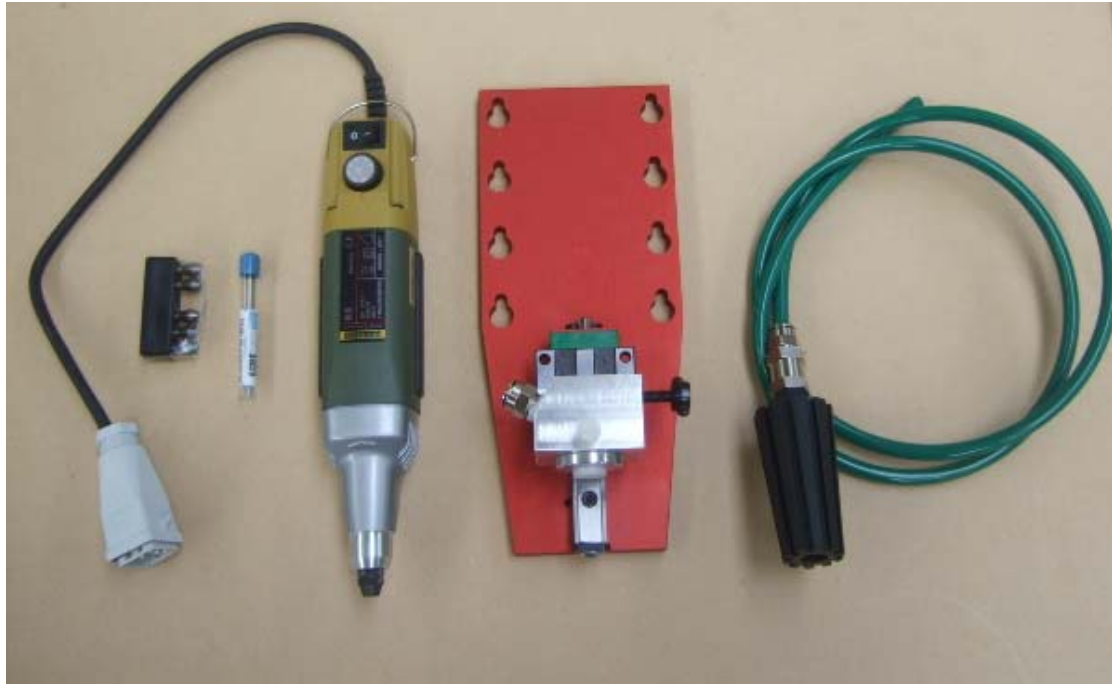


Floating Head Tutorial

Standard Equipment

The Floating head is supplied with the following standard equipment.



- Precision spindle motor 5000 – 20000RPM
- 6 collets 1mm – 3.2mm
- Back plate floating head assembly
- Dust extraction system (requires vacuum cleaner)

Principles of operation

The Floating head system is designed to allow either engraving or drilling to a preset depth on materials that may not be totally flat.

The reference tool is set to protrude from the float ring by the depth that you wish to engrave to. The float ring is then locked at that depth.

When machining the tool is lowered onto the surface of the material and will cut to the preset depth. The z axis will continue to be lowered so that the float ring is resting on the material surface and the depth of cut is set by the difference the tool protrudes through the ring.

As the tool moves over the surface it will cut to the preset depth as the float ring will remain on the surface of the material.

Extraction must be used while operating the floating head otherwise debris from the cutting can prevent the float ring making contact with the surface of the material and will then cause the cut to be incorrect.

When changing tools the motor is removed from the floating head assembly. The new tool is fitted to the motor and set to the depth required with the tool depth gauge.

The float ring should not be adjusted when changing tools.

Removal of the spindle motor

The pictures in this tutorial show a Compact 1000 PRO but the principles on the other routers are much the same.

The position of the motor power plug and the type of plug and spindle motor may be slightly different.

First disconnect the VR Milling software then power off the machine.



Disconnect the spindle motor power lead from the connector box at the top of the Z axis slide.

Remove the cutter from the spindle motor before removing the motor from the machine.

This machine has a Laser Scanning Head fitted. This does not have to be removed to fit the floating head.

Remove the 6 screws securing the motor mounting plate to the angle side plate then lift out the spindle motor.



Store the spindle motor somewhere safe.

Setting up the reference tool

Before fitting the floating head to the machine it is best to set up the reference tool.



Select the correct collet (3.2mm) for the supplied PCB track cutter. Fit the collet to the motor and tighten by hand to the point where the tool is gripped but will slide in and out of the collet under slight pressure.

Now using the supplied depth gauge fit the tool into the slot $Z=0$



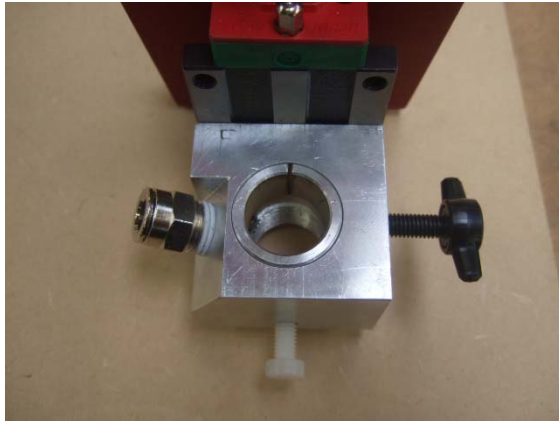
Now push the tool into the collet with the gauge so that the tool is now in the $Z=0$ position shown below.



Press the silver button on the spindle motor to lock the spindle and tighten the collet with the supplied spanner.



Before fitting the spindle to the floating head assembly ensure the slot in the clamping ring is positioned to the back of the assembly as shown.



When changing tools it is good practice to make sure that dust accumulations are removed.

