How to knurl on a lathe with a scissor knurl tool

This procedure explains how to knurl on a lathe using a scissor knurl tool mounted in the tool post. You position and center the tool, set the depth, feed the rollers across the workpiece, and inspect the pattern. The procedure also covers a second pass for harder steel and material-specific tips.

Purpose

This SOP describes a repeatable method for producing a consistent, high-quality knurl on a cylindrical workpiece. It uses light roller contact, a controlled depth setting, low lathe speed, and a steady feed.

Scope

This procedure applies to knurling with a scissor knurl tool on a lathe. It covers a first pass, an optional second pass on harder material, final inspection, and guidance for aluminum, steel, and knurling up to a shoulder.

Required equipment and PPE

- A lathe with a chuck and a tool post
- A workpiece that is securely mounted in the chuck
- A scissor knurl tool installed in the tool post
- A suitable lubricant (kerosene for aluminum)
- A wrench, if you want to apply extra tightening pressure (optional)
- Personal protective equipment: this procedure does not specify any, so follow your shop's standard safety requirements

Procedure

Part 1: Set up the knurl tool

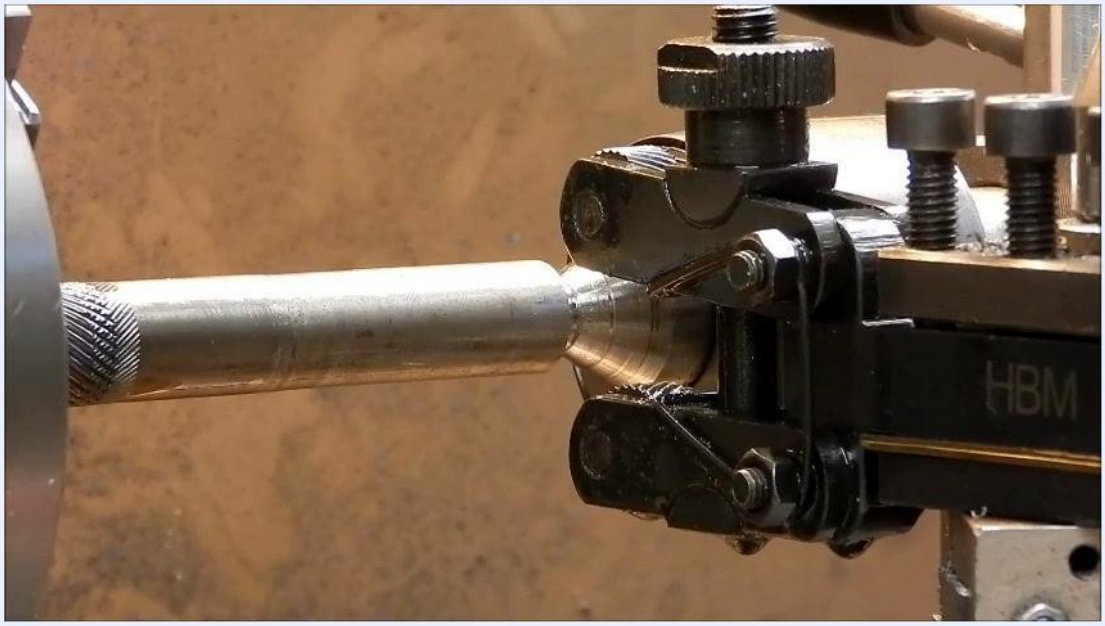
Step 1. Prepare the lathe and workpiece

Make sure the workpiece is securely mounted in the lathe chuck. Confirm the scissor knurl tool is installed in the tool post and aligned with the workpiece. Keep the work area clean and free of obstructions.

Step 2. Bring the knurl tool to the workpiece

Move the scissor knurl tool toward the workpiece until the knurling rollers are close to the area you want to knurl. Align the tool by eye so the rollers are centered on the knurling location.

> **Note:** Do not engage the rollers yet.



Scissor knurl tool positioned near the cylindrical workpiece, with the rollers close but not yet engaged

Step 3. Center the knurl tool

Advance the knurl tool carefully so both rollers sit equally on either side of the workpiece. Confirm the rollers are centered on the job for even knurling.

