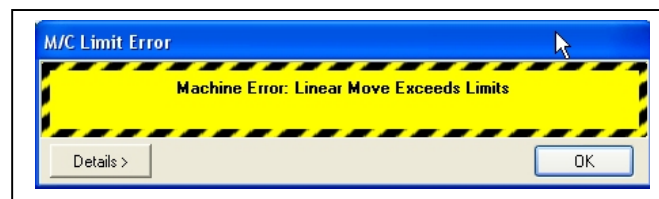


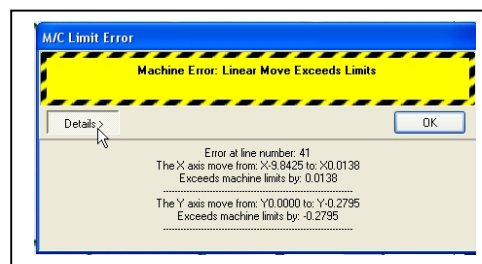
# Machine Error: Linear Move Exceeds Limits

This is a common error that normally relates to a problem with the machine work offsets or a problem with the CNC Program.

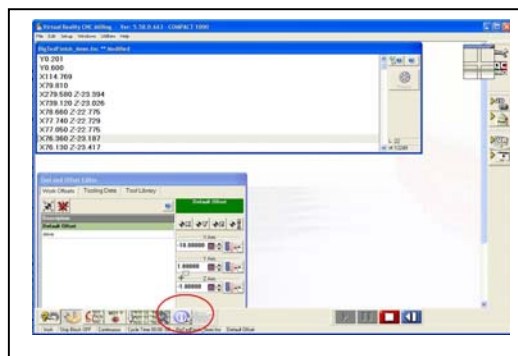
The error means exactly what it says, the machine is being asked to move outside the physical limits of the machine.



If you click on the Details button you will be told in which axis the machine is going to exceed the limits in.



VR Milling 5 has a feature designed to help resolve these issues and clarify where the problem is located.

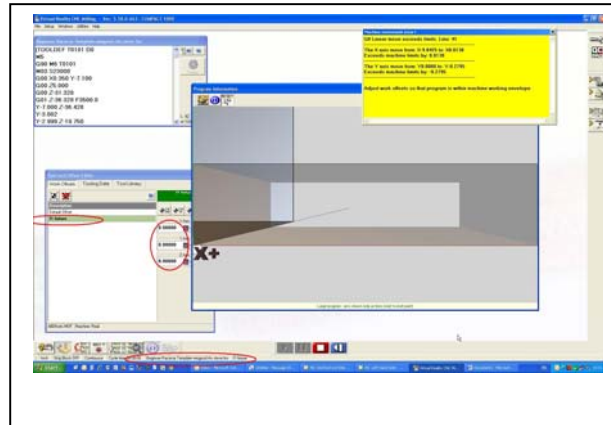


Click on the Blue information Icon shown at the bottom of the screen.

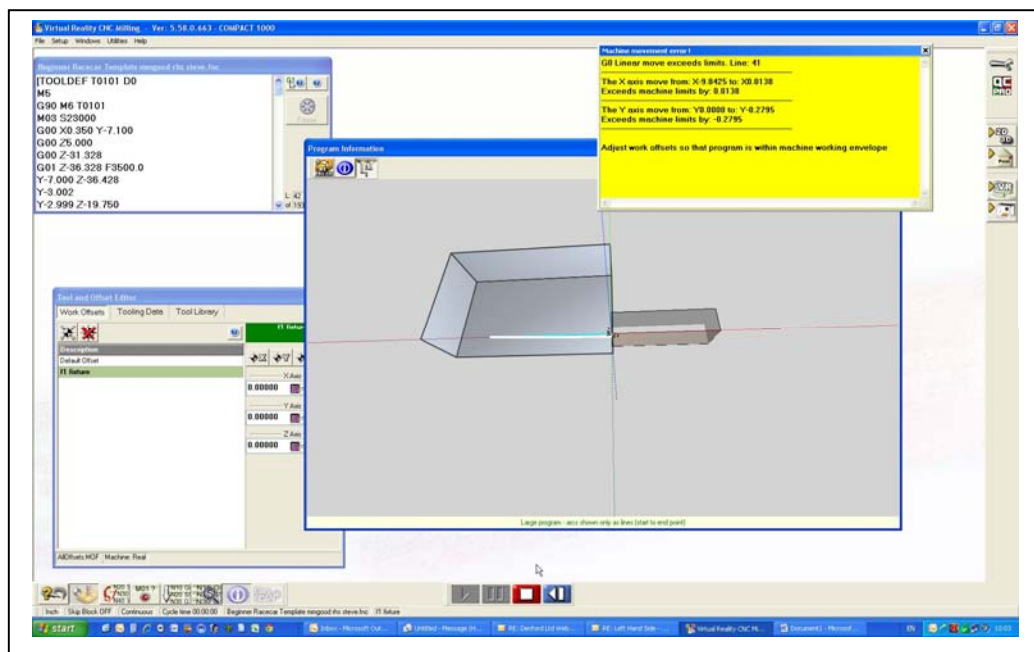
This will open up an information window and will highlight any errors that exist in a yellow window. The machine does not have to be connected for this to work.