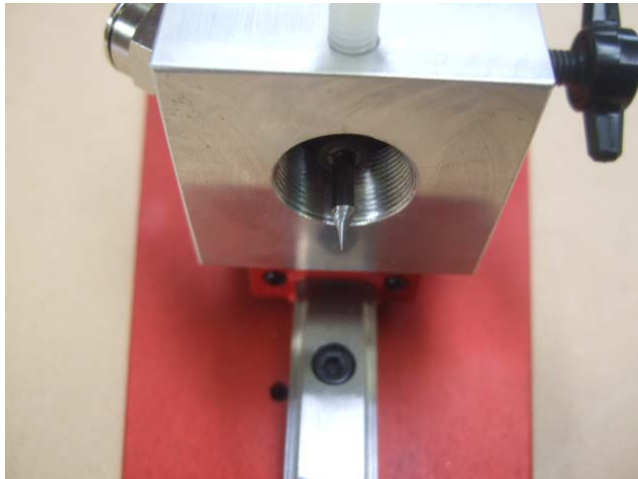
Now set the spindle speed on the motor to 20000 and turn the power switch to the on position.



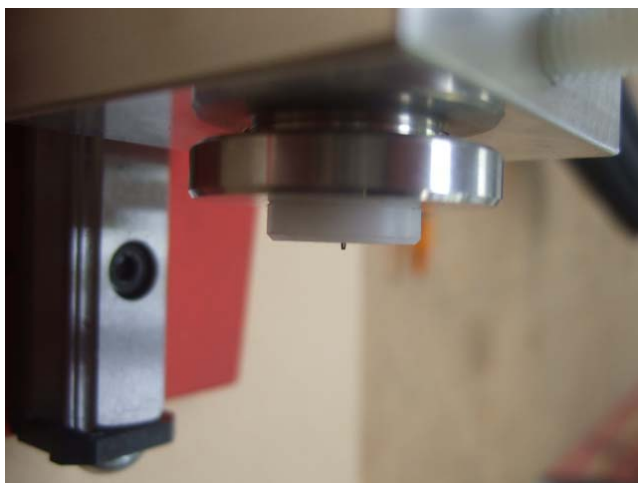
Fit the motor to the floating head assembly. Push as far into the collar as the motor will go then tighten the black locking screw.



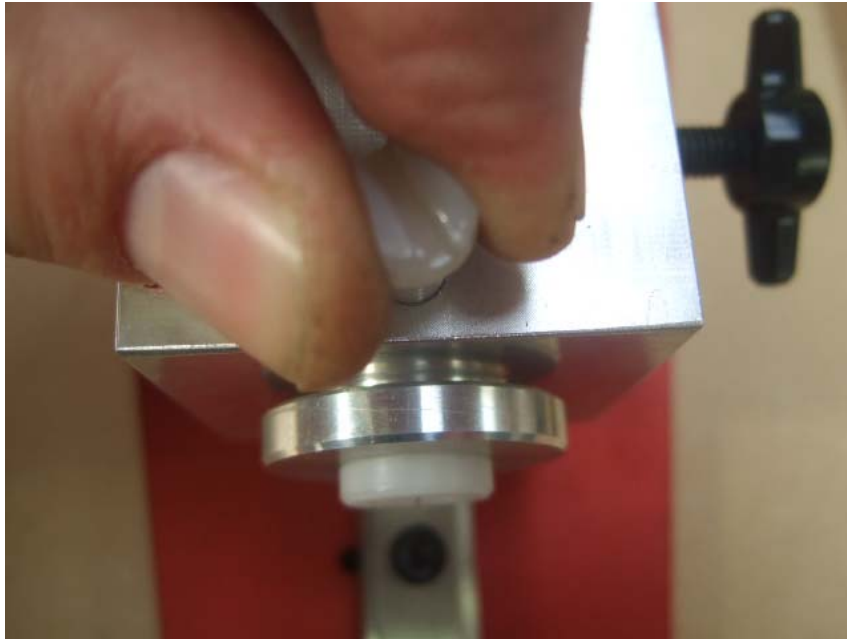
The tool will protrude from the block as shown below.



Fit the locking ring and adjust until the tool sticks out 0.1 or 0.2mm (as required to just cut through the top layer of the material)



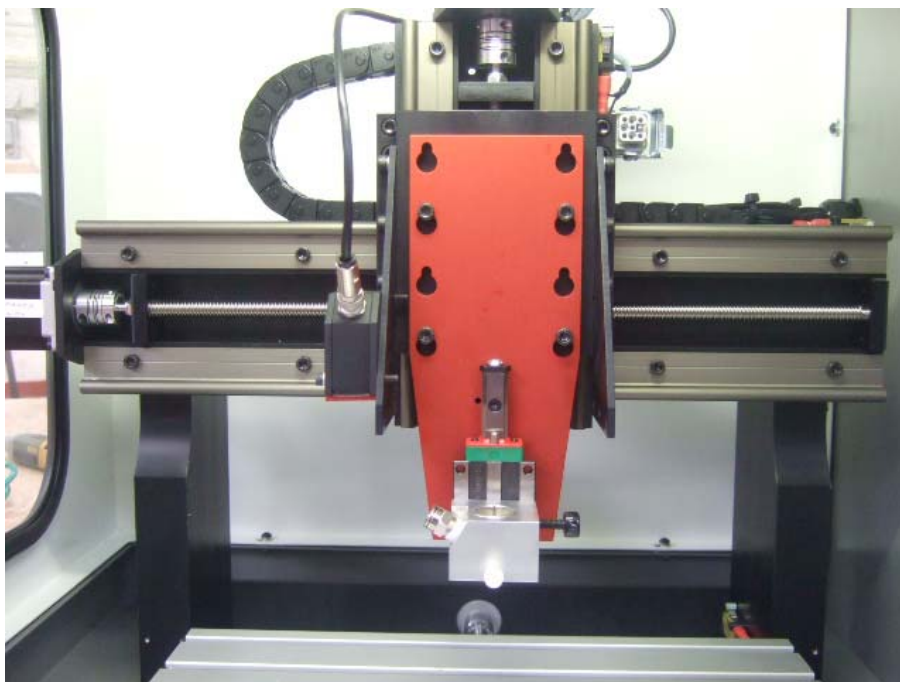
Now lock the float ring in place using the white nylon screw.