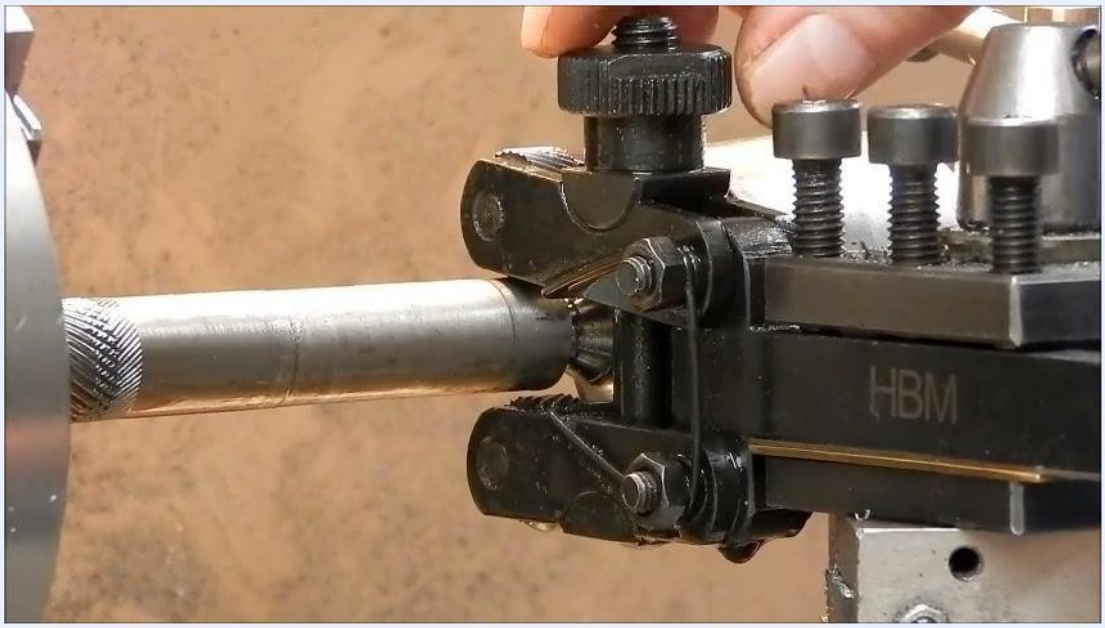


Scissor knurl tool rollers aligned and centered on the workpiece, ready for engagement

Step 4. Engage the knurl rollers

Tighten the knurl knob by hand until the rollers lightly touch the workpiece. Tighten it finger tight only.

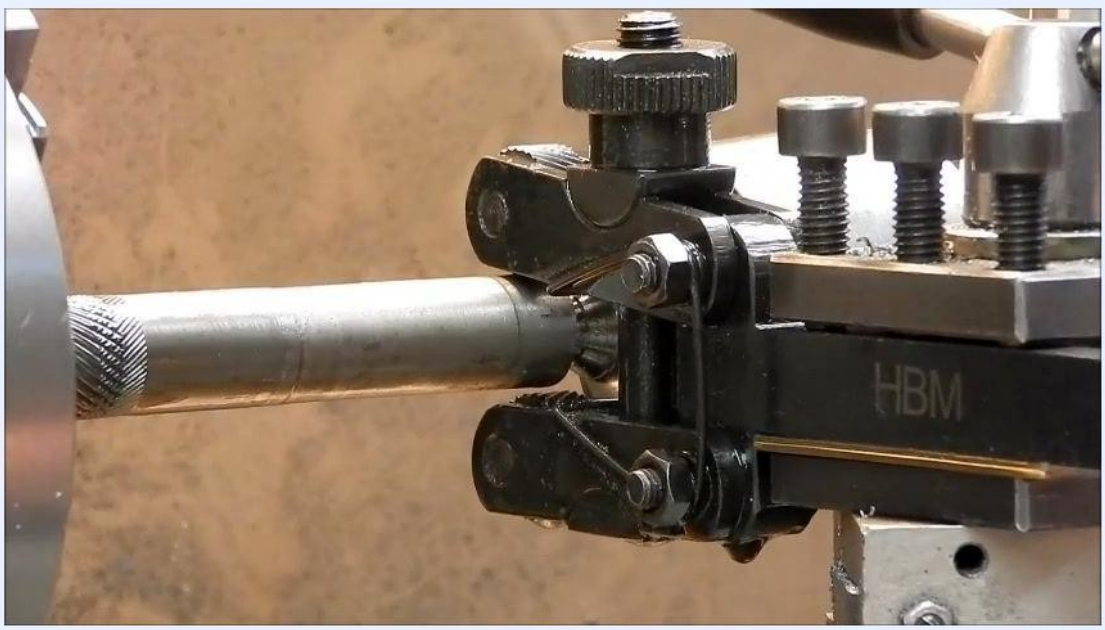
> **Caution:** Do not use excessive force at this stage.



