Building a Non-Floating Jaw Vice

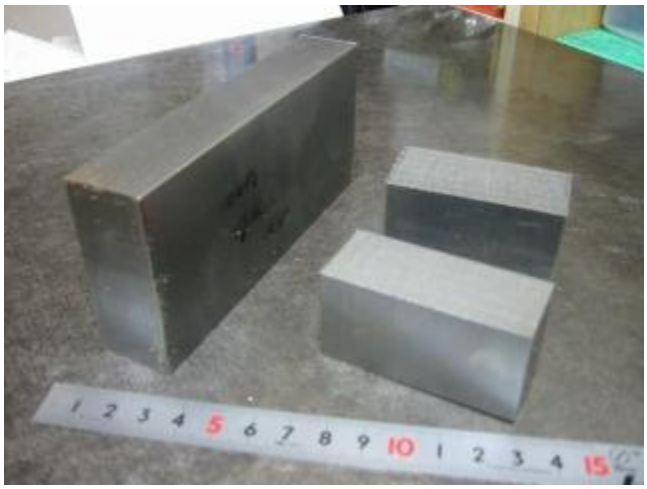
When clamping a work-piece by using two plates with a conventional vice, it is sometimes necessary to bang the top of the work piece with a small hammer in order to have the work piece fit in the vice. However, after that, the plates under the work piece tend to move, making the work piece float when it is clamped with in the vice. This phenomenon ruins the accuracy of the work piece.

As a transitory measure, adjust/tighten the movement of the vice, however it fundamentally appears again with the conventional type vice. It seems to be impossible to avoid lifting the work piece with a conventional type vice.

There is, however, an un-floating type vice. Its construction isn't so complicated.

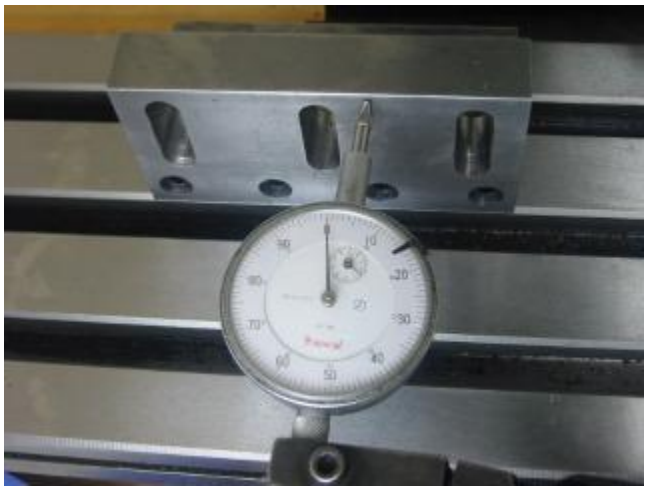
This one is made of the mild steel.

The size is 60mm width, 130mm long, 50mm high, max clamping width is 75mm.



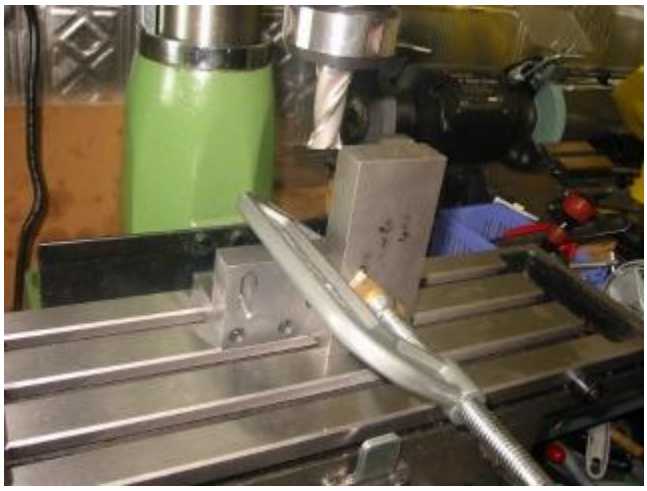
The material used is mild steel.

It is best to use carbon steel, however, using mild steel offers no real problem with strength for this vice.



