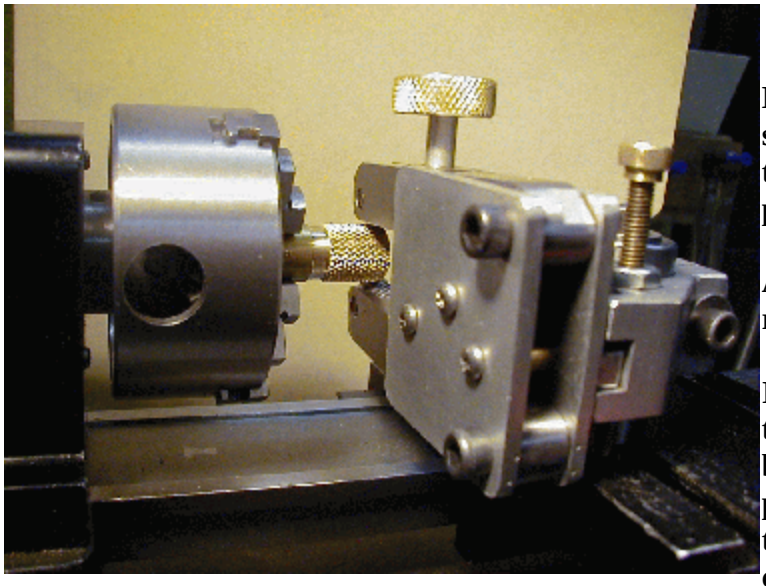
A better knurling Tool for the Sherline Lathe

I am a great enthusiast for the design and quality of Sherline tools. But in my experience, their knurling tool leaves much to be desired.

In spite of my adding some thin, bent washers to the T-slot screws to provide some tension, the tool insists on working itself loose owing to the vibration of the knurling process. The knurling wheels are very difficult to change, especially if you have aging eyes and old, insensitive fingers like mine. And having to use two adjusting screws is not especially cool.

There do not seem to be any other manufactured knurling tools available for our small machines, so I looked around at various plans in our books and websites, and made a better one.

Atkinson's Miniature Knurling Tool

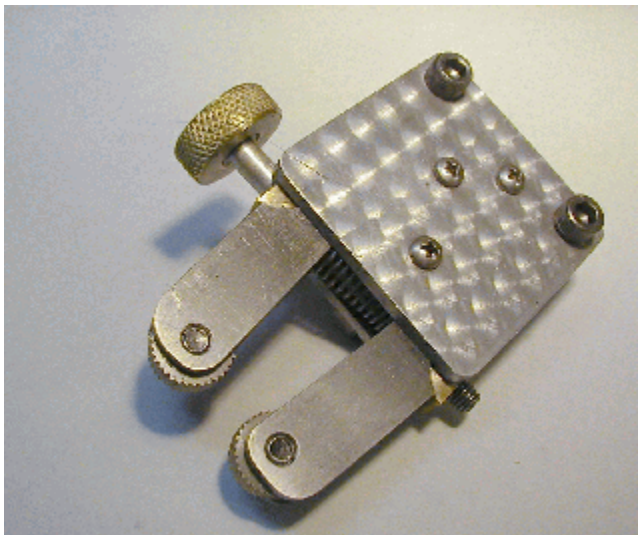


My tool is shown here in a shop-made adjustable toolpost, but it fits Sherline posts as well.

As you can see, it puts on a really excellent knurl.

It's a basic clamp (caliper) type tool sandwiched between two mounting plates, with the mounting tang on the side. The common design for this type of tool, with its mounting tang extending out the back, is rather too long for our small machines.

My design was inspired by the Hemingway model for a Myford lathe. (See: "hemingwaykits.com" under "Tool Holding and Positioning" in the online catalog.