Hand adjusting the knurl knob while the rollers just contact the workpiece, with the tool post and adjustment screws visible

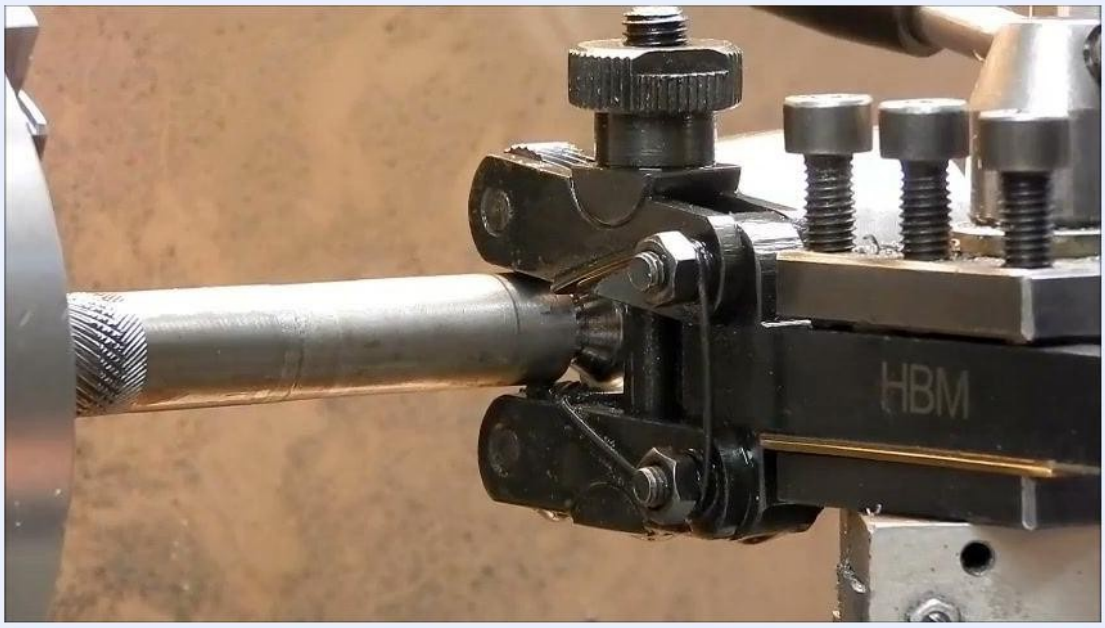
Step 5. Verify roller engagement

Move the tool in and out slightly to check that both rollers contact the workpiece. Confirm the rollers are properly engaged and centered.



Knurl rollers in contact with the workpiece, aligned, with the tool post and adjustment screws visible

Step 6. Back off and lubricate
With the rollers in finger-tight contact, back the knurl tool off slightly. Spray the workpiece area with a suitable lubricant to reduce friction and improve knurl quality.



Knurl tool in the finger-tight position, ready for lubrication, with the rollers at the workpiece

Step 7. Set the lathe to low speed
Set the lathe to its lowest gear or slowest speed setting.

