

# Ten steps to a smooth lathe

by Dennis Belcher, photos by Roger Young

Your lathe should be a pleasure to use, not be something that causes stumbles. The key to a smoothly running lathe is systematic, step-by-step maintenance. You need to concentrate on what you're turning, not on your balky machine.

A balky lathe can be of any age; new machines need care as much as vintage ones. Details will

vary among manufacturers, but the basics are common to all. Methodically working through each part in order will put any lathe right. But first, there are three basic tuning operations will need to be repeated on nearly every part of the lathe. They are:

- file maintenance,
- cleaning,
- lubrication.

## File maintenance

Sometimes called fettling, file maintenance means running a clean bastard-cut mill file across flat surfaces and edges, not to remove metal but to knock down ridges and burrs. File maintenance needs to be done upon acquiring any new-to-you lathe, though very rarely afterward.



**File maintenance** 1353, 1360, 1369. Use a bastard-cut mill file to knock down any burrs on surfaces and edges. Use light pressure.

Dings and burrs, which result from metal parts hitting each other in action, will impede the movement of the tailstocks and banjo. Lay the file flat on the ways, the bottom of the tailstock and the bottom of the banjo and run it lightly across the surfaces to knock down any high points of metal.

Next, address the edges. Angle the file diagonally and run it across the edges as shown. Relieving the edges aids free movement, so all edges should be relieved. Many new lathes will arrive with edges relieved and it is simply a matter of maintaining their clean condition.



**File edges** 1369. For free movement, angle the file to clean up inside edges.



## Cleaning

Wrapping a block of wood with 180- or 220-grit emery cloth and running it across a metal surface removes rust and machining marks, and improves abuse. Wetting the emery cloth with mineral spirits helps loosen stubborn debris. Use clean paper towels to remove grit and residue.

Mineral spirits, or naphtha, will dissolve built-up grime. Use mineral spirits with either a green (400-grit) or maroon (600-grit) non-woven abrasive pad. Wipe clean with fresh paper towels, and be sure to remove all the grit from the metal surfaces.



**Cleaning 1366.** Wrap emery cloth around a flat surface and run it over the ways to remove spilled finishes, rust, and high spots. Use mineral spirits as a lubricant to soften grime.

## Lubrication

For the ways and the undersides of tailstock and banjo that slide on them, either paraffin wax or car wax makes an excellent lubricant. Find bars of paraffin wax in the canning section of a hardware store; any can of paste wax for cars will work. Load a fine, non-woven abrasive pad with the wax and apply evenly. The non-woven abrasive will help remove wood sap, spilled finishes, and excess wax from the ways. Finish by polishing with a fresh paper towel.

Moving parts inside the banjo and tailstock also need lubrication but with something that retards



**Lubrication 1377.** Load a non-woven abrasive with wax and apply to sliding surfaces, then polish off the excess with a clean paper towel.

dust. Oil-based lubricants attract and hold dust, but dry lubricants are formulated to resist dust. Search for “dry lube” and closely inspect the

label for language indicating it won't attract dust. And be sure not to get any lube, oil or dry, on a workpiece because it will mess with most finishes.



## 1. Lathe ways

Remove the tailstock and banjo and set them aside. Go through the file maintenance process on the ways and be sure to address the top, inside edge, and bottom surfaces. If any surface needs further refurbishment, work through the emery cleaning process. Your fingertips should feel smooth metal everywhere on the ways and their edges. If your lathe has a removable bed section, clean it up the same way.

Clean all the faces of the ways, and do not neglect the inside edges of the ways that guide the tailstock.

Not all way faces should be lubricated. The underside of the ways need to provide a solid grip for the locking plates of the banjo and tailstock. Clean, bare metal is the goal here, without any lube or wax.

If your lathe has a removable bed or a swing-away tailstock, treat it same as the ways. Also, be sure to clean, wax, and polish the mating surfaces that guide and hold the removable bed.

**Removable bed 1383.** Lathes with removable beds should have all edges chamfered with a file and all surface cleaned.



**Inside edges 1374.** Clean the inside and underneath sides of the ways. Finish with a clean paper towel.



**Sliding bed 1384.** Thick build-up of grime impedes the movement of this sliding bed.

When the surfaces are thoroughly smooth and clean, move on to lubrication. Load non-woven abrasive with paraffin wax, or car polish, and rub it on the ways. The abrasive helps spread the wax across the entire surface of the ways and their inside edges, but not the undersides. Polish with a clean paper towel.