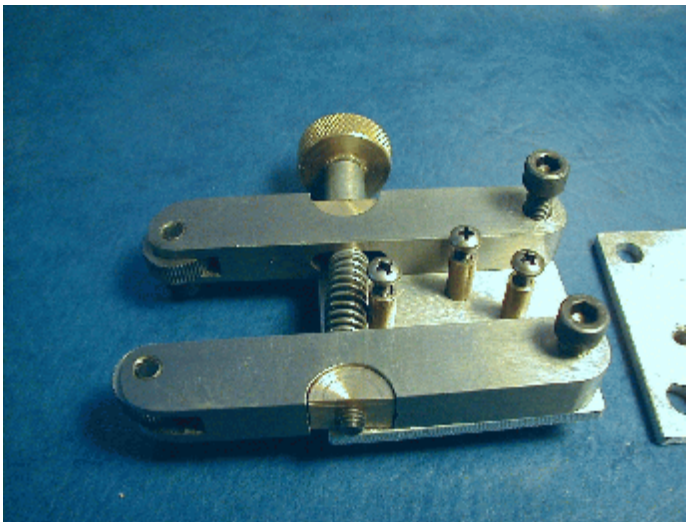


Left side

The side-plates are 1/8" aluminum, 1-3/4" square. This clears the cross slide top so the tool can be used in the right-hand T-slot, although it is normally used in the left slot and hangs over the left side of the cross-slide.

The arms are 3/8 x 1/2" tool steel, grooved 3/16 for the knurling wheels I already had for the Sherline tool.

Hole spacing on the arms is 2-5/8" – centered on the pivot end, offset on the wheel end. The pivot screws and axles are 10-32 Allen Screws. (I have placed a file for the tool to make the surface treatment as "Damascening Tool")



Anatomy

The interior view shows the brass spacers, slightly over 3/16" long and carefully matched. The Phillips screws are 4-40. *The uppermost of the three might be dispensed with.*

The clamping mechanism is made from a long 10-32 Allen screw with knob (knurled with the then unfinished tool) Loctited on, and with a sleeve to space the knob safely away from the lathe chuck. The spring is from the hardware store.

(The photo also shows my bunged-up hole in the plate to the right!)

The picot screws will last forever, but I may find myself replacing the axles after a while. Bronze sleeves, or bronze pins might be a good ideal right from the start if you intend to give the school really heavy usage.

I cut the slots in the arms with a slotting saw, and the bearing half-rounds with a 1/2" end mill, on my Grizzly mill/drill. But a 3/16" end mill in the Sherline mill could make the slots as well, if more slowly, and the bearing circles can be made by clamping the two arms side-by-side and drilling a 1/2" hole exactly on the intersection between them and centered between the ends.

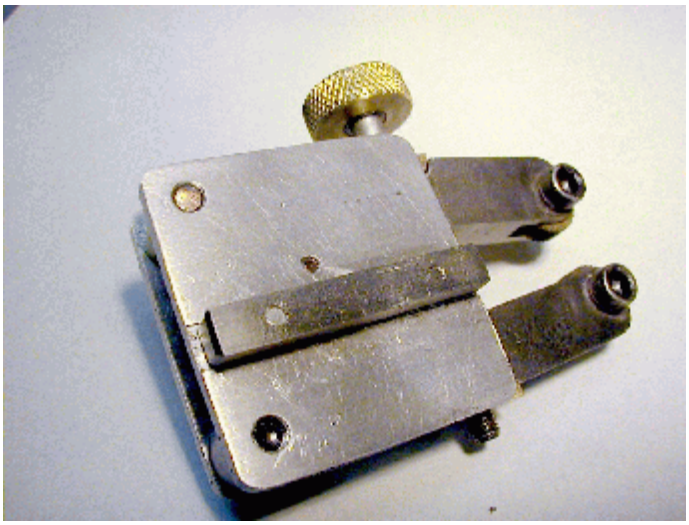
The brass bearings are best made in these steps:

Drill a 10-32 tapping hole perpendicularly through a 1/2" brass rod (faced), spaced a little less than 3/16" from the end so the hole will be approximately centered in the part when it is cut off a bit less than 3/8" - for easy clearance between the plates.

Cut a slot as thin as you can, at least 3/8" deep in the end of the rod, bisecting it.

Cut off a little less than 3/8" of the bisected rod by sawing or parting off.