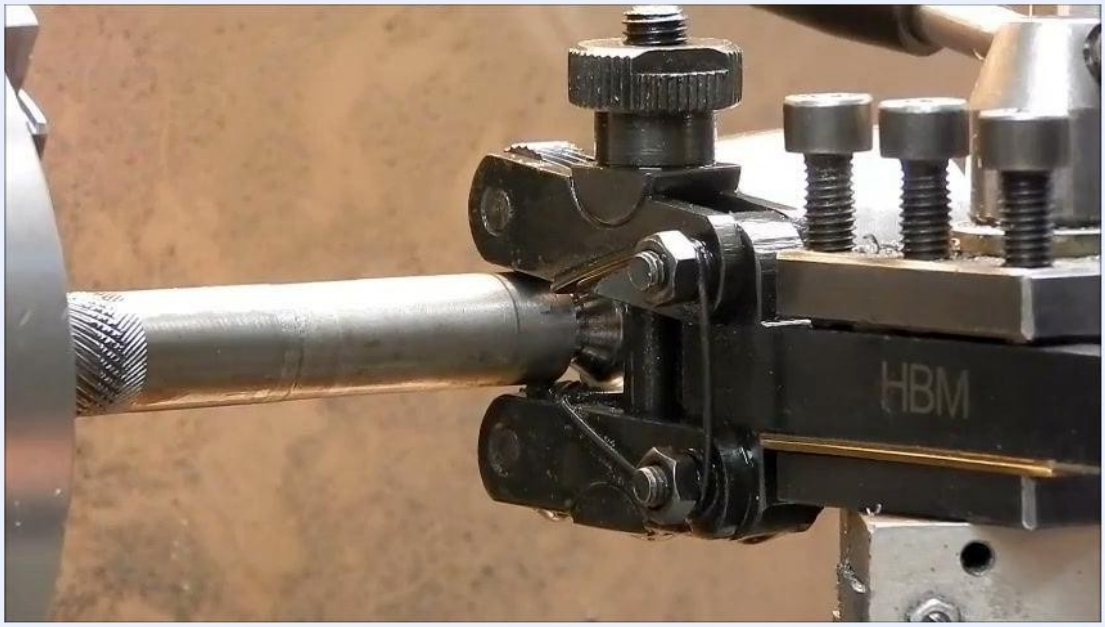
> **Caution:** Low speed is critical for proper knurling and helps you avoid damaging the tool or the workpiece.

Part 2: Knurl on a lathe (first pass)

Step 8. Set the knurl depth
Advance the knurl knob to set the depth of cut, starting from the point where the rollers just touch the workpiece.

- For a heavy knurl, turn the knob up by approximately one third of a turn.
- For a lighter knurl, turn the knob up by a quarter turn.

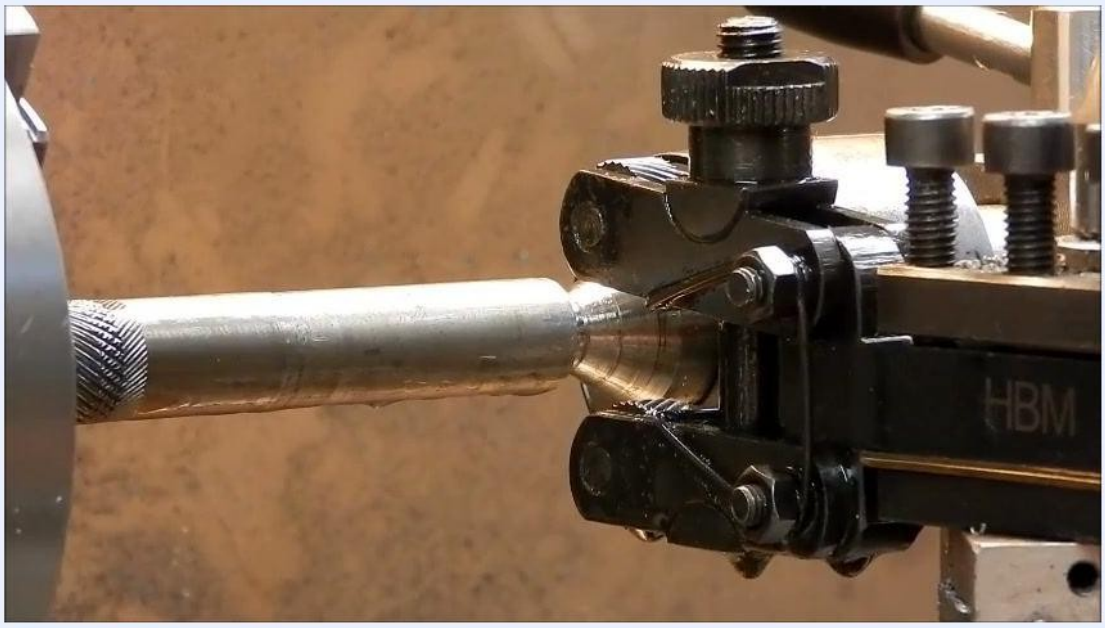
This example uses a heavy knurl, so turn the knob one third of a turn.