The angle plate is adjusted at right angles on the milling table.

This adjustment is easy.



This is the milling procedure of the body edge.

The angle must be adjusted carefully to a right angle using a small hammer.

After the milling, the right angle must be checked with a square.

Above is the groove cutting process. Cut down 0.5mm steps with a roughing-end mill. The width of the groove is 10mm, and depth is 5mm.

After finishing one side of the groove cut, then invert without any change to the end mill setting in order to keep the symmetry.

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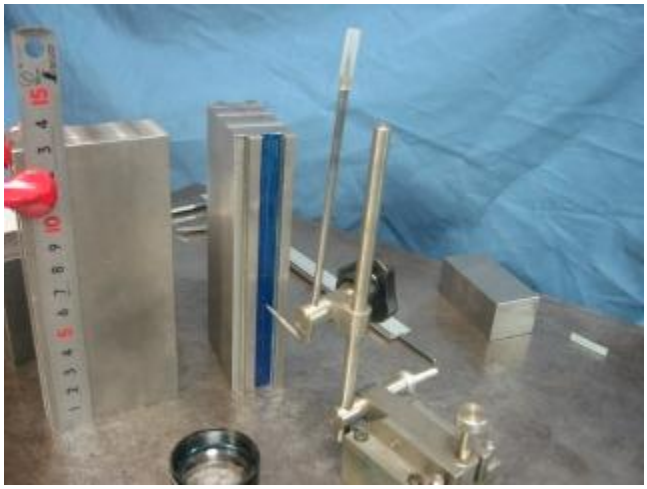


Mark out for the side holes, after cutting both of the grooves.

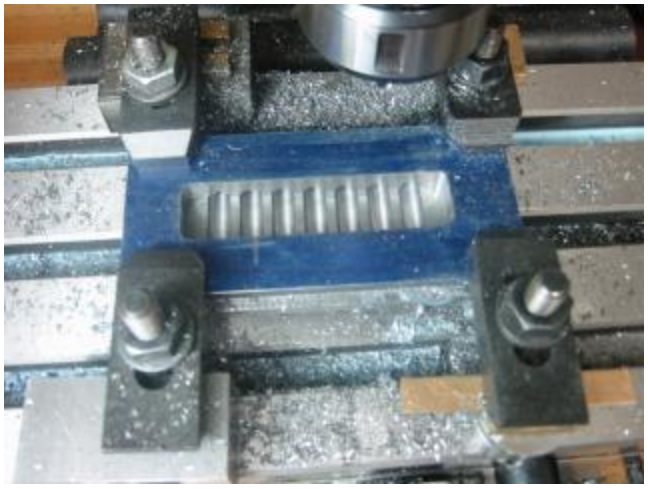
Drilling is the difficult procedure. Inspect to be certain all holes are right-angled.

This deep hole drilling is a difficult yet a key process of the vise making. The depth is 50mm. All the holes must straight and drilled at the accurate position.

The hole position has been indexed by the milling table dial indicator. Marking out lines are also helpful avoiding careless mistake of wrong positioning.

All the holes drilled 7.8mm and finished up with a reamer of 8mm.

Slot cutting from the bottom side. The slot reaches to the one half of the hole diameter.
The end mill size is 12mm.



Completion of the bottom side slot cut.

Cut path completely through from the bottom side.

Use a 10mm end mill, cut depth is 0.5mm.

Drill two sink holes on the fixed jaw, and mount it on the base of the vise.

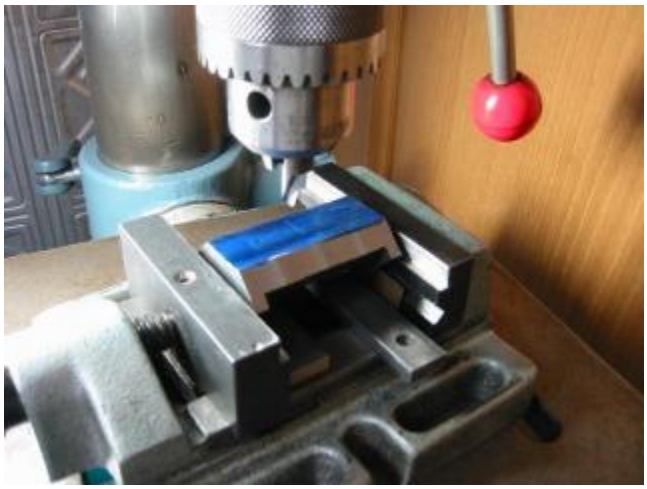
The fixed jaw joins with two screws, and ends up joining by two knock pins. The knock pin plugs with anaerobic adhesive.

