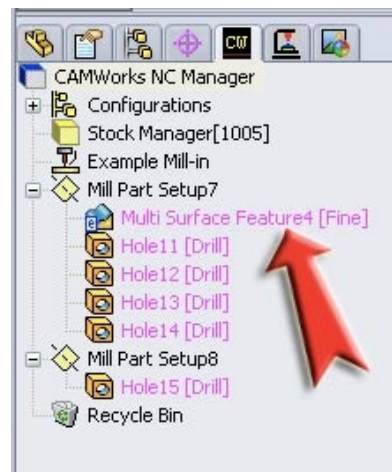
V.6.



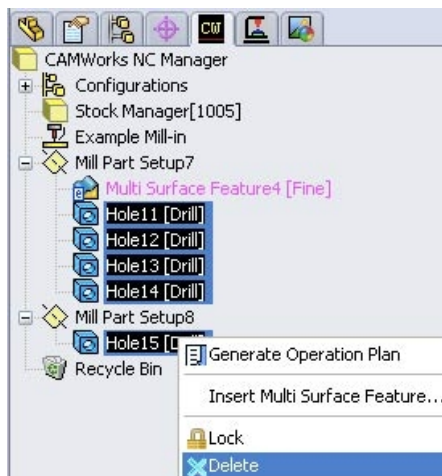
For the strategy select Fine from the pull down menu. Check the Select all and associate box. The CO2 Dragster body will turn blue.

V.7.

CAMWorks created all the strategies to the right that you see in pink. The Hole strategies and the Mill Part Setup[8] will not be used. By not using these will alleviate problems between different mill part setups that would cause crashes of the mill.

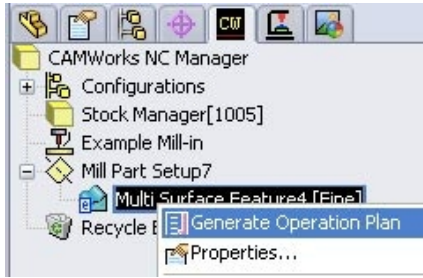


Select the Hole tool paths and delete as you see to the right. Once these are in the recycle bin, empty the Recycle Bin. This will cause confusion later if you do not empty the recycle bin.



CAMWorks – How To Create CNC G-Code for CO2 Dragsters

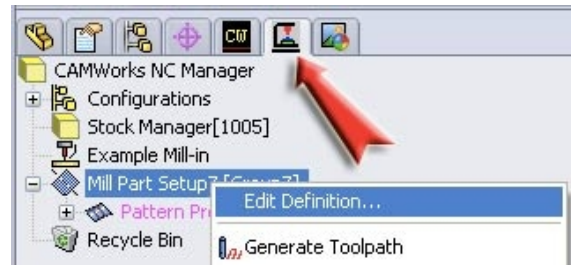
V.8.



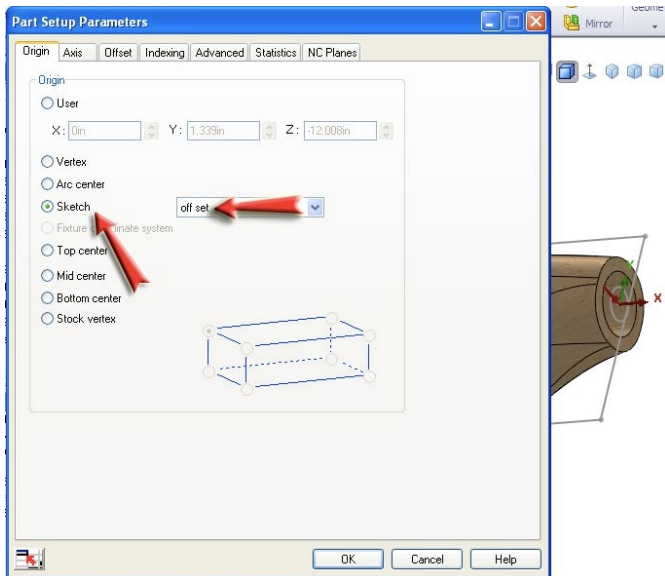
Select and then right click on the **Multi Surface Feature** and then select **Generate Operation Plan**.

V.9.

Notice that once you selected **Generate Operation Plan**, it puts in the **CAMWorks Operation Tab** (see the icon). Select **Mill Part Setup** and right click and select **Edit Definition...**



V.10.

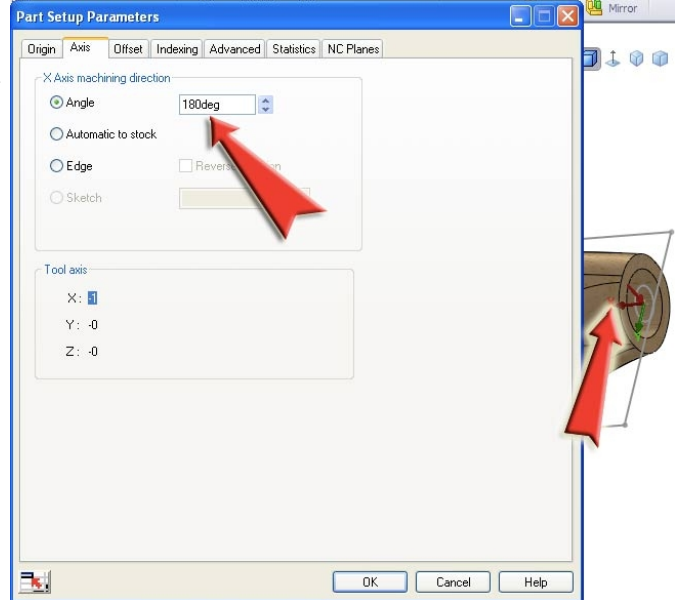


On the **Origin** tab, select **Sketch** radio button, then select “off set” sketch from the pull down menu. Notice the **X-Y-Z Axis Triad** jumps to the **origin sketch**. The X Axis origin will need to be rotated 180 degrees. Go to the **Axis** menu and make the changes.

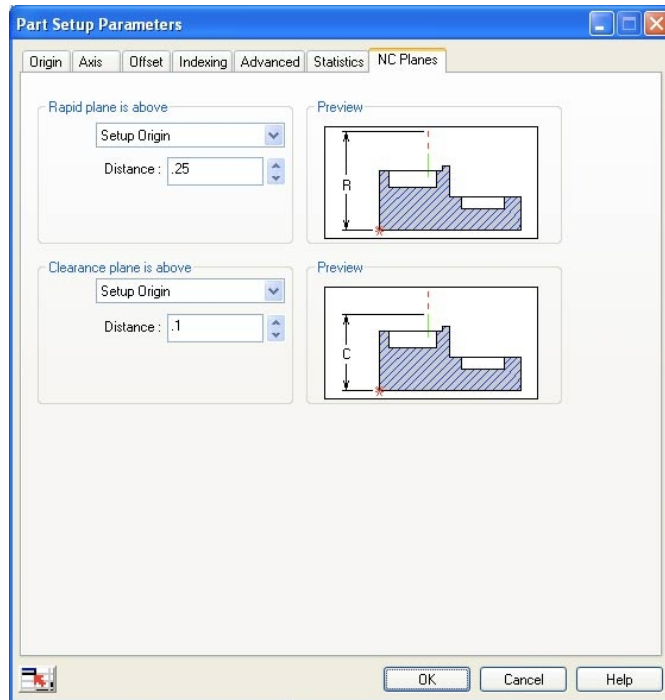
CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.11.