Hand turning the knurl knob to increase depth while the rollers stay engaged with the workpiece

Step 9. Start the lathe and begin knurling

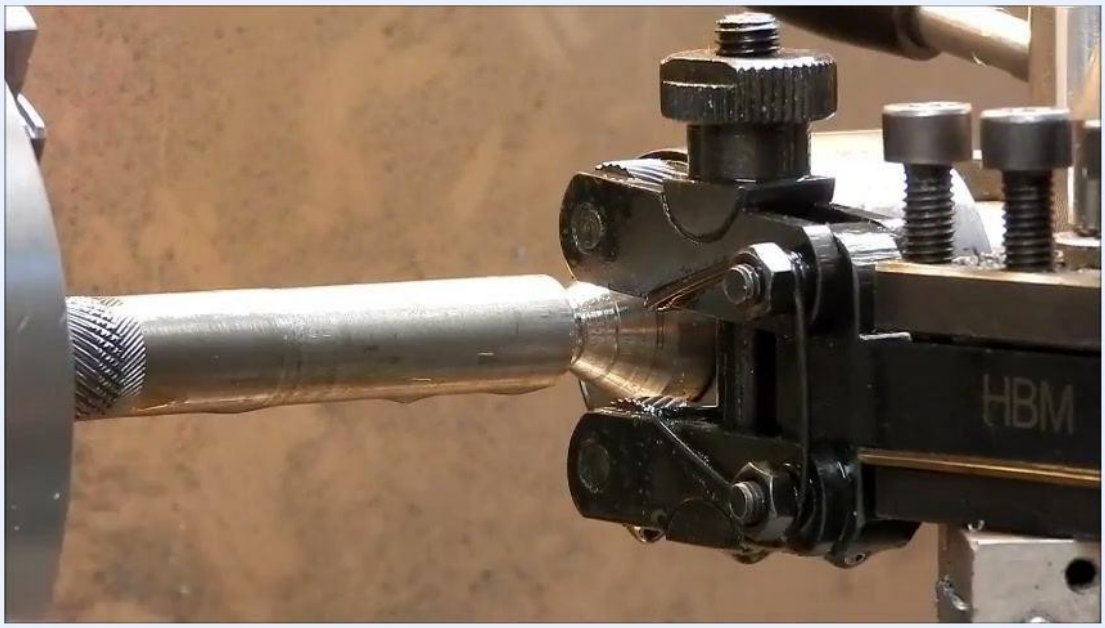
Start the lathe at the low speed you set. Bring the knurl tool into the workpiece to begin knurling. Watch the process to confirm the knurling is even and the tool is engaging properly.



