

XIN DIAN VICE MOUNTING BLOCKS

Introduction

I am indebted to [David Loomes](#) for bringing the Xian Dian centring vice to my attention through his VLOG post. These are available from a number of Internet suppliers at relatively low cost.

The vice is quite small having a jaw width of 55mm and a maximum jaw opening gap of 55mm. The jaws have built in 'parallel' supports and the jaw faces have serrated teeth on the inner and outer face. As a fixturing device it can grip items very rigidly with minimal material depth held in the jaws. The jaws are opened and closed using a 5mm AF Allen key or a 10mm AF box spanner.



My interest, like David Loomes', was to have a vice to mount on my Tormach 4th Axis microARC head. The microARC is supplied as standard with a 100mm 3 jaw chuck but I have often had situations where a vice would have been more useful. Having a vice that is symmetrical in its closing action is ideal for 4th axis set up and operations.



Having received the Xian Dian vice, my first intention was to make a mounting plate to hold the vice on the microARC. Having completed this it became obvious that there would not be much work involved in producing a similar 'pallet' to hold the vice on my Tormach 440 tooling plate.

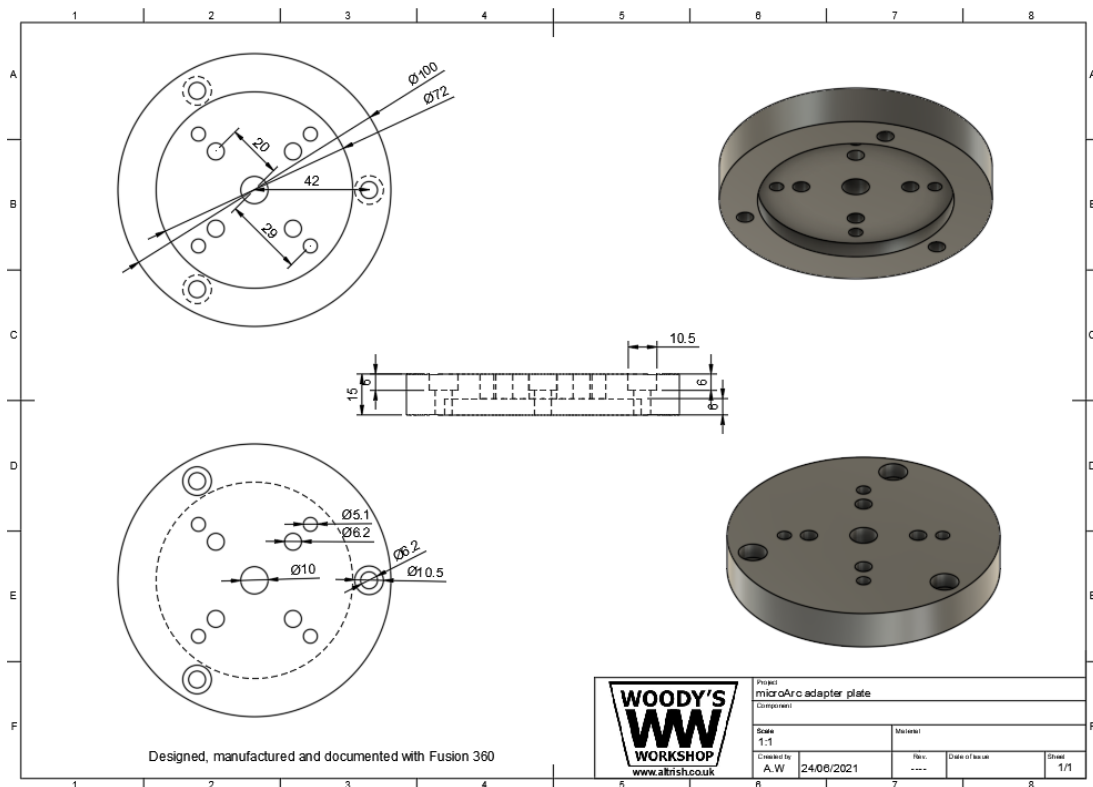
The following notes describe the two styles of mounting bases. Note that the vice as delivered has a tooling plate fitted which is removed and not used. The vice mountings allow for a set of M6 and M5 positions and a central M10. Both plate designs to be described have all these holes included.

microARC Mounting Plate

The microARC mounting plate is a 100mm diameter disc that is retained with the three M6 fixing points that hold the chuck. There is also a small retaining flange on the microARC face that also had to be considered.

