Clamp style knurling tool

I have used a single wheel knurling tool for some time, but the results were not good. On the web I found several articles about knurling, and all recommend clampstyle or pinch knurlers. Graham Howe (www.homepages.mcb.net/howe) has detailed plans for a nice clamp or calliper knurling tool. At the website of Ishimura (http://homepage3.nifty.com/amigos/knurl_holder/knurl_holder-e.htm) I found pictures of his knurling tool and I have based mine on what I found at these websites. I decided to attach the knurling tool to the tool-post the same way as Ishimura did, and to change the arms to allow for knurling larger diameter rods.

Arms

The arms were made from a piece of hot rolled steel from my scrap box, around 20-mm thick. I faced one side in the 4-jaw and used a hacksaw to saw out the two arms.

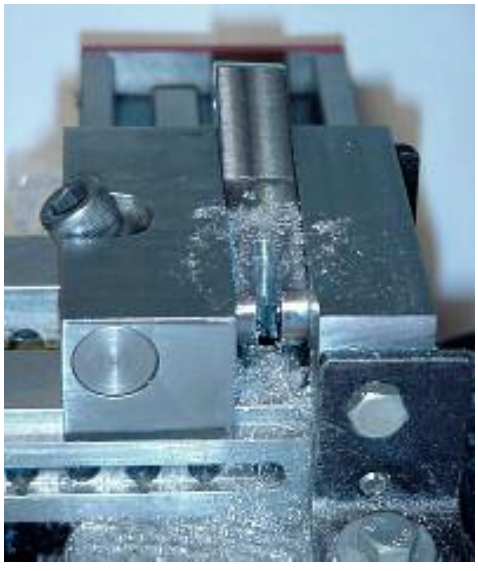
I mounted the arm in the mini-mill vise and faced the upper part of the arms using a carbide tipped end mill I just made. The outer scale of hot rolled steel is hard and abrasive and I didn't want to ruin my HSS end-mills.

After facing the upper part of the arms I turned them around and milled down to 20 mm. This way I got the upper and lower faces parallel.

The outer ends are at a slight angle (approxi-mately 15º) to be able to knurl a large diameter rod, and slightly tapered (from 20mm down to 16 mm).

The arms was then mounted in the 4-jaw and turned down to 19 mm (see picture to the right).

The centre of the holes for the knurling wheels were marked drilled and tapped. These were drilled through with a 5-mm drill, and then opened up to 5.9 mm halfway through and reamed to 6 mm. The 5 mm part was then tapped M6. The hole at the other end was drilled 7.9 mm and reamed to 8mm.



The slots for the knurling wheels were milled with a 6-mm end-mill. This gave a nice sliding fit for the knurling wheels. I made two 19 mm long rods from 6 mm diameter hard steel, and threaded one end M6 for a length of about 5 mm. The thread holds the rods in place when knurling.

I drilled 8 mm holes in each arm for the M8 pressure screw (made from a long M8 coach bolt). Each arm was then mounted in the mill vise and the hole made larger on the inner side (see drawing at the end of this document).

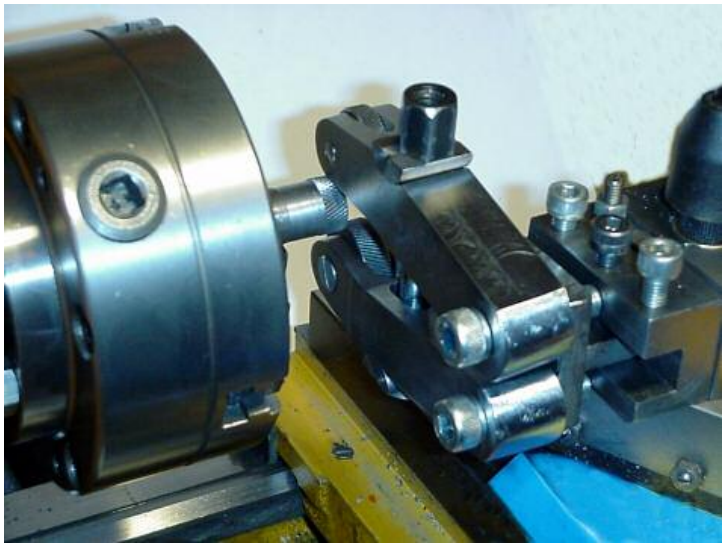
A 19-mm long piece of 14-mm diameter steel rod was drilled through with a 8 mm drill. Then sawn in two lengthvise, and used as top and bottom segment for the pressure screw. The 8 mm hole in the bottom segment was milled oval.
With the arm mounted sideways on the milling table I could mill the crescent shaped recess for the segment. After milling I used a handheld Dremel copy to grind the final shape and to get a smooth surface.