**Locking nut 1387.** You'll need a wrench to remove the banjo locking nut and pressure plate.

## 2. Banjo

Remove the banjo and place it downside-up to remove the locking nut and locking plate. Work through file maintenance, cleaning, and lubrication.

Clean the eccentric locking rod underneath the banjo so that it rotates freely. Remove any rust with emery cloth and wipe away any residue. Dry-lube the rod to avoid dust buildup. Also clean and lube the ends of the locking rod.



**File the banjo 1390.** Place a file flat across the bottom of the banjo and run it over the full length. Use a light touch. Do the edges too, inside and outside.

Clean the locking plate but no lube, because contact under the ways is what holds the banjo in place. It needs a firm grip against the forces of turning.

The banjo lever turns the eccentric rod, drawing the locking plate up against

the ways. There is a sweet spot where you can apply maximum locking force and yet freely move the unlocked banjo. You may need to adjust the nut to find that sweet spot.

Return the banjo to the ways to inspect and clean the toolrest post hole. Inserting a



**Eccentric rod 1399.** Remove rust and grime from the locking rod with mineral spirits and non-woven abrasive. Do not wax.



**Dry lube 1402.** Apply a dry lubricant that does not attract and hold dust to the locking rod.



**Rod ends 1406.** Clean both ends of the banjo locking rod. Lubricate with a dry lubricant.

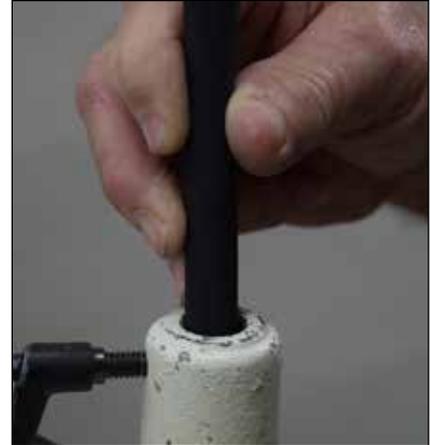
## *Banjo continued...*

finger will identify ridges. Low spots will not interfere with smooth movement, but high spots will. Wrap emery cloth around a dowel and abrade them away.

Clean any grime inside the post hole with rolled up non-woven abrasive and mineral spirits and wipe clean. If the toolrest does not move freely, use emery cloth. Finally, remove the toolrest clamp handle. Clean the threads and inside and out, and dry-lube.



**Locking plate 1405.** Locking plates can be circular or rectangular. They should be cleaned, but not waxed or lubricated.



**Post hole 1413.** Clean inside the post hole with rolled up non-woven abrasive.

## 3. Toolrest

Clean the toolrest post and examine it for marks or scoring. Remove any ridges with emery cloth or a file; low spots are no problem. Remove grime with a clean paper towel and mineral spirits.

The toolrest should not encounter resistance as it enters the banjo. Inspect the end of the toolrest post, its edge should be chamfered. Dry lube aids smooth movement.



**Toolrest post 1424.** Remove dings on the toolrest post with emery cloth, or a file.



**Chamfer 1421.** Relieve the end of the toolrest post so it easily enters the post hole.

If the toolrest itself is soft steel, remove any dings with a bastard-cut mill file. Here, low spots are as much a concern as high spots -- any variations will be transferred to your turnings.

If the toolrest is hardened steel, remove dings by filing with a diamond honing card or diamond sharpening stone.

It is important that the toolrest is true across its entire length, so draw-file it end to end.



**Toolrest 1428.** Draw a file with both hands over the full length of the toolrest to remove any dings.



**Tailstock-1439.** Run a mill file over the flat bearing surfaces and each edge.

## 4. Tailstock

File, clean and wax the working surfaces of the tailstock. Remove the locking plate, which might be round or rectangular. Both types apply force against the underside of the ways to lock the tailstock in place. For a good grip, clean the plate with mineral spirits and non-woven abrasive but don't lube it. This makes a tremendous difference in how easily your tailstock moves.

Remove grime, rust