

Building a Sine Table

I had long wanted to build a sine table, but the designs I had found used a thick, large block of steel and involved a lot of milling. Peter Dawes published an article in Model Engineer's Workshop (March 98) about how he built a sine table using a much thinner steel plate with the round bars inside a couple of end pieces. This design involved little machining and seemed to be easy to make. His sine table was built for a larger Taiwanese mill/drill, far too large for my Mini Mill. So I had to make a smaller sine table and make a few adjustments, see the sketch to the right that shows one end of the sine table I made.

I cut out pieces from each corner so it would be possible to clamp the sine table to the Mini Mill milling table.

Materials

I used a 185 x 95mm piece of hot rolled steel just over 16mm thick for the table. This piece had been flame cut from a larger piece and the cut sides were rather rough. For the end pieces I used some 12mm thick pieces from my scrap bin. I bought some M5 and M6 Allen screws for the project.

Round bars

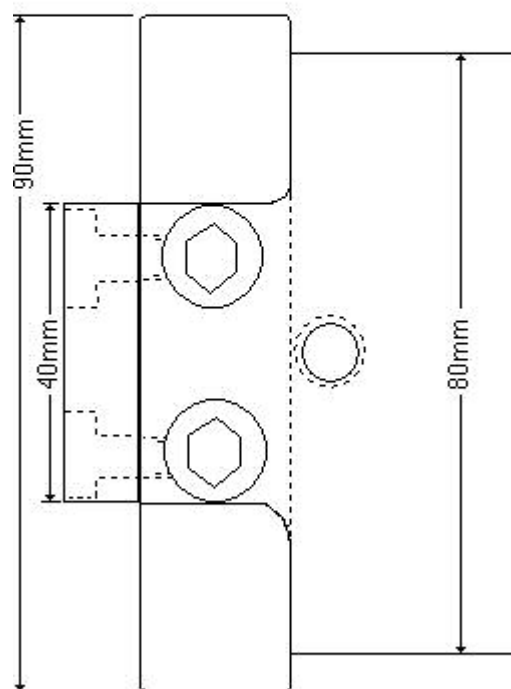
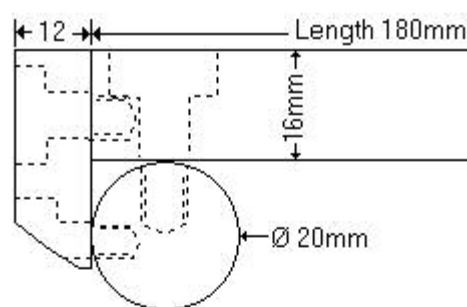
I used 20mm diameter silver steel (drill rod) for the round bars. They were mounted in the four-jaw and I used a dial indicator to get them to run true. At each end a 6.9mm hole was drilled to a depth of 12mm and tapped M8.



Table

First the work was marked up and I drilled two 5mm holes, one near each end. The holes were tapped M6 and will be used to clamp the work to an angle plate and a box angle. The distance between these 5mm holes coincide with the mounting holes of my dividing head, and will be opened up to 6.9mm and tapped M8 when finished. I will drill and tap more holes to clamp a vice etc. to the sine table.

The work was then clamped to an angle plate and a box angle for milling the long sides. I used a couple of extra clamps to make sure the work could not move (right photo). After milling the first long side the work was flipped over and the other side milled parallel to the first. Then the work was removed from the milling machine and the corner pieces removed with a hacksaw.



After milling the long sides of the sine table and removing the corners, the work was mounted flat on the milling table with a couple of parallels underneath (see right photo). Now all sides could be milled getting the sides of the table parallel and the corners square. I used a rotating carbide file on the long sides due to some hard spots left after the flame cutting.

The diameters of the round bars were measured carefully and the total length of the table adjusted so the distance between the centres of the two round bars would be 160.0mm.

I then clamped the work to the faceplate with two M6 Allen screws and faced one side, turned the work 180 degrees and faced the other side. Lacking a surface grinder and the ability to fly cut a large area this was the method that gave me the best result.



Then I made the end pieces from a couple of pieces from my scrap box. I drilled and counter-sunk the holes for the M5 screws clamping the end pieces to the table. I was able to mount the table in my old drill press and drill the 4.2mm holes in each end and tap M5.

I also made two stop buttons from 25mm diameter mild steel rod. I drilled through 8mm and counter bored for M8 Allen screws.

I could now mount the two stop buttons on the Mini Mill table and line them up using a square. The table with end pieces and round bars could not be clamped to the milling machine table. I used a clamp to push one of the round bars against the stop buttons to drill the holes for clamping the table to the round bar – see right photo. It is important that the round bar is pushed both against the table and against the end piece when drilling the holes.



The holes for clamping the round bars to the end pieces were drilled 5mm diameter and counter bored.
The last operation was to mill the bottom of the end pieces at an angle – see right photo.

I also made some clamps – see photo below.



Below is a photo of the sine table in use for milling a 60T worm wheel for a rotary table.