Finger pointing at the knurl knob while the lathe runs and the knurl tool engages the workpiece

Step 10. Feed the knurl tool into the workpiece

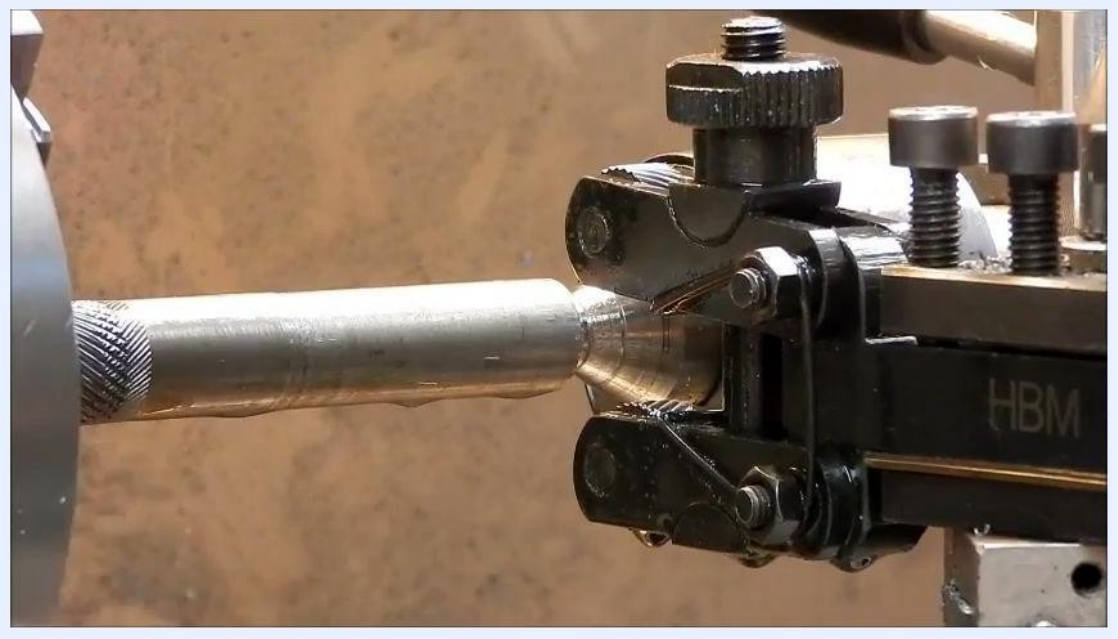
Advance the tool until the knurl pattern begins to form. Make sure the rollers are aligned and making full contact with the workpiece.



Knurl tool rollers engaged with the workpiece as the knurl pattern begins to form

Step 11. Position the tool on center

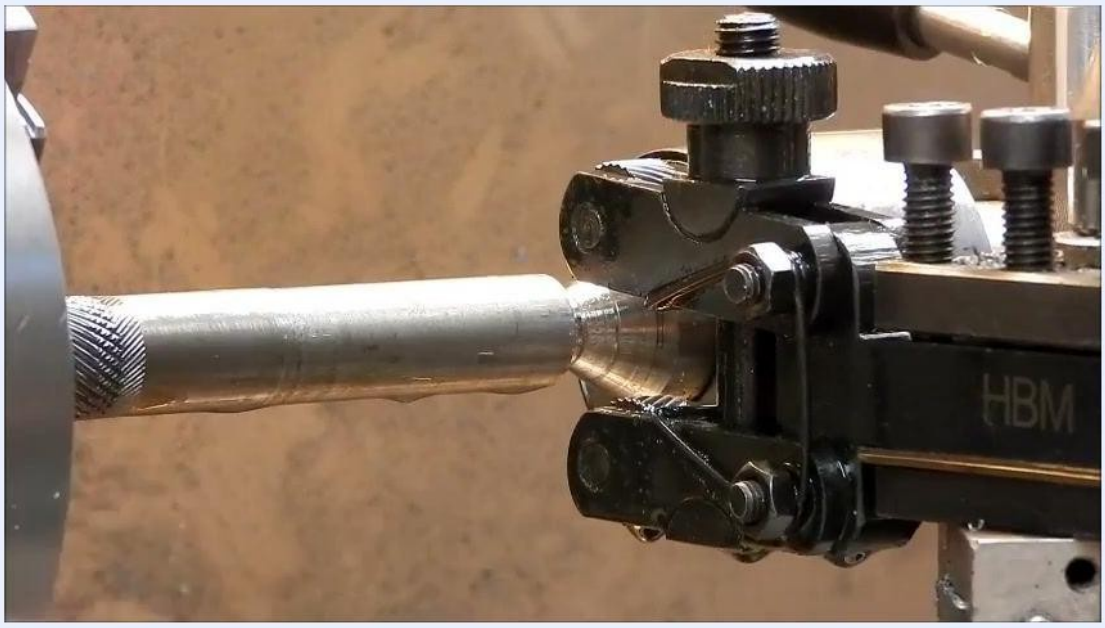
Move the knurl tool so it is centered on the workpiece. Confirm the rollers are evenly positioned for a uniform pattern.