Change the Angle to 180deg and notice the X Axis has changed to the opposite direction. This will allow the machine to mill in right direction. If you did not set this direction, you would most likely get an X Axis exceeds limits error.



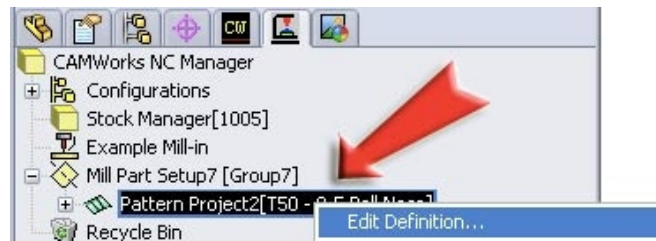
V.12.



Change your Setup Origin Distance to .25 and the Clearance plane is above Setup Origin to .1.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

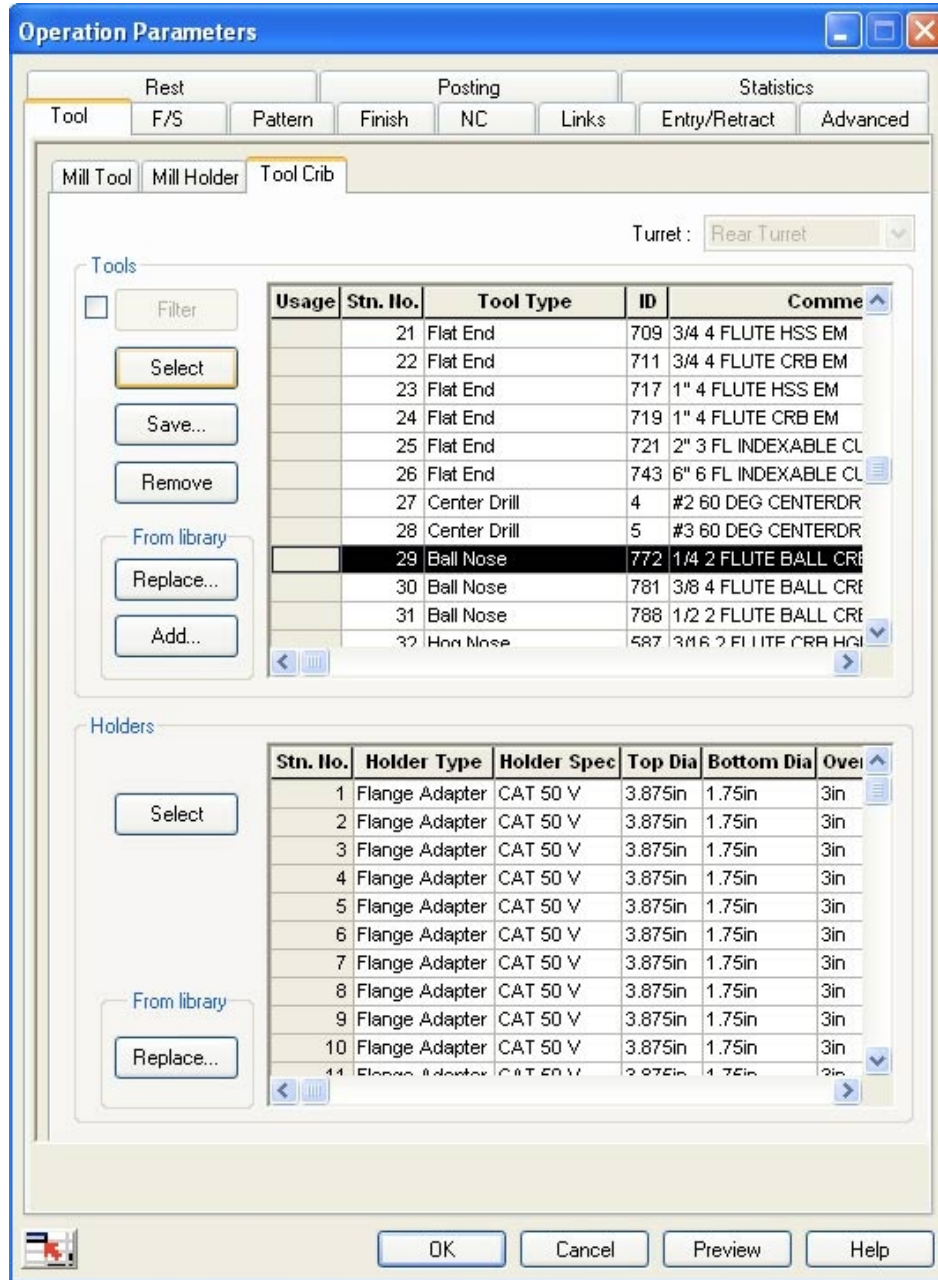
V.13.



Select the Pattern Project and then right click, select Edit Definition... Notice the tool T50 – 0.5 Ball Nose, CAMWorks has tried to select for this milling strategy.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