In the window below the active work offset is highlighted and it can be seen the work offset values are all reading 0.000 so have not been set.

The active Work offset and Program are also highlighted on the bottom Menu bar.

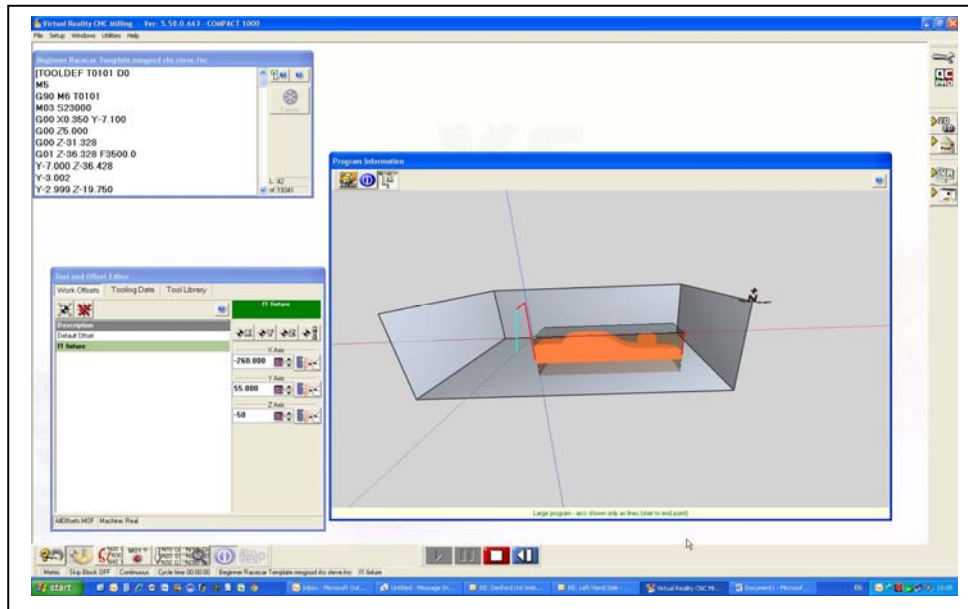


By Right clicking and moving the mouse in the Program Information Window you can zoom out from the information view. Left clicking and moving the mouse will allow the view to rotate.



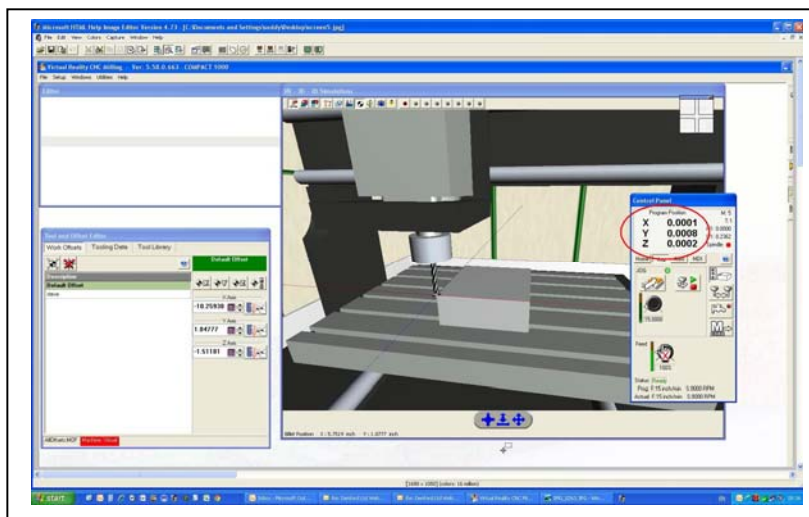
The larger grey box in the screen shot above is the working envelope of the machine. The smaller box to the right of this is the tool path the program is telling the machine to try and cut the part here.