I used 15mm cast aluminium as I had it to hand. I cut a square blank that was slightly oversize, cut the corners at 45 degrees and drilled a central hole at 8mm diameter. Using this central hole and an 8mm cap head screw as an arbor I turned the stock in the lathe to slightly oversize on 100mm. This was an expedient way of getting something quickly to overall size with a view to finishing using CNC. Had I opted to CNC cut this irregular shaped blank I potentially would have put more stress on the single hole fixing on the tooling table.

The layout of the vice mounting holes is shown in the Fusion 360 drawing below.

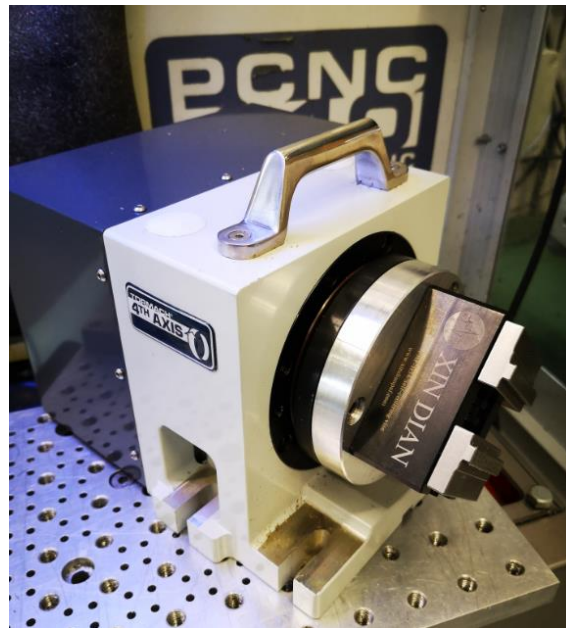


My tooling table on the 440 has M8 holes on a 25mm matrix with in-between smaller holes for tooling pins. I referenced the 440 to a M8 hole on that was roughly central on the tooling plate. The aluminium blank was mounted on top of a piece of sacrificial MDF and into this chosen hole.

Gripped only by the single central M8 clamping, I ran all the holes in the plate and the counterbores. I then ran a skim on the perimeter to bring the plate to size. After the skim I fitted perimeter clamps around the blank before removed the central M8 screw and then milled enlarged the central hole from the 8mm up to 10mm. This ensured all processes were concentric.

I have no idea whether I might need the 10mm central hole but it is tapped M10 on the vice and seems like a useful centralising guide. All top side holes and the perimeter edge of the disc were CNC chamfered.