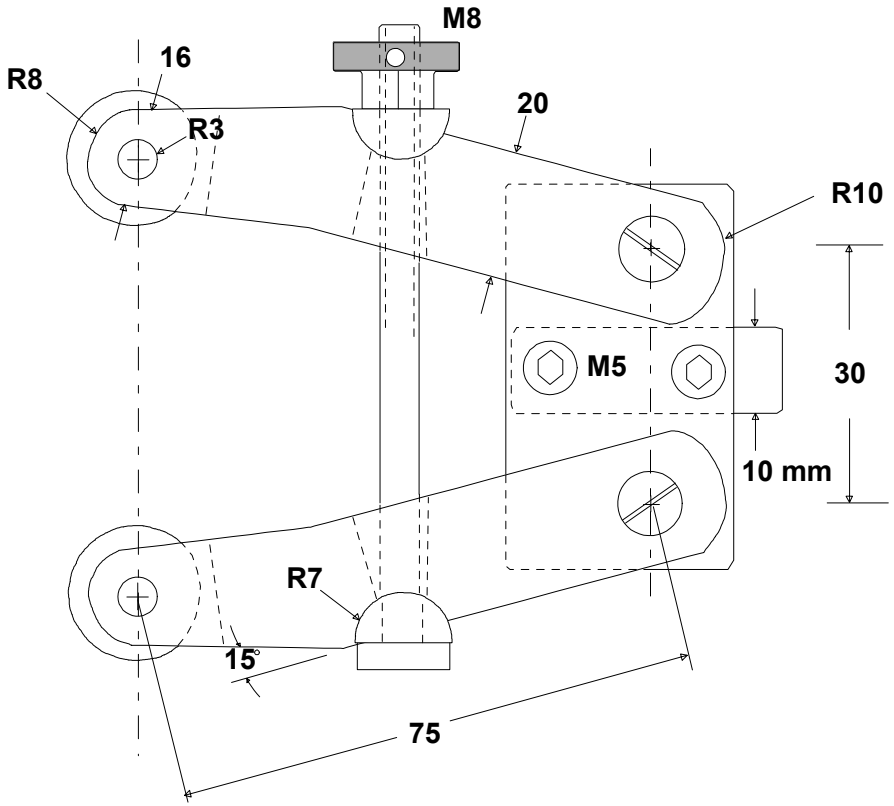
Holder

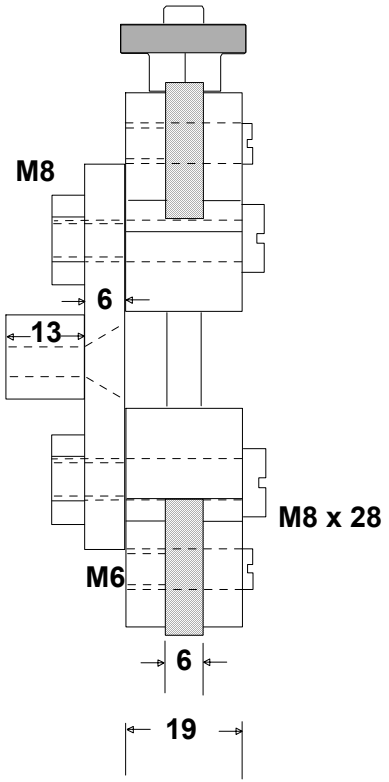
The holder consist of a piece of 6 mm steel plate approximately 50 x 30 mm. A piece of 10 x 13 mm steel is screwed to the steel plate with two countersunk M5 screws. Two holes tapped M8 is used to hold the arms.

Pressure screw and nut

I used a M8 coach bolt of suitable length for the pressure screw. I turned the head down a little and filed the square part close to the head oval to fit the oval hole in the bottom segment. This way the bolt will not rotate in the hole.
The pressure nut was made from a piece of 15 mm diameter steel rod. It was centre drilled, drilled 6.8 mm and tapped M8. One end was turned down to 14.5 mm, the other end was knurled with my new knurling tool (see picture to the right).
Before parting off the nut it was moved to my dividing head and the 14.5 mm diameter part was milled hexagonal so I can tighten the nut with a wrench.







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