If the work offsets are set correctly and the program is within the working envelope of the machine then the tool path can be seen and there will be no errors displayed.



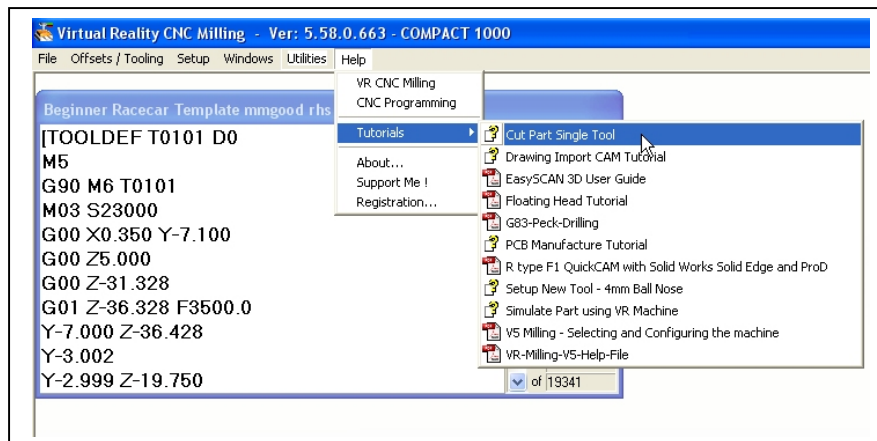
## How to check your Datum Position is correct

This will depend upon what part you are trying to make. For simple programs where you have set the machine to work from the top RH corner of the block then you can jog the tool to the required position and set this as the Work Offset Position.