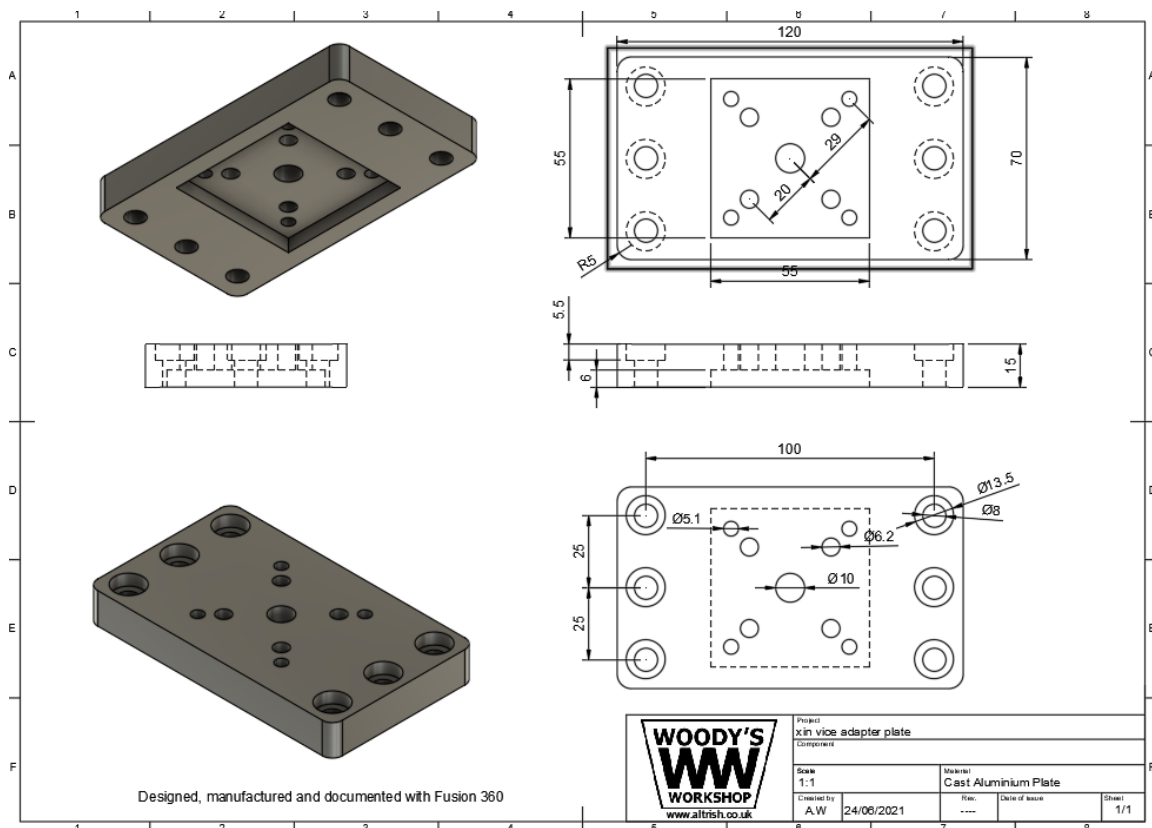
With all top side operations completed I removed the blank from the 440 milling vice and then debated either milling the rear side cavity or turning it on the lathe. I opted to turn it in the lathe using outside jaws and slowly brought it to size to give a close fit on the microARC mounting plate and associated flange. I hand chamfered all the hole exits on the reverse size using a Noga style tool. This completed the microARC vice mounting disc and it is shown mounted on the microARC below.



Vice Mounting Plate for CNC

Having completed the microARC mounting plate it seemed like a useful idea to translate the existing Fusion sketch into a simple sub-mounting plate to fasten the vice onto my 440 tooling plate. Because the vice mountings holes are a symmetrical array, the vice could be mounted in either orientation on the sub-plate.

Based on the 25mm spaced matrix of M8 holes, the new mounting plate was straightforward to create in Fusion and the drawing is shown below. The top side sketch had the vice mounting holes and the six M8 mounting holes. The lower side had a clearance pocket around the vice mounting holes to clear M6 socket head screws. Here is the Fusion 360 drawing.



As with the microARC mounting plate, I used 15mm cast aluminium and a blank was prepared slightly oversize. The first side operations, with the exception of the perimeter skim, were done in the CNC vice on the mill table. The mill was then re-referenced with the block mounted directly onto the mill tooling plate on a piece of sacrificial MDF using the four corner holes. The rear side pocket was cut using an adaptive strategy and a perimeter skim done to bring the block to final shape.

A chamfer cut was made around the pocket, the perimeter edge and around the middle two mounting holes. The mounting was then changed to use the two central holes and the corner holes chamfered to complete the lower side operations.

The final operation was to turn the block over, remount on the tooling plate and chamfer the perimeter edge.

With the block complete it struck me that if I had a second vice and identical mounting block, I could use the combination to mount long items on the mill tooling plate. A second block was cut in preparation for this and a second vice has been ordered.

Here is a picture of the vice mounted on the sub-plate.