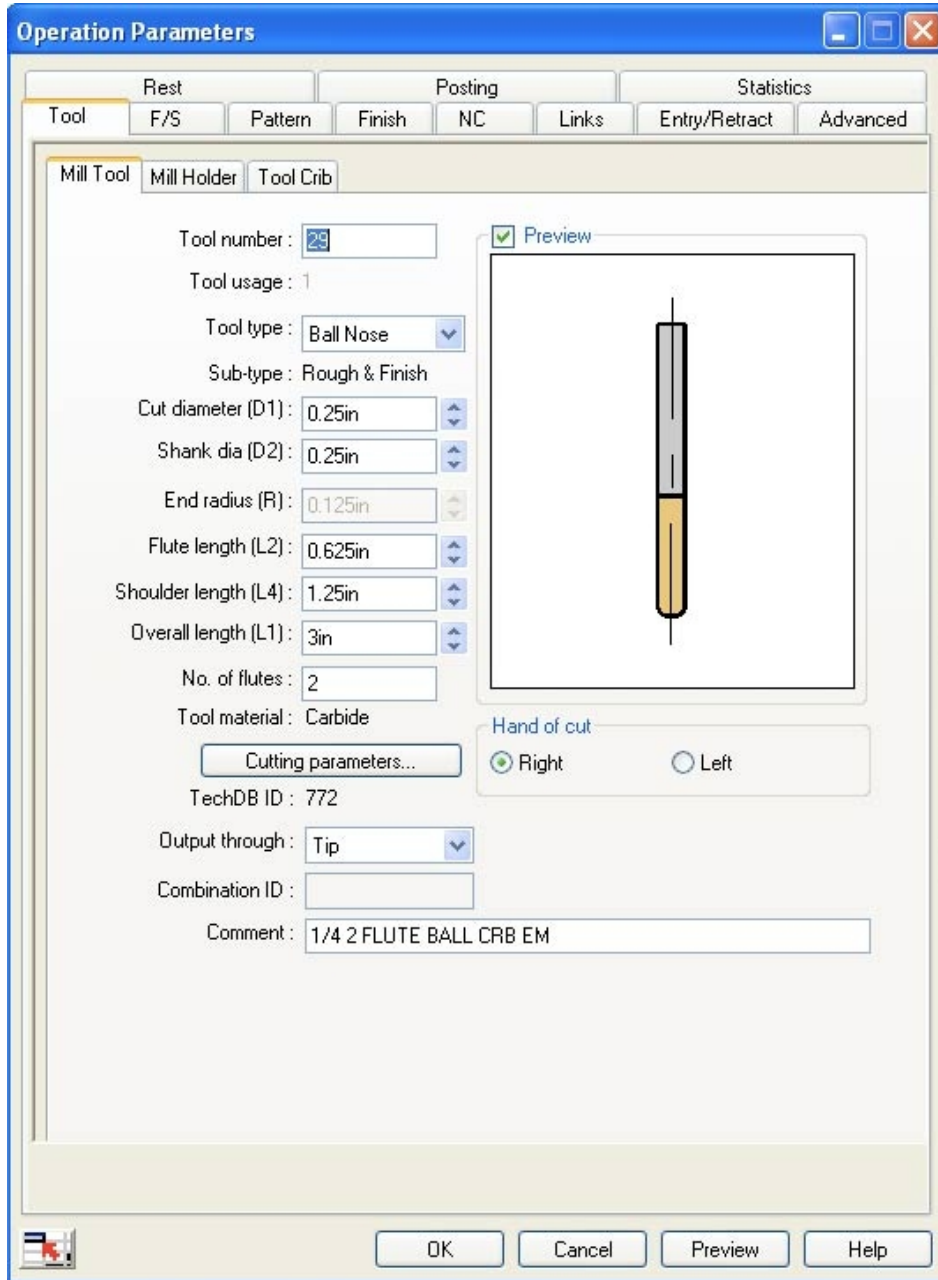
V.14.



Select the Tool Crib, and scroll down and select Tool 29 and the press the Select button.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

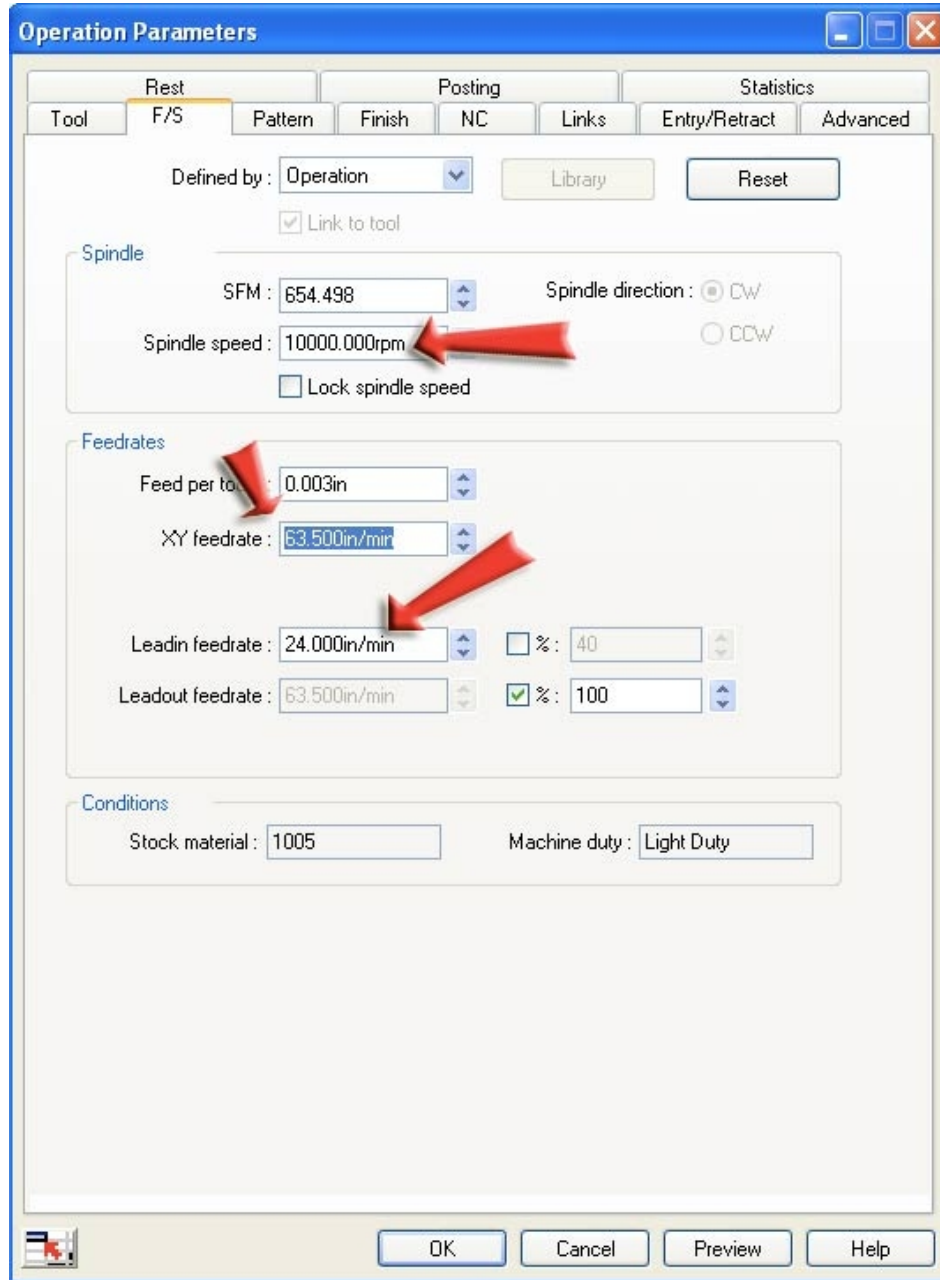
V.15.