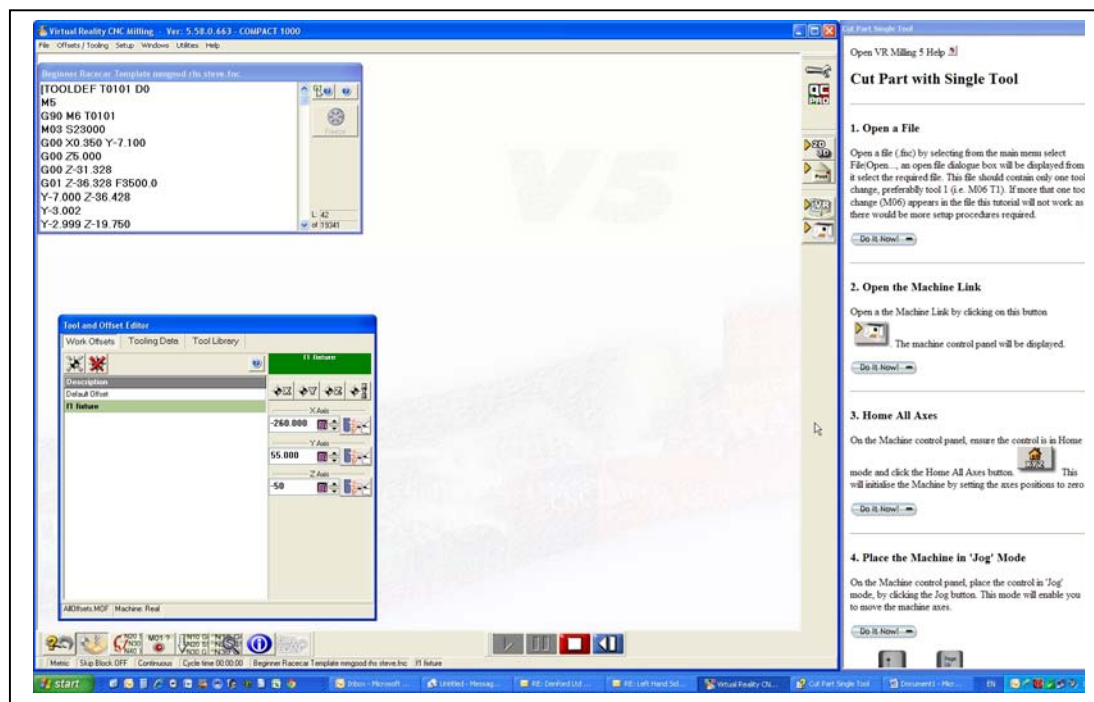


In the screenshot above when the tool is in the position shown the Program Position should read X0, Y0 Z0. Click the icon shown to switch between machine and program position.

To Set the Datum position there is a simple “Do It Now” tutorial that will take you through the process step by step. Select the Tutorial Cut a part with a single tool.



The tutorial will open up at the right hand side of the screen and explain each step of the process.

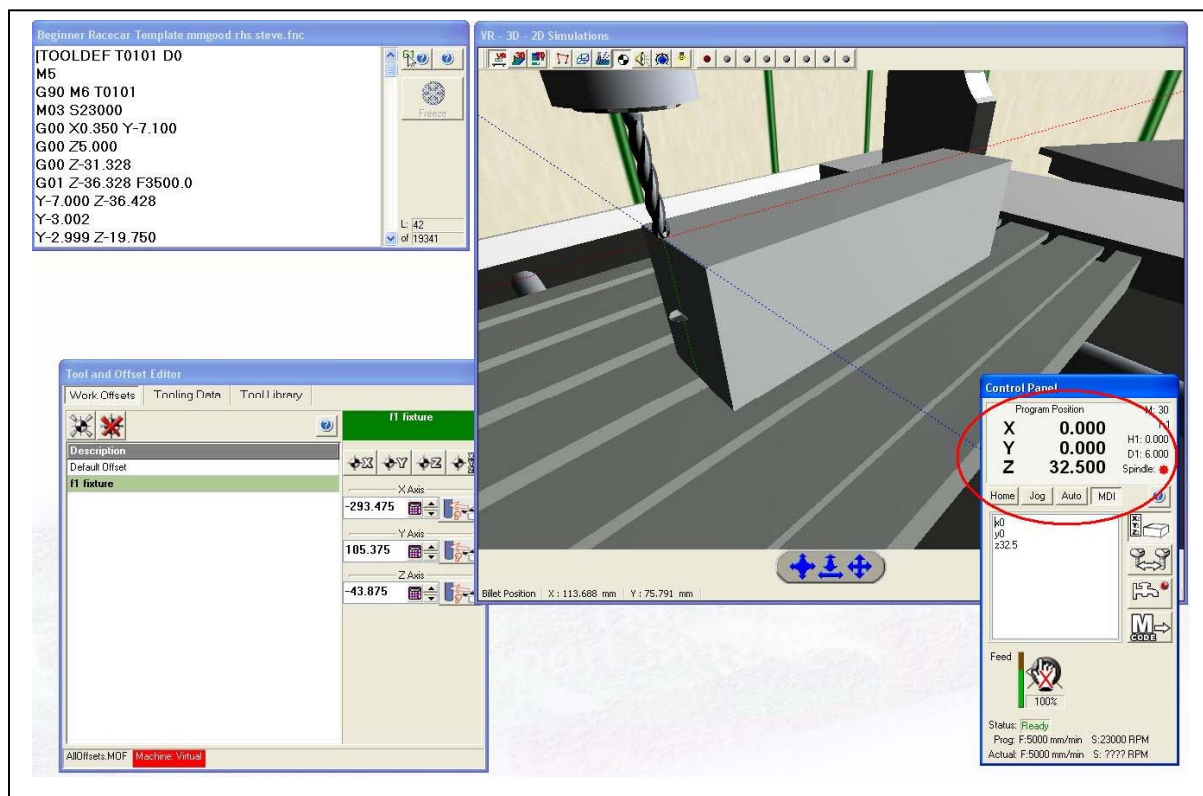


## Work Offset for F1 Billet

For more complicated Work offset positions, such as when machining an F1 car the offset may not be set on the front right top of a block but in the centre of the hole in the billet.