The fixed jaw has two screw holes in order to attach a jaw plate.

Machining the moving jaw chamfer at 45 degrees.

The vise in the photograph is for the drilling machine. Its accuracy isn't so high, so it's difficult machining parallel to the milling table.

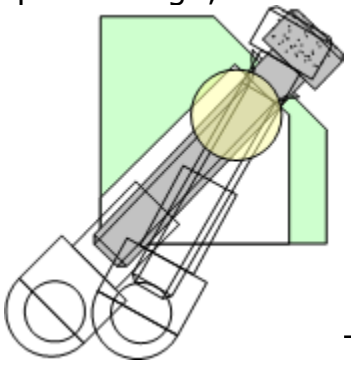
You can see some metal spacer under the vise to adjust parallel.



Drilling for the tightening screw.

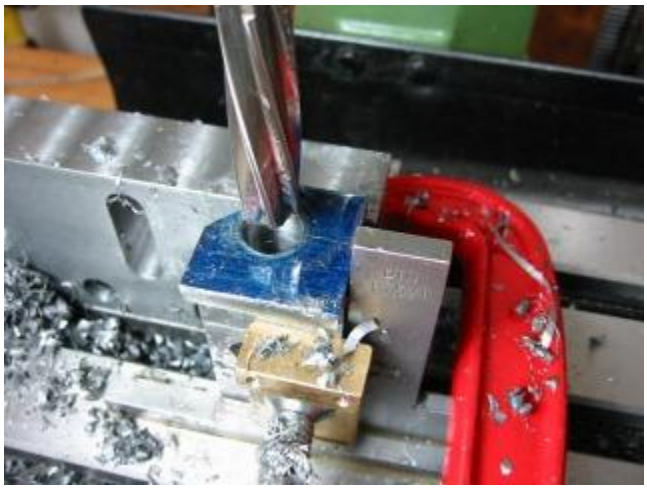
Machining a clearance for the tightening screw.

I've not well considered the clearance space design, so cutting was too much.



The clearance in the moving jaw must be made as shown in this figure.

The white part is the clearance space.



Drill a pass through hole on the moving jaw. The diameter is 12mm.

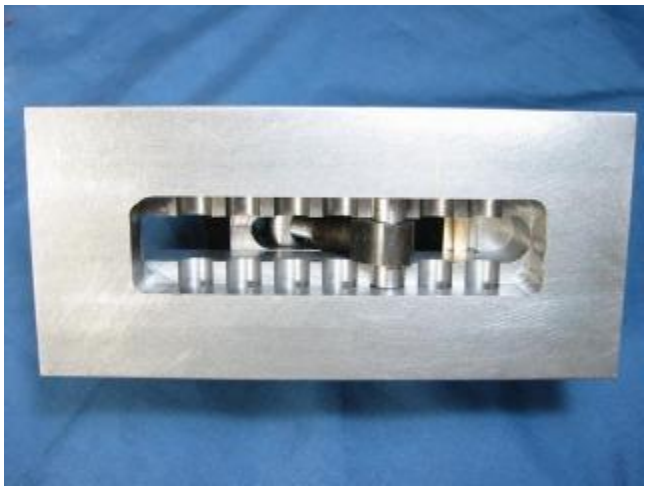
There were other design ideas, however this design has an advantage of the unit strength and easier to make.

This is the tightening system.

Machining the jaw plates with the vise temporary assembled

The jaw plates are brass.

All the parts



A bottom view of the vise.

Drawings for the Vice