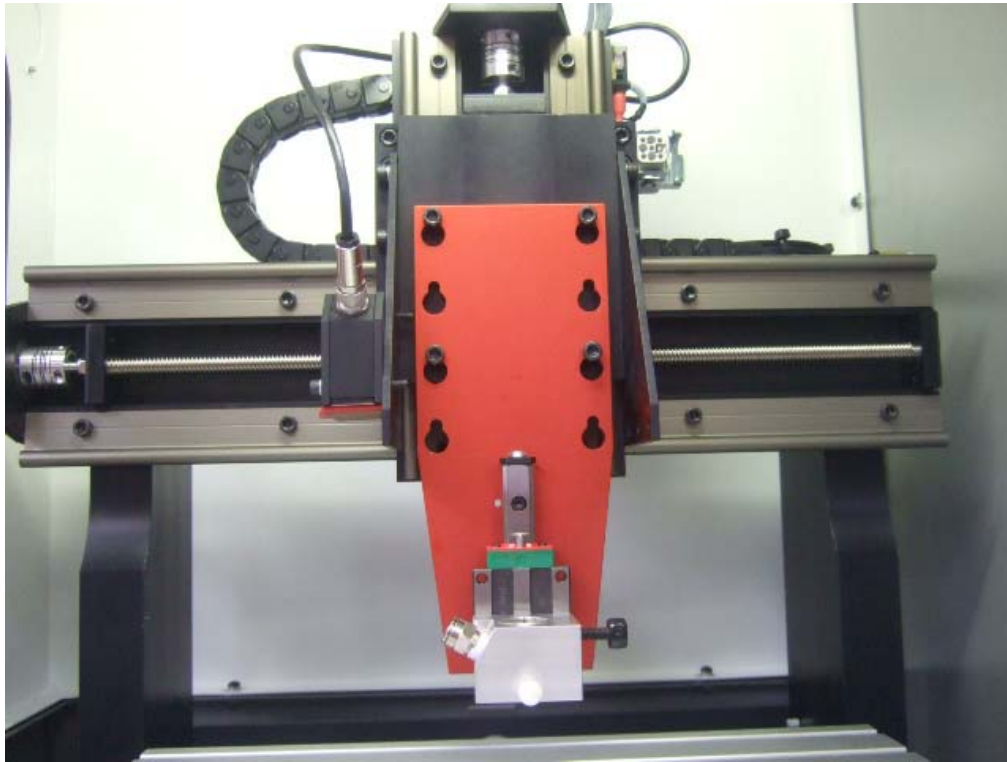
NOTE: Now the float ring is set and calibrated to the depth the float ring should not be adjusted again!

Fitting the floating head

It is possible to fit the floating head in different positions in the z axis. This allows the head to work on material located close to the machine bed or raised up.



The head is shown in the upper position.



The head is shown fitted in the normal lower position.

Secure the four mounting screws and fit the motor.