If the program uses the centre of the hole for the c02 cartridge as the datum position as detailed in several F1 Car manufacture tutorials then to check your datum is correctly set you can follow the procedure below.

Jog the machine axes to the position shown. Ensure the display in the control panel is reading Program Position.



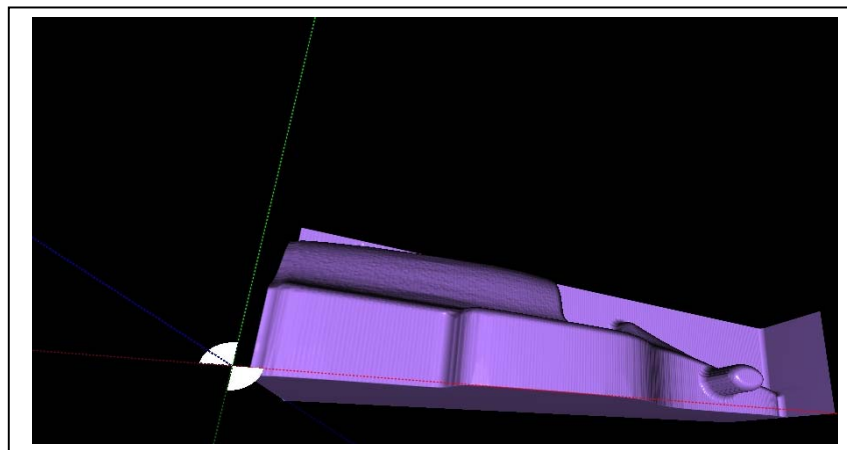
The F1 billet is 65mm wide so the tool will be level with the top when it is 32.5mm

The hole for the cylinder is 29mm above the base of the billet so when the tool is over the centre line in Y it will read Y=0 When jogged to the front of the billet it would read Y-29

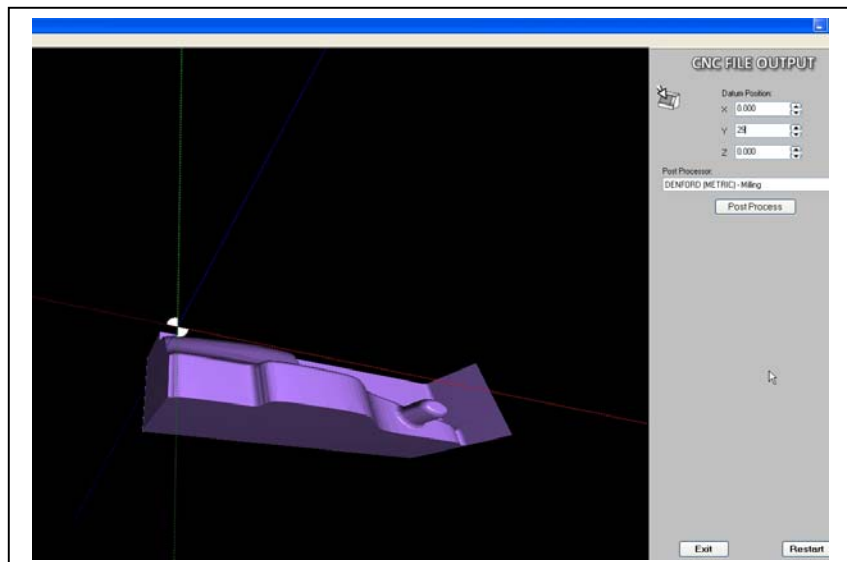
It is essential that the Work offset used on the machine matches the work offset set in the CAM program.