Make sure your settings match the above. From the roughing tool path, CAMWorks, maintained the previous tool settings for Tool 29, that was changed.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

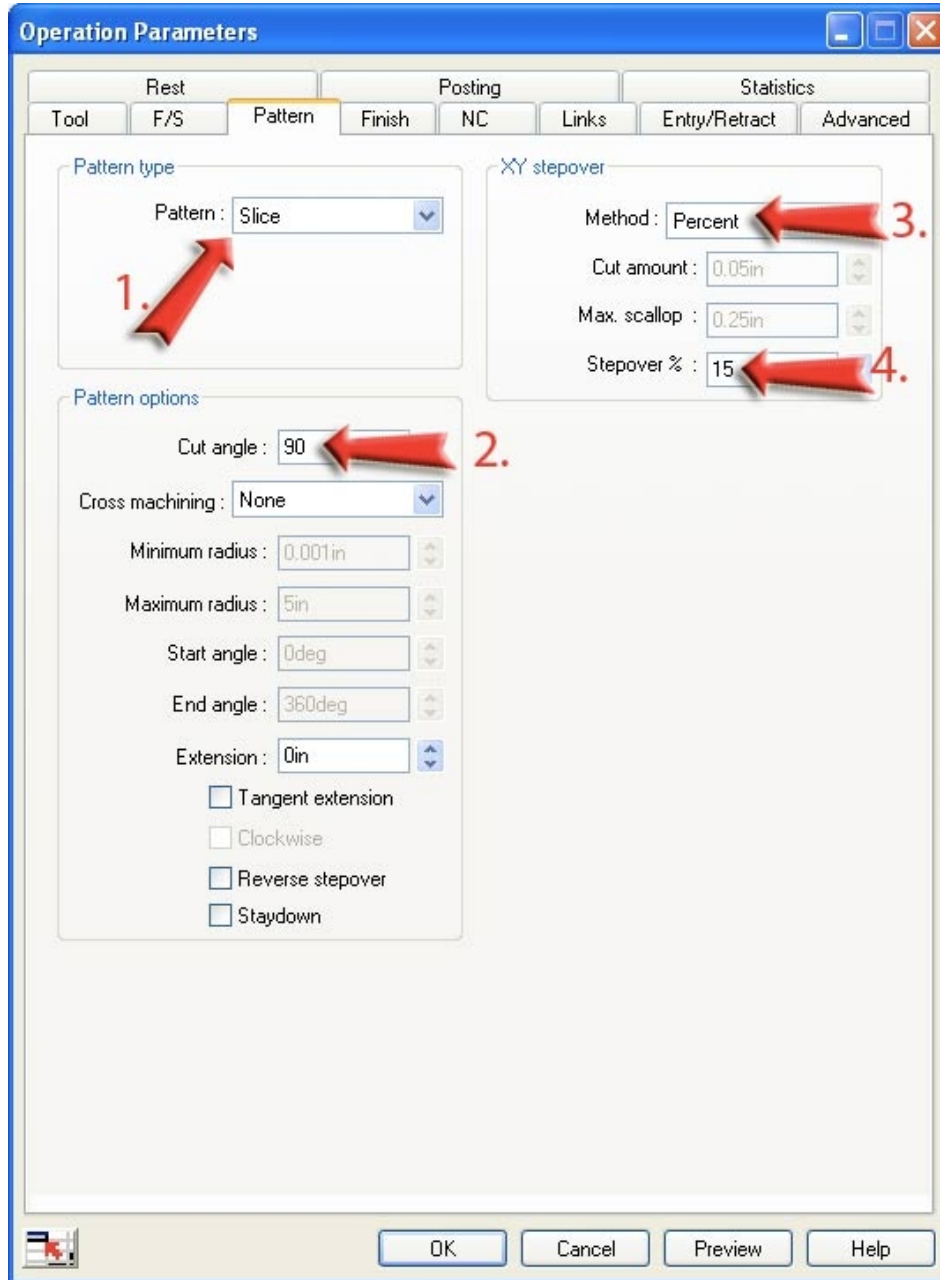
V.16.



Set Spindle Speed to 10000. You will notice it changes the XY-Feedrate to 63.50in/min. Leave that setting. This is sufficient for this operation. **Change the Leadin feedrate to 24.000in/min.** This will speed up the milling time.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

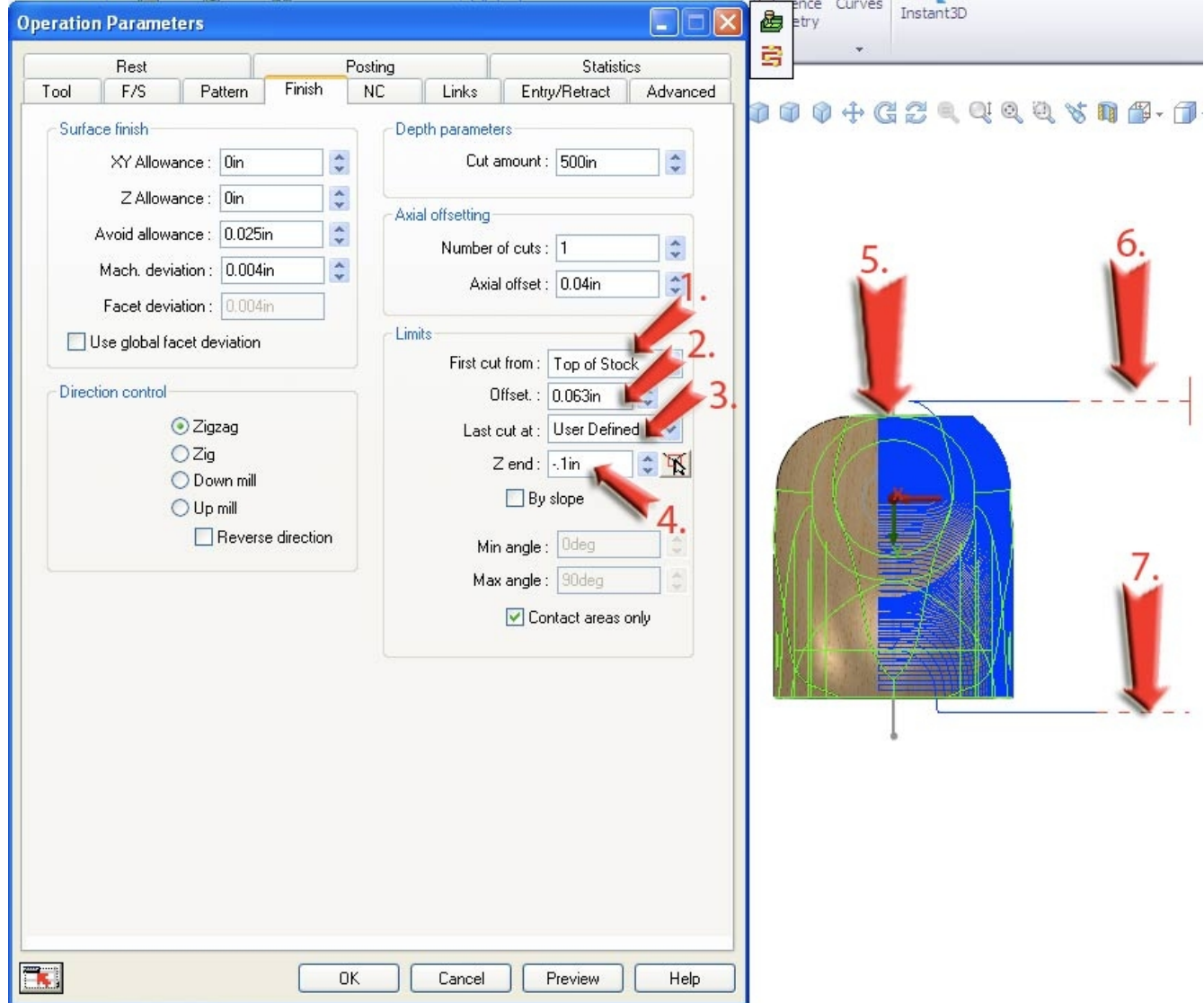
V.16.