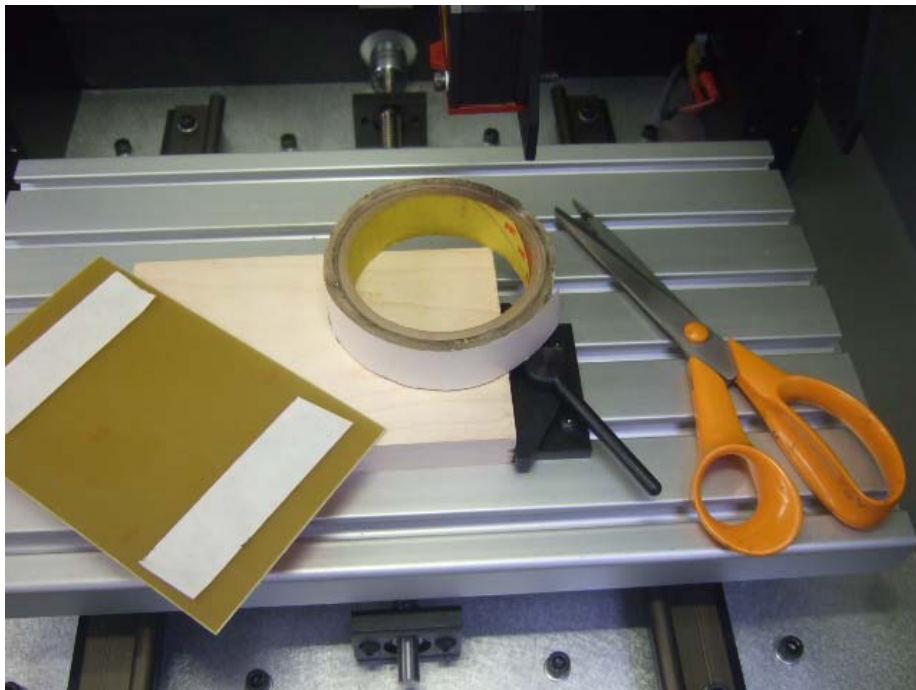


Setting the Work Datum



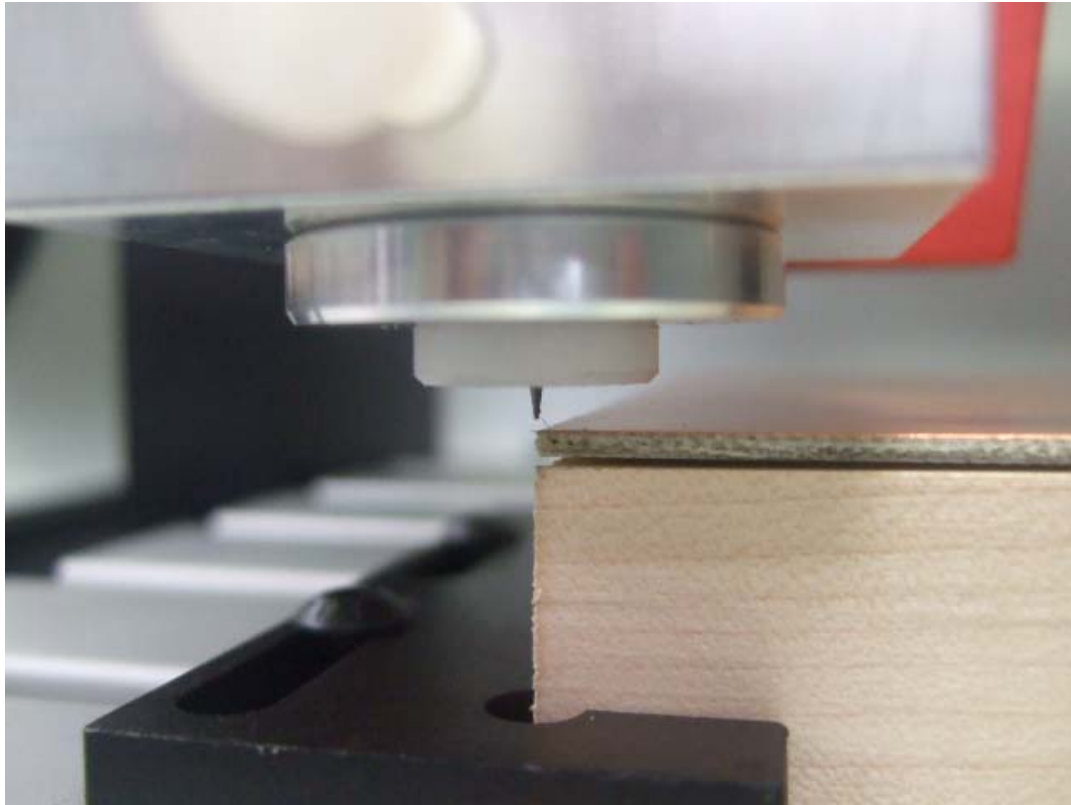
Fit the datum clamp to the bed then clamp in a piece of sacrifice material.

We will set the X and Y datum in the bottom left corner.



Tape down the copper clad board to the top of the sacrifice board, take care to line up the bottom left hand corner.

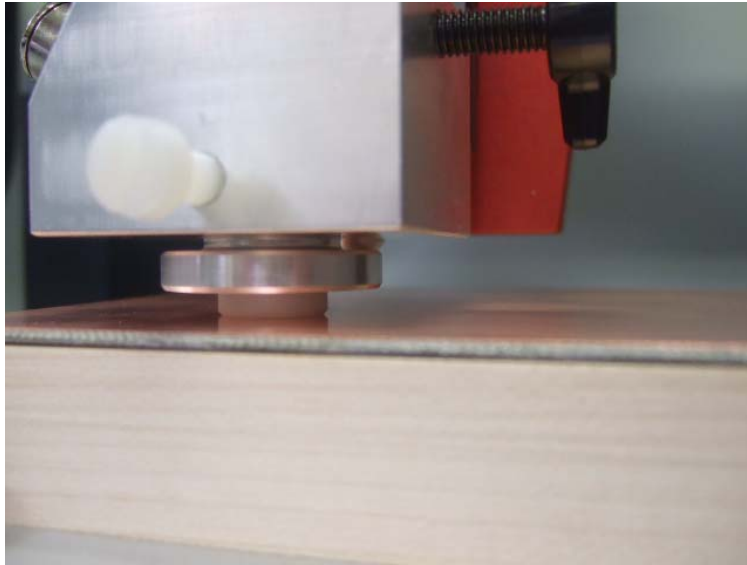
Now jog the X and Y axes to the corner as shown below. As you can see the board is not stuck down flat, this does not matter as the floating head will compensate for this.



Position the tool right above the corner of the work piece and set this position to be the X and Y datum.



Now start the spindle and then move the tool over the board in an area where you are able to set the tool. Note the tool will cut a small hole as you set the offset.



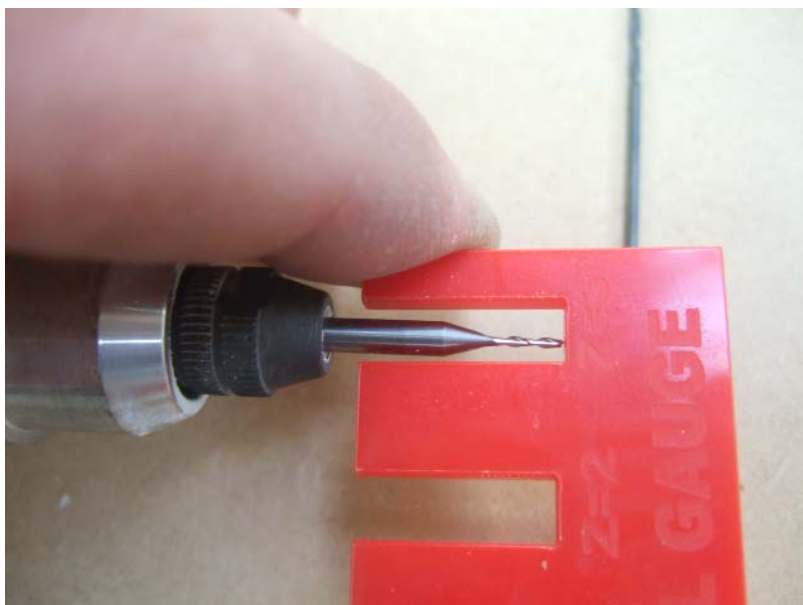
Lower the head slowly until the white float ring sits on the surface of the copper then note the Z reading.