When using QuickCAM Pro to make a program to cut a car the **DATUM POSITION SET MUST MATCH THE DATUM USED ON THE MACHINE.**

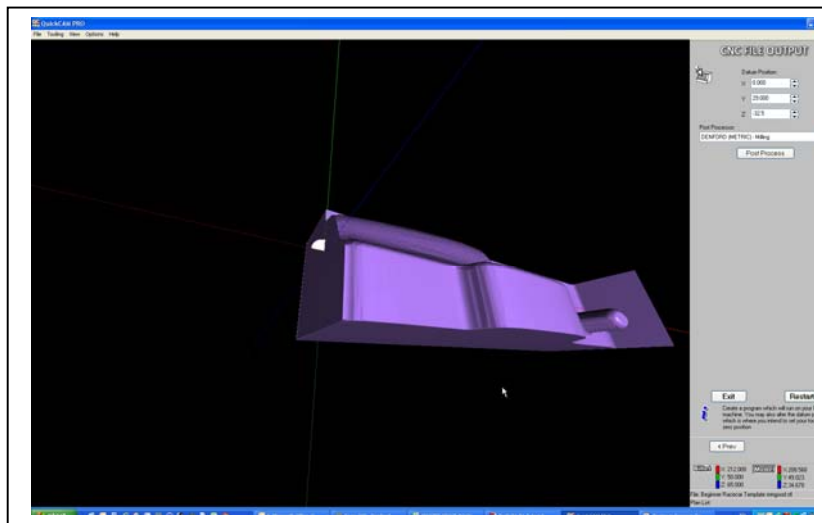
When cutting the right hand side of a car the center of the CO2 Hole will be 29mm above the base so the Y axis shift will be 29mm, halfway through the 65mm width of the block so the Z shift is -32.5mm and finally level with the left hand side of the block so the X axis shift is 0



NO DATUM SHIFT APPLIED



DATUM SHIFT OF 29mm in Y



DATUM SHIFT APPLIED IN Y AND Z AXIS

X DATUM SHIFT = 0

Y DATUM SHIFT = 29

Z DATUM SHIFT = -32.5



## How to set the Workshift values for the F1 Fixture

There is a tutorial on how to create a car program using QuickCAM PRO and how to set up the F1 fixture and 4<sup>th</sup> axis for production of F1 Cars available as a download from the Denford Forum.

<http://www.denfordata.com/bb/viewtopic.php?f=55&t=4771&p=18789#p18789>

I have taken a few pages from this manual to explain the setup procedure for the Work Offsets.

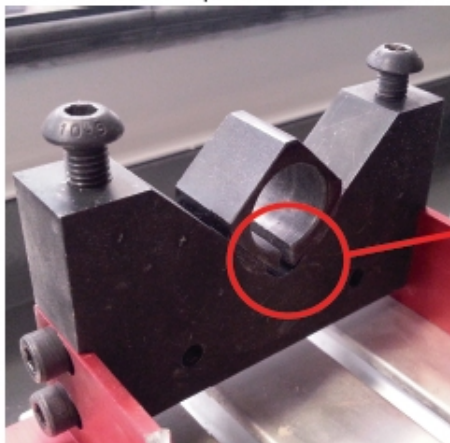


### F1 in Schools Car Manufacturing Fixture

The billet should be positioned in the machine as shown in the image below.

Note that the tether line guide slot is facing you, this is set up for the right hand side to be machined

When tightening the bolts circled in the image above always tighten the right hand side before the left to prevent the billet from being twisted.



*Ensure that this cutout is at the bottom. As the bolts are tightened onto the aluminium bar that goes over this bracket the cutout closes up and secures the aluminium post which is inserted into the cartridge hole.*

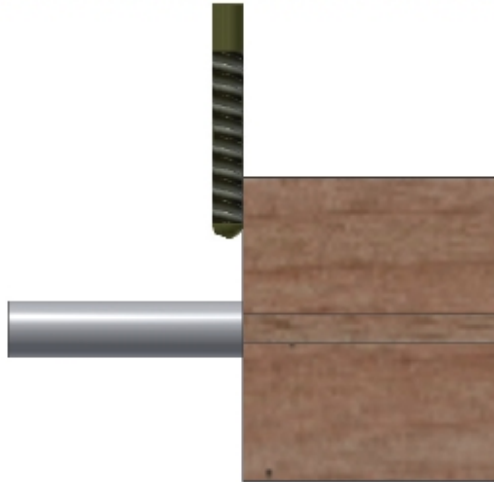
On the left hand side the bar which is inserted into the cartridge hole has an aluminium block around it with a cutout, ensure the cutout is to the bottom as shown in the image below. Set the datum to the left hand side of the billet with Y and Z on the centreline of the aluminium bar as shown on the next page.