1. Set the Pattern is set to Slice. 2. Set the Cut Angle is 90 degrees. 2. Set the XY stepover method to Percent. 3. Set the Stepover % to 15%. The stepover % is small, however the finish on the CO2 Dragster will be very smooth with any tool deflection or very little cut marks. This will minimize the amount sanding required for the CO2 Dragster.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.17.

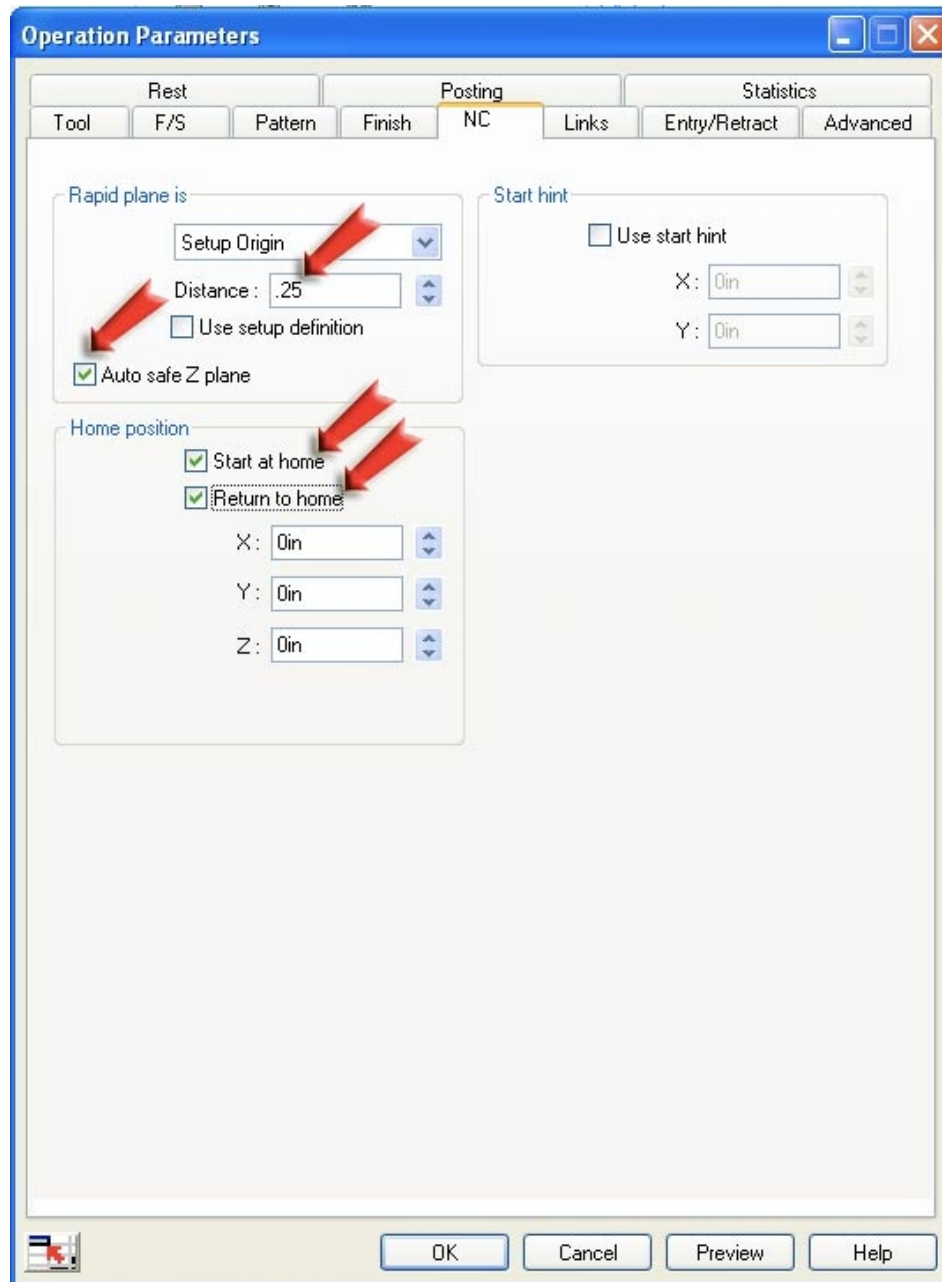


1. The first cut will be from the top of the stock. 2. The Offset is 1/16” above the surface of the part. 3. Last cut at: User Defined. This allows the user to determine how low on the Z-Axis cut the user needs to go. **4. & 5. As you can see the Z Axis depth of cut is going 1/10” past the triad.** This creates a smooth transition from one side of the CO2 Dragster to the other side. This alleviates a lot of unnecessary sanding. **6. The start of the tool path is too high and needs to be lowered significantly.** This will be lowered in the NC tab. **7. The ending of the tool path does not go back to the start point and is very high.** This will be fixed on the NC tab.

These are issues you will become aware of as you use CAMWorks more and more on different types of parts.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.18.



Set your NC tab to the above settings. These will lower the traverse lines that will cause exceed Z-Limit errors.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

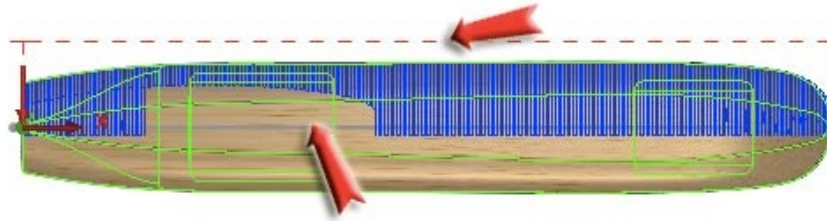
V.19.



Set your Entry/Retract settings as you see above. Then select the Preview button to reprocess the tool file.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.20.