There will now be two separate pieces. Tap the hole in one piece10-32; open the other hole out to 3/16". Done.



Right side

Shows the mounting tang which is ¼" keystock.

Note that it is set in a groove, just visible at the left end. This is to facilitate location and assembly. *<u>The top edge should be on the centerline of the plate.</u>*

Mill the slot first. Make the tang and drill #4 tapping holes a little less than ½" from the tang's centerline. Spot from these holes and drill clearance holes in <u>both</u> plates. Tap the holes in the tang. *(Location of the front hole is somewhat critical – it may interfere with the arms when knurling very small diamters (as when making a "poor man's press fit").)*

I have posted a separate file showing a diagram for the hole locations in case you really want to make one of these tools for yourself. Sorry, I haven't mastered a drawing program yet.

Assembly Instructions

If you do build this tool, you will wish you had the proverbial third hand in assembling it unless you follow these steps:

1. **Insert one of the small screws through the left-hand plate, then through its spacer and through the right-hand plate; then screw it into the mounting tang engaging just a few threads. This will hold things well enough to insert the remaining small screws easily.**

2. **Tighten these screws finger tight.**

3. **Assemble the arms complete with their knurling wheels, adjusting screw, bearings, and the spring, and insert into place.**

4. **Insert the pivot screws.**

5. **Tighten everything down and the job is done.**

You may have to tweak things around a bit until everything works smoothly. A little oil helps.

The screws on my tool have not worked loose, but you may have to use a bit of thread-locker. Use the mild version, as you will surely have to adjust or take the thing apart at some point. Clean both screw and hole with alcohol. Screw in not quite all the way. Apply just a tiny dot of thread-locker just within the hole making sure it does not wick back all the way to the inner surface of the plate, and tighten the screw all the way. That should do it.

Final Notes

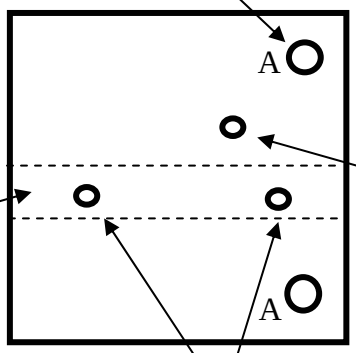
I haven't used the Sherline tool since I made mine. In fact, I made two, one for each type of wheel, and I saved the template I used for the plate holes in case I want to make others for different size knurls.

While searching the web for this project, I found two interesting plans for side-mounted tools. Both are open designs and the "carter" one has the clearest instructions I have ever seen. This type of design may be easier to fabricate than mine. See: "cartertools.com/knurl.html" and "iwr.ru.ac.za/~iwdf/lathe/knurl.htm"

Side Plates – 1/8” Aluminum

(A) Clamp plates together. Drill # 19, tapping hole for 10-32 thread – two places. Then open left-hand plate, ***only,*** to 3/16”.

1/4” from edges – two places



Center-line of plate

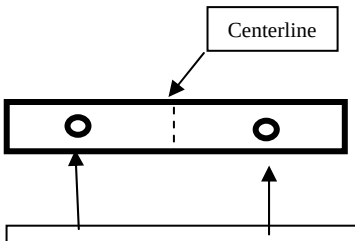
Drill #43, then open out to #31, ***left hand plate only***. Then tap the right-hand plate 4-40. ***<u>This screw may not be necessary</u> and can be dispensed with.***

¼” groove in ***outer*** surface of right-side plate.

Make the mounting tang first, and cut the groove on the outside of the right-hand plate. Then clamp both plates and the mounting tang (in its groove) together and, using the tang as template, drill #43 both plates. Then open these holes out to #31 in both ***plates only***, leaving the tapping hole in the tang. Tap tang holes 4-40, after spotting operation.

Mounting Tang ¼” Steel, 1-3/4” long

MAKE THIS FIRST!



Drill #43 tapping holes for 4-40 screws, ½” from centerline – two places. Spot holes in plates using this as template. ***<u>Tap holes later</u>.***