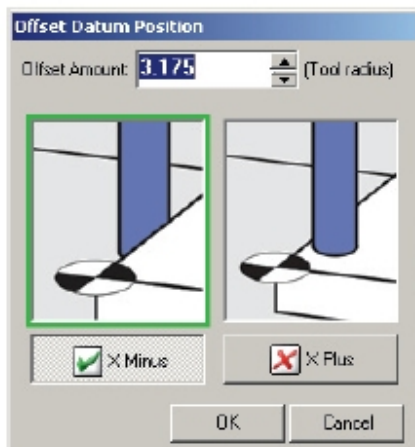
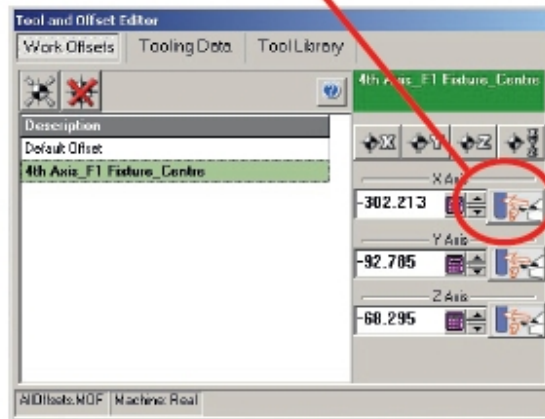
## Setting the DATUM

### X Axis

Touch the tool onto the left hand side of the billet as shown in the image below



In the Tool and Offset Editor window select the X axis datum offset button

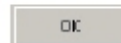


Type the value shown below into the offset amount  
**3.175**

Click the X Minus button



Click the OK button

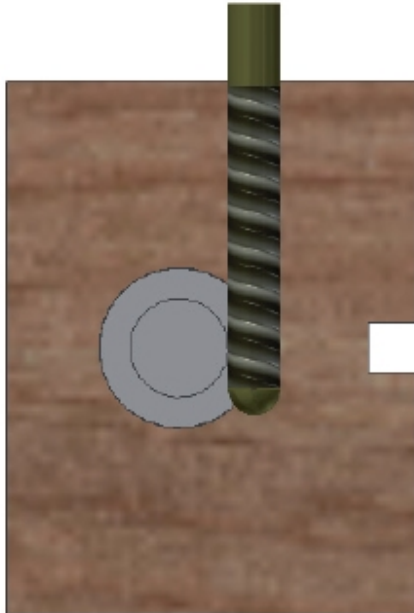


You have now set the X axis

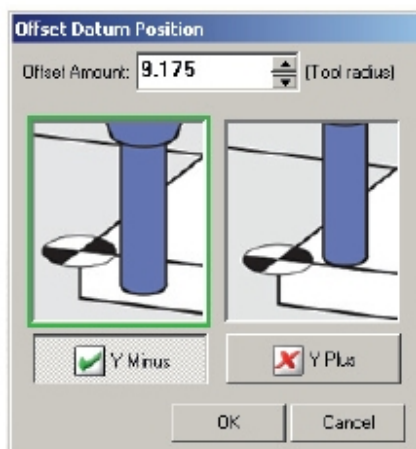
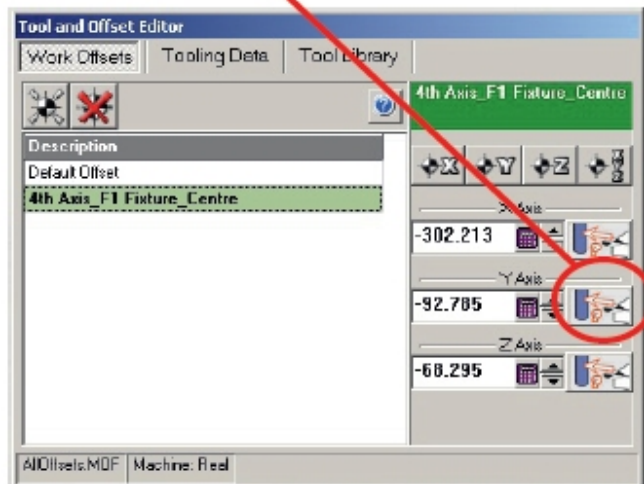
The 3.175 offset amount is the radius of the cutter (this assumes you have a 1/4" or 6.35mm cutter). If you are using a different diameter cutter then you should enter the radius of the one you are using.