Now jog the Z axis down a further 1mm. You will notice the head does not move down any further (as it is floating on the surface) only the red back plate moves.

Now set this as the Z datum position.

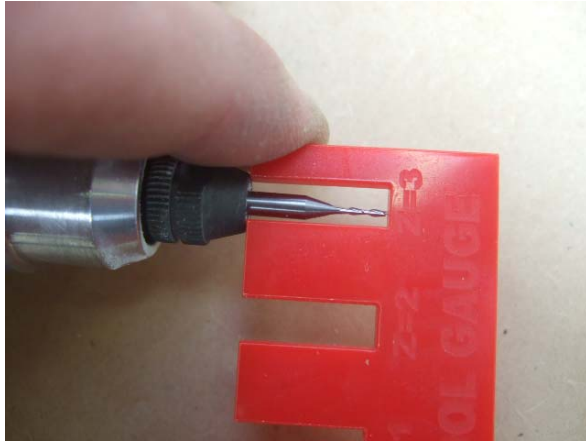
Setting additional tools

When you have a program with more than one tool and you want to cut deeper (for drilling holes) you have to change the tool and leave it sticking out further.

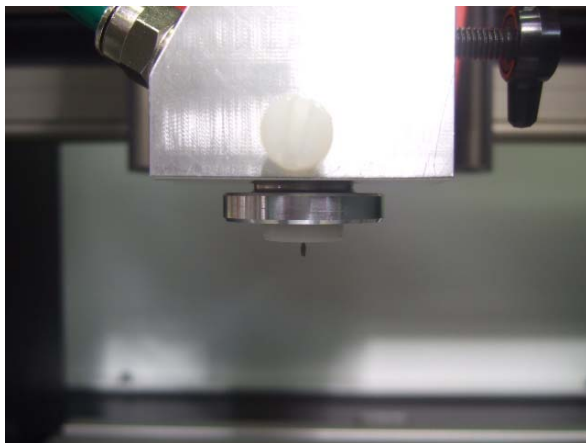


Use the depth gauge as before but this time fit the new tool in the slot $Z=3$

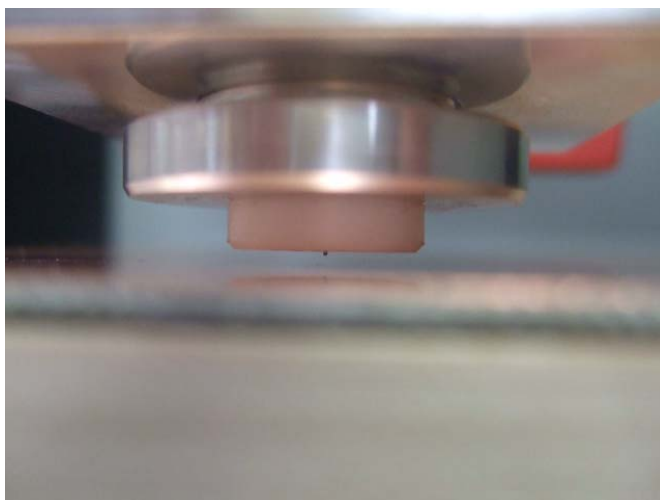
This leaves the tool sticking out 3mm further than the engraving tool so the tool will drill holes 3mm deep before the head floats



The tool is shown fitted to the head and protruding 3mm through the float ring.

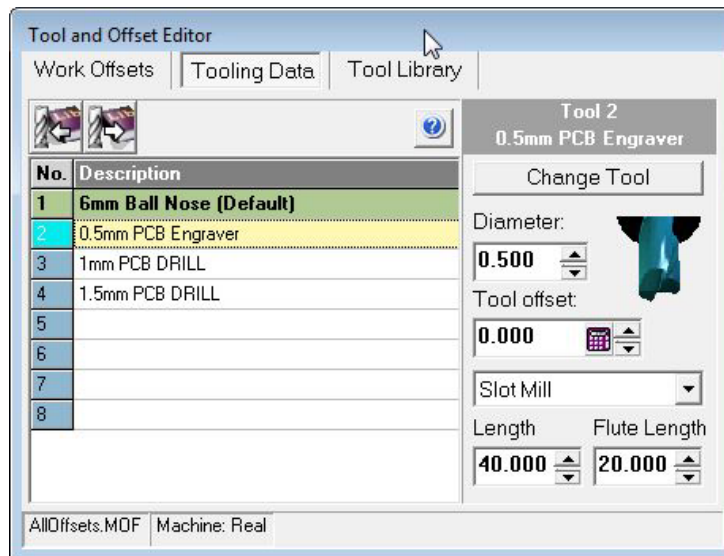


To go back to the original track cutting tool just repeat the process and set the tool with the $Z=0$ slot in the gauge.