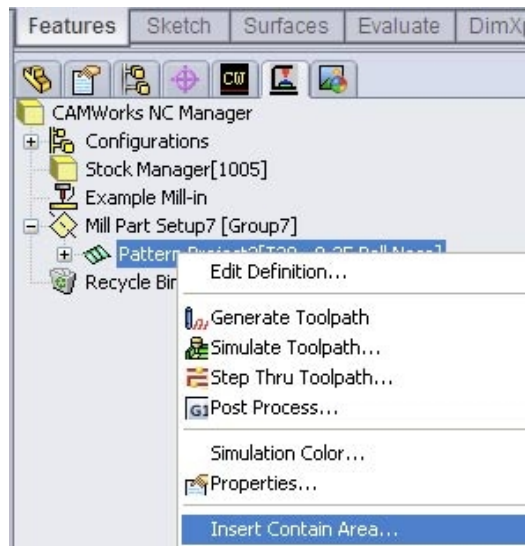


The changes in the NC and Entry/Retract tabs have lowered the height of the rapid or traversing lines and returned home the cutter after the last cut.

Note the tool path cuts all the way down the front of the CO2 Dragster and will need to use the contain sketch we created in the Feature Manager.

Note the lower arrow pointing at an area on top of the car that needs to be addressed. This will be addressed in the advanced tab.

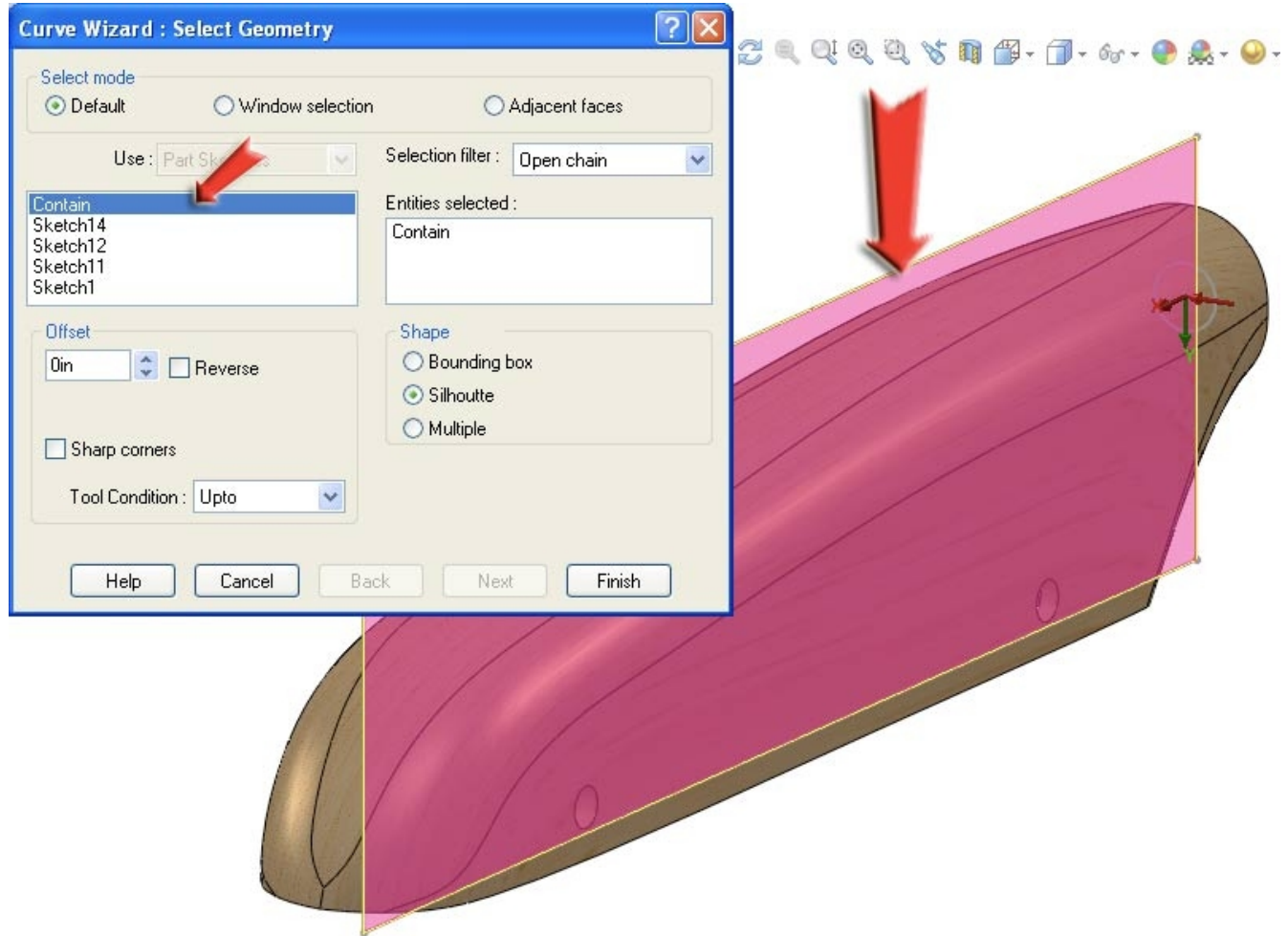
V.21.



Exit from the Operation Parameters menu and click on the Pattern Projection and right click and then click on Insert Contain Area...

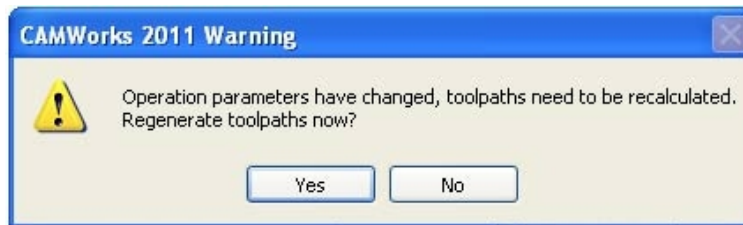
CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.22.



Select the contain sketch and it will take the sketch we defined in the Feature Manager and highlight in pink as you see above. Select Finish.