Knurl tool centered on the workpiece with the rollers in contact

Step 12. Feed the tool across the workpiece

Feed the knurl tool along the axis of the workpiece to extend the pattern across the length you want. Keep the feed steady so the knurl stays even and consistent.

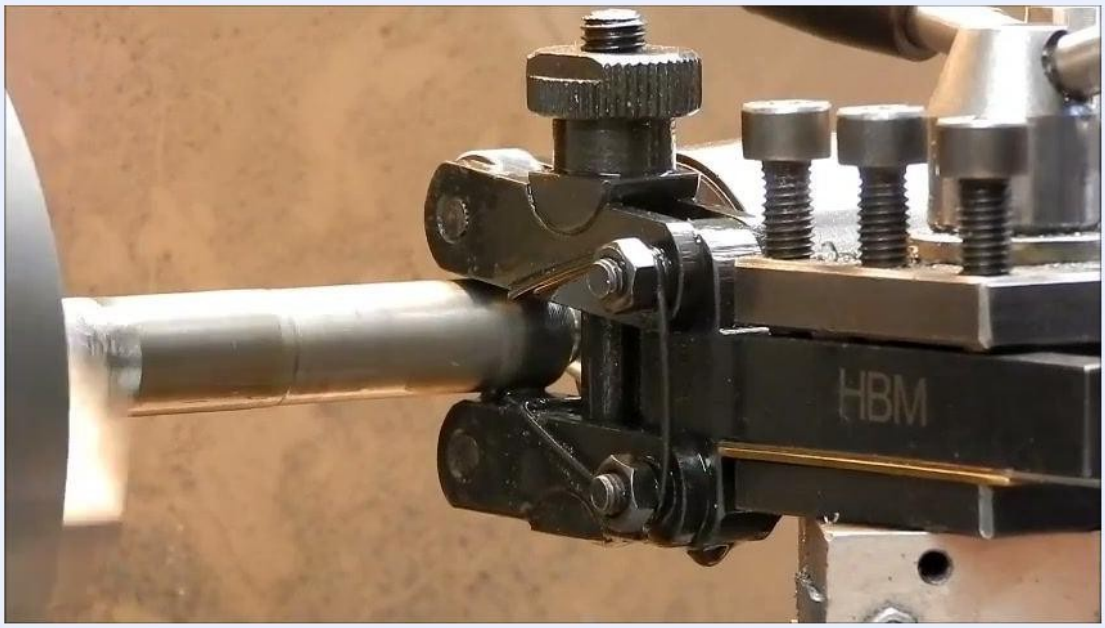


Knurl tool feeding across the workpiece with the rollers engaged and the knurl pattern extending

Step 13. Use a coarse feed rate

Set the lathe feed to a coarse setting, approximately 140 RPM as recommended for knurling. Let the knurl tool roll onto the job naturally. The tool climbs onto the workpiece as you feed it across.

> **Caution:** Do not force the clamp down.



Knurl tool feeding at a coarse feed rate with the rollers engaged

Step 14. Continue rolling the knurl

Keep feeding the tool across the workpiece and let the rollers form the pattern without excessive pressure. Do not overtighten the clamp. Simply roll the knurl into the job.



Knurl tool rolling across the workpiece as the knurl pattern forms

Step 15. Back off the knurl tool

When the knurling reaches the length you want, back the tool away from the workpiece to disengage the rollers. Stop the lathe if necessary before you inspect the work.



Knurl tool backed off from the workpiece after the knurling operation

Step 16. Inspect the knurled surface

Examine the workpiece to assess the quality and depth of the knurl pattern. Check that the knurling is uniform and complete.