Cutting a PCB with a multiple tools

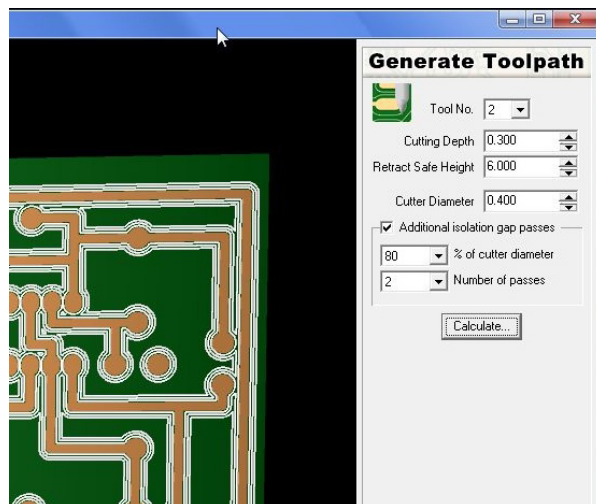
First you must ensure the tools are defined in the tool library of VR Milling.
For the example below the program uses 3 tools.



Now you need to import the PCB file into VR Milling 5.

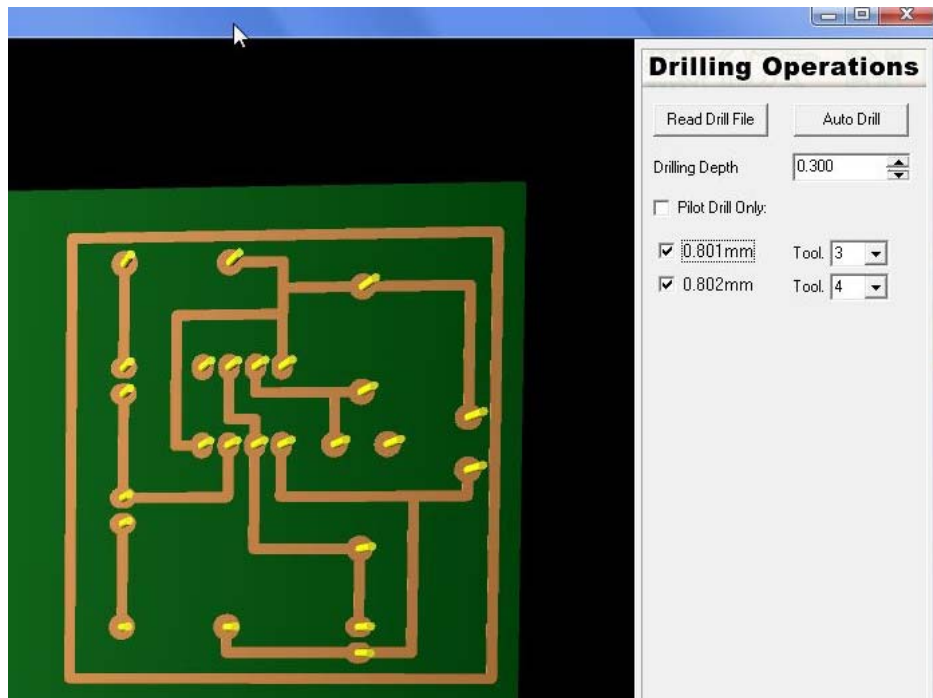
Refer to the HELP menu and PCB Manufacture Tutorial within VR Milling.

The important differences when using a floating head to standard milling are covered below.



Setting the cutting depth does not make any difference! The depth of cut is set by the tool stick-out through the float ring.
Set the value to 0.3

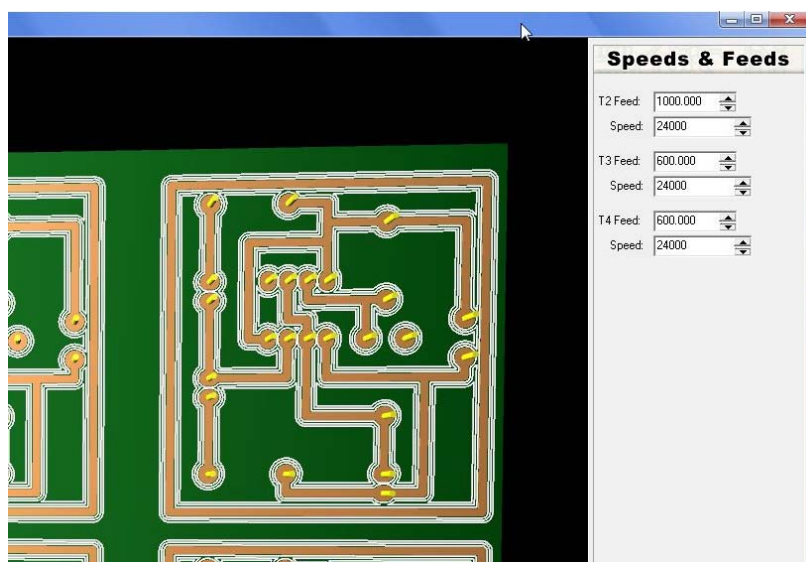
IMPORTANT: Set the Retract Height value to at least 6mm. This move has to take up both the retract distance and the float in the head!