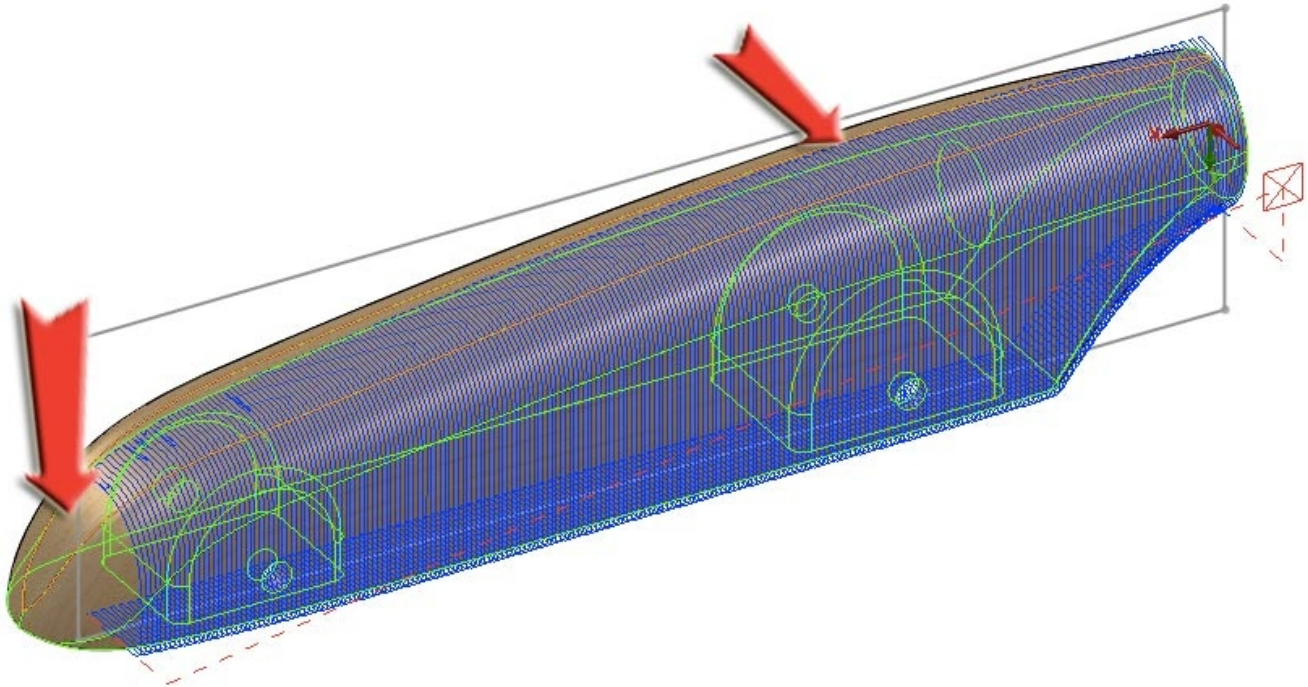
V.23.



Select Yes and the tool paths will be recalculated.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.24.



Here you can see the newly processed tool path and how the contain sketch keeps the tool path from milling the front of the CO2 Dragster.

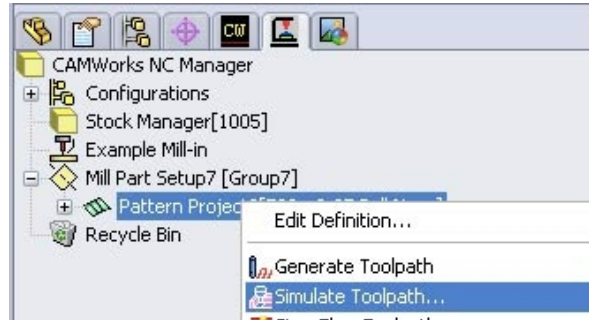
Additionally, on the top of the CO2 Dragster you will notice how the tool path covers the whole top side, eliminating the void area as identified as problem areas in section V.20.

Make sure you save your file.

The next step will be to simulate the tool path to see how the tool path should work.

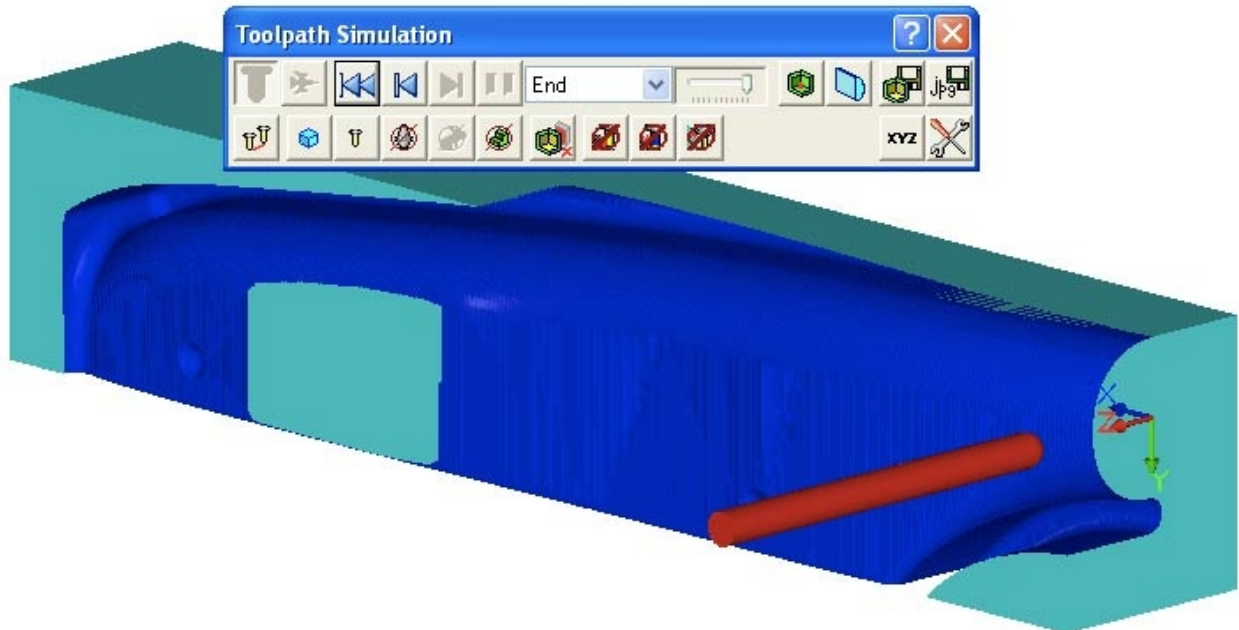
CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.25.



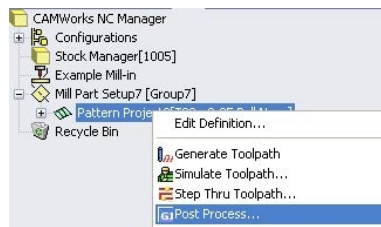
Select the Pattern Project and right click and then select Simulate Toolpath...

V.26.



Here you see the results of the simulation, the area behind the front axle is not of concern because of the close tolerance of the tool path. This milling operation will work for our purposes.