Workpiece with a completed knurl pattern and the knurl tool disengaged, giving a clear view of the knurled surface

Step 17. Decide whether a second pass is needed

If the knurl is not deep or pronounced enough, make a second pass. This is most likely on harder steels. Plan to re-engage the tool, increase the pressure slightly if needed, and repeat the process to deepen the pattern.



Workpiece with a visible knurl pattern, ready for a possible second pass

Part 3: Second pass on hard steel (if required)

Step 18. Prepare the workpiece for the second pass
Get the workpiece ready for another pass, with the original knurl pattern visible.



Hand adjusting the workpiece in preparation for a second knurling pass, with the knurl pattern visible

Step 19. Align the tool with the original pattern

Move the knurl tool back into position, aligned with the original knurl pattern. Make sure the tool is set to the correct depth and ready to re-engage the workpiece.



Knurl tool and workpiece aligned and ready for another pass, with the knurl pattern visible

Step 20. Set up the second pass
Position the knurl tool in the correct location, aligned with the original pattern. Confirm the depth is set and the tool is ready to engage the workpiece.



Knurl tool aligned with the workpiece, with a clear view of the existing knurled pattern

Step 21. Feed across with increased load
Start the lathe at a slower speed to suit the harder steel. Feed the knurl tool across the workpiece with more load than in the first pass to deepen the knurl. Make sure the tool tracks the original grooves.

> **Note:** You may see some steam or smoke because of the increased friction and the hardness of the material.



Knurl tool feeding across hard steel under increased load as the knurl pattern forms

Step 22. Monitor the knurling process

Watch for excessive resistance or heat, such as steam coming off the workpiece. Keep the feed steady, avoid forcing the tool, and let the rollers do the work.



Knurl tool in operation with a steady feed across the workpiece

Step 23. Back off the knurl tool

When the knurl reaches the depth and coverage you want, back the tool away to disengage the rollers. Stop the lathe if necessary before you inspect the work.



Knurl tool disengaged, with the completed knurl pattern visible on the workpiece

Step 24. Inspect the final knurled surface

Check the workpiece for a uniform, deep, well-formed knurl pattern. Check that the edges are clean and the knurling extends to the length you want.



Close-up of the completed knurl pattern on the workpiece held in the chuck

Step 25. Use a wrench for extra tightening (optional)

If you need a deeper knurl, use a wrench on the knurl tool to apply extra pressure. The tool has a provision for a wrench to assist with tightening.



Hand adjusting the knurl tool, with the wrench provision visible and the knurled pattern clear

Step 26. Choose your adjustment method

You can tighten the knurl tool down with a wrench, or set it up and roll it onto the job as shown in this procedure. Both methods are valid. Choose based on your preference and the requirements of the job.



Knurl tool and workpiece after the final pass, showing the completed knurl

Material and finishing guidelines

Apply these guidelines whenever you knurl on a lathe.

- **Aluminum:** Use kerosene as a lubricant to achieve a cleaner pattern.
- **Steel:** You can knurl dry, as shown in this procedure.
- **Sequence:** Knurl early in the machining process, then machine up to the edge of the knurl. This gives a smooth, clean transition and avoids jagged edges.
- **Shoulders:** When you knurl up to a shoulder, align the tool properly to avoid damaging the edge. Feel the transition to confirm the edge between the knurled and unknurled sections is smooth and clean.

Verification and summary

Examine the finished workpiece and confirm the following:

- The knurl is uniform and consistent.
- The knurl has the depth you want.
- The edges are clean.

- The pattern extends to the length you want.



Close-up of the completed knurled workpiece held in a chuck, with the knurl tool disengaged and a clean transition to the machined section

To summarize, set the rollers to finger-tight contact, lubricate, run the lathe at low speed, and roll the knurl onto the job with a steady coarse feed. If the first pass is too light, make a second pass with slightly more pressure, keeping the tool tracking the original pattern. Wrench-tightening and finger-tightening are both valid, so use the method that fits your workflow. Always inspect for clean edges and a uniform knurl, and adjust your technique to the material and the finish you want.