## Y Axis

Touch the tool onto the front of the aluminium bar as shown in the image below



In the Tool and Offset Editor window select the Y axis datum offset button



Type the value shown below into the offset amount.

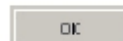
**9.175**

This is the radius of the tool and the radius of the bar

Click the Y Minus button



Click the OK button

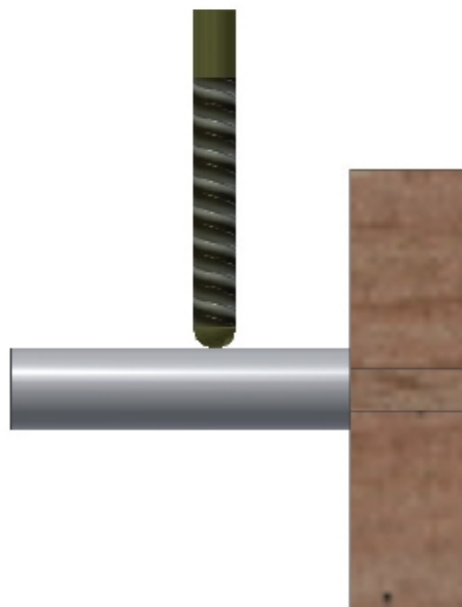


You have now set the Y axis

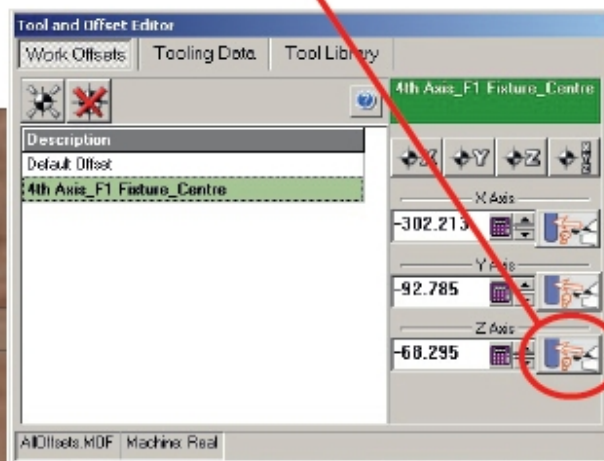
Setting up the Y axis is a little more awkward as the tool cannot travel to the centre of the hole. The Aluminium spigot that is used to mount the block in the fixture has a diameter of 12mm where it enters the billet. In this next step you will touch the tool onto the diameter of the spigot so the center of the tool to the center of the hole is: (Spigot Radius + Tool Radius)  $6\text{mm} + 3.175\text{mm} = 9.175\text{mm}$

## Z Axis

Touch the tool onto the top of the aluminium bar as shown in the image below.



In the Tool and Offset Editor window select the Z axis datum offset button



To do this the Y axis must be at 0

Go to the MDI tab in the Control Panel

Type "Y0"

Press the Start button

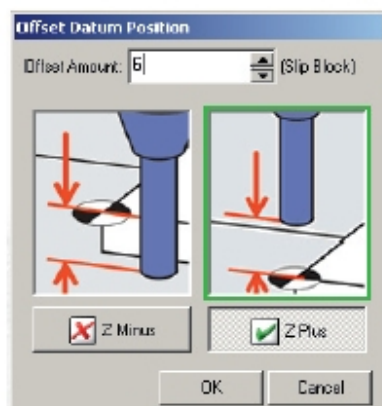


Go to the jog tab and lower the tool onto the top of the bar

Type the value shown below into the offset amount.

6

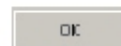
This is the radius of the bar



Click the Z Plus button



Click the OK button



You have now set the Z axis and can run the program RHS.fnc, when this is finished simply rotate the billet and run the program LHS.fnc



When setting up the Z axis first jog the Y axis until the program position reads Y0 then lower the Z slowly until it touches the top of the 12mm diameter spigot once here the tool is 6mm above the centre line.