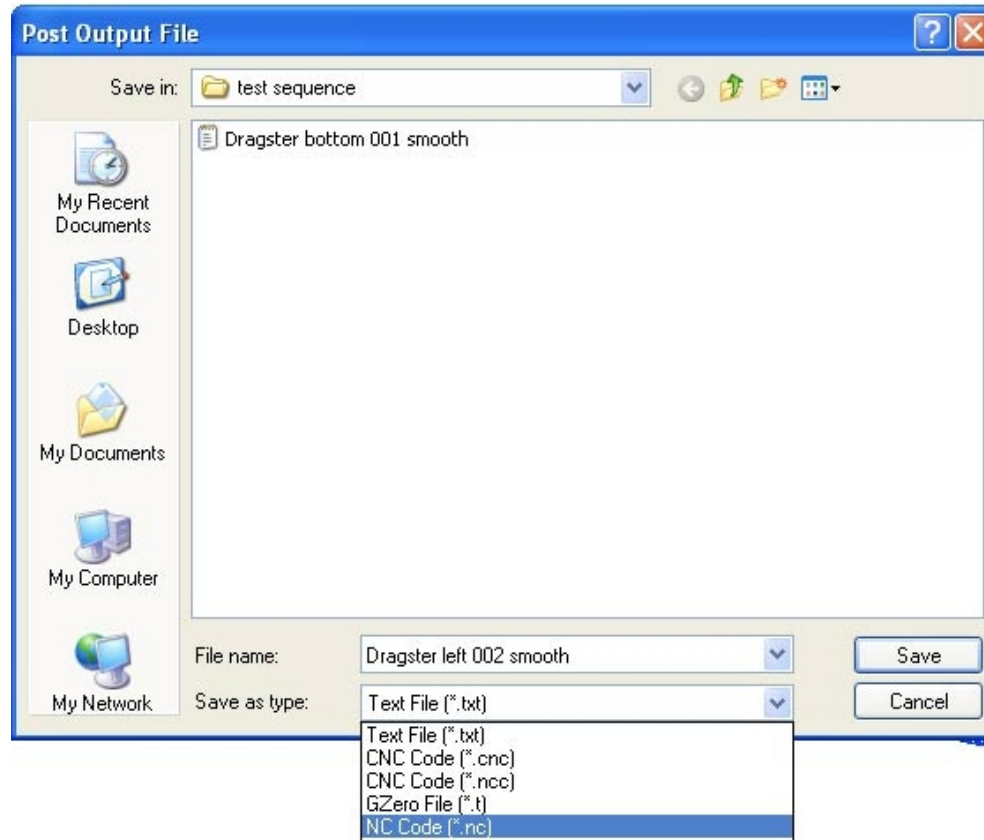
V.27.



Click on the Pattern Project, and then Right Click and the click on Post Process...

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

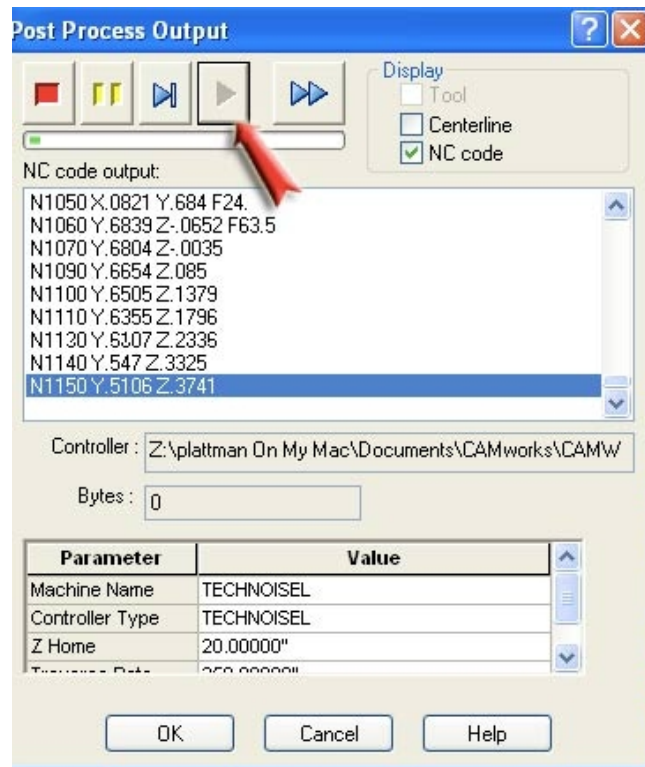
V.28.



Select the Save as type: pull down and select NC Code [* .nc] for the file type the Techno CNC and the Denford CNC mills and CNC routers will use.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

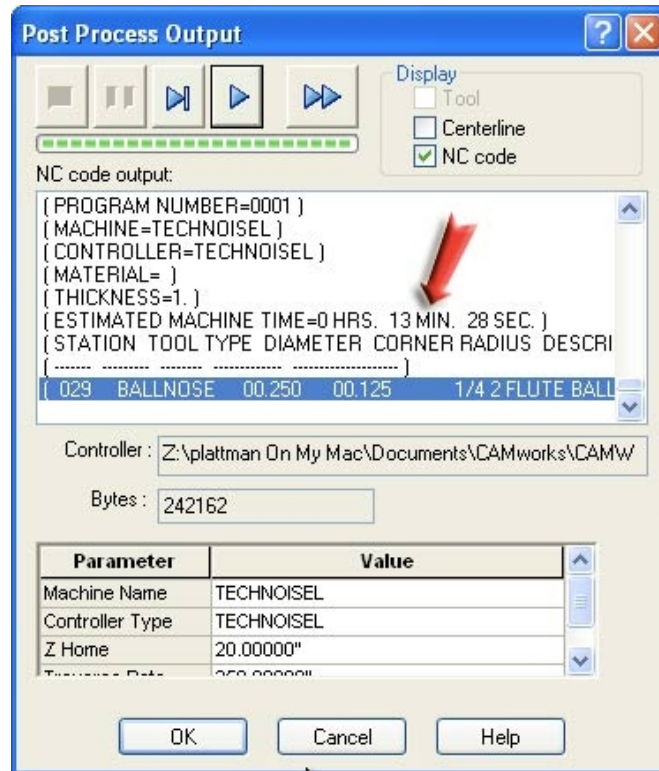
V.29.



Select the center play button to write out the tool path G-Code. Notice the tool path already processing and writing the .nc file we just setup.

CAMWorks – How To Create CNC G-Code for CO2 Dragsters

V.30.



Here you see the tool file has completed writing to the .nc file we created. This file tells us it will estimated machine time is 13 MIN. 28 SEC. Remember you have machine speed over ride control and can speed this up even more.

The highlighted blue line tells you what tool you are using and in this case it is tool 29. Notice it describes the tool, flute and radius cut.

Additionally, note the Machine Name is TECHNOISEL. Always review the completed tool process information as shown above.

Click OK.

Next save the .nc file to your thumb drive or memory stick and load the file on the CNC Mill or CNC Router computer. If you have a network folder for that computer, then drop the .nc file into a folder on that computer. Test your file.

The next chapter will show you how to use CAMWorks to precision mill out the axle holes. This will significantly aid in problems with cant and camber and toe-in and toe-out for your axles and wheels. This will help us to create a CO2 Dragster with balanced wheels, axles and bearings.