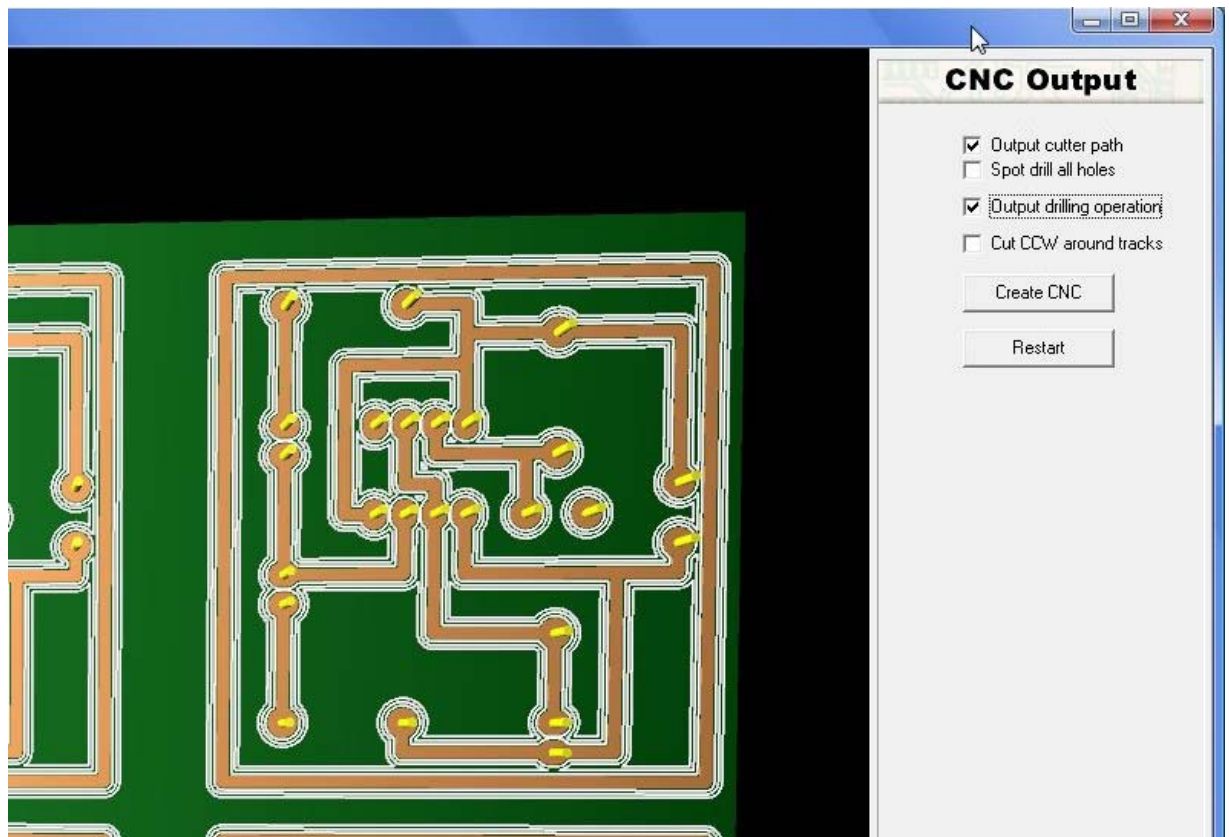
Import the drill file and select the different tools for the different hole sizes.

Again the depth of the drilled hole is set by the tool stick-out not by the drilling depth.
Set the Z to 0.3

Uncheck the box Pilot Drill only if you want the holes to be drilled.



Set the feed for track cutting to between 600 and 1000mm / Min and the drilling feed to 400 - 600mm / Min.



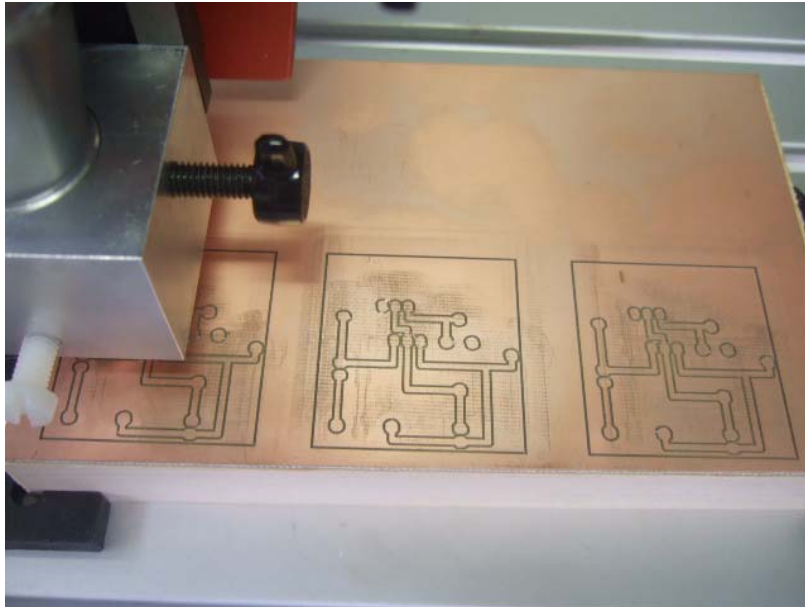
Finally set the file to output both the cutter path and the drilling output. Then select Create CNC file.

The file will now open in VR Milling 5.

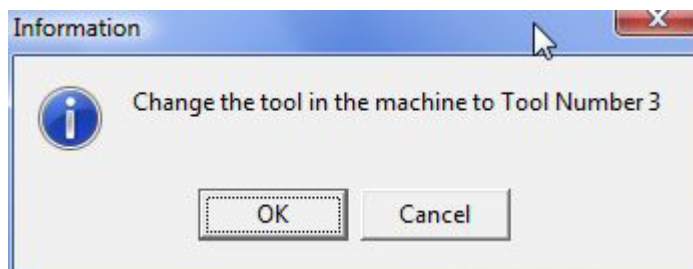
Before manufacturing ensure that the extraction pipe is connected and the vacuum is running



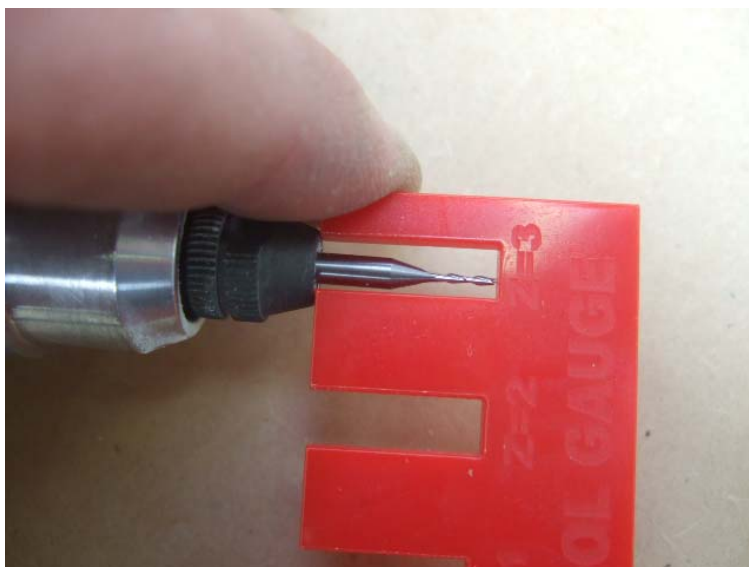
Insert the PCB track engraving tool (tool 2) and start the cycle.



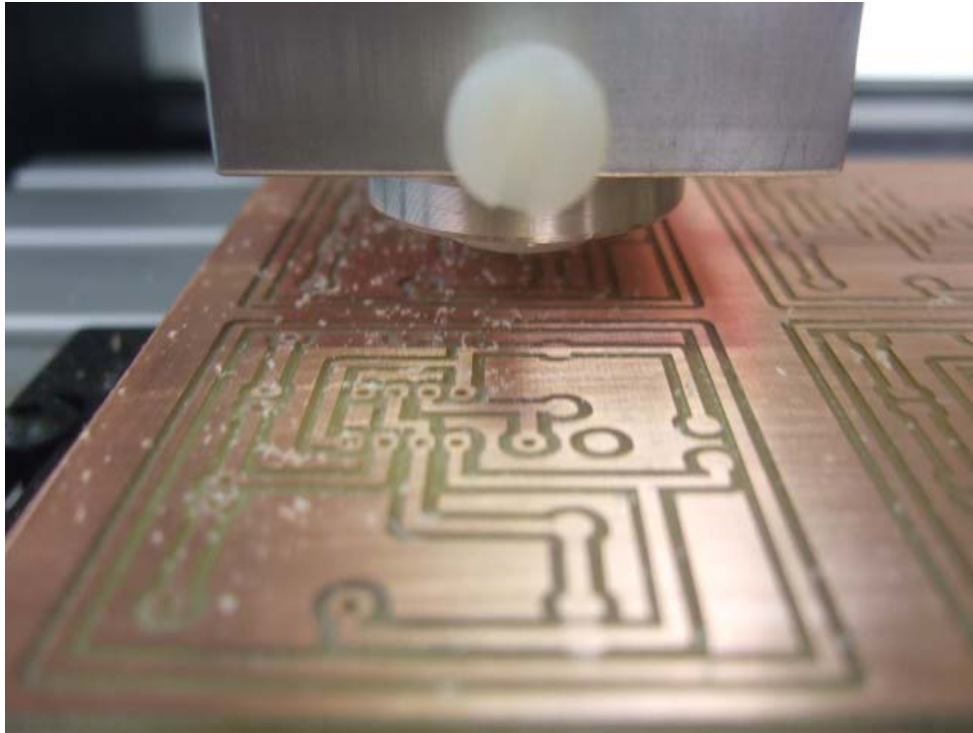
The PCB will be engraved and when the Isolation gap has been created the tool will move to the park position and you will be prompted to change tool.



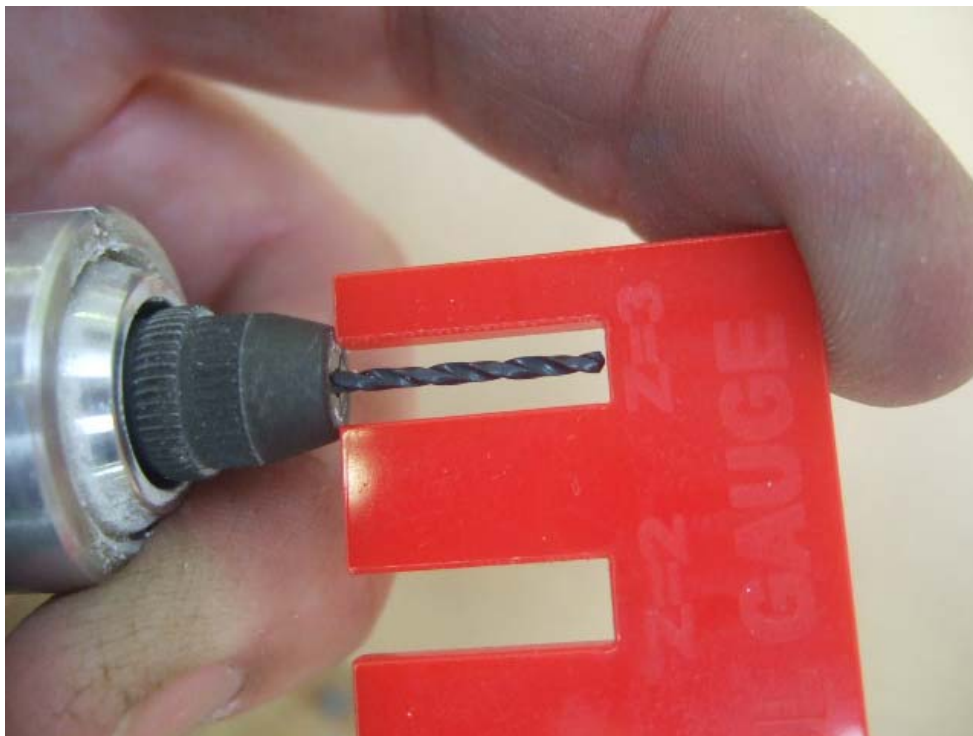
Set tool 3 the 1mm drill to stick out 3mm further than the reference tool.



PCB holes are drilled.



Change tools again for the last set of holes. Again set the 1.5mm drill to stick out 3mm



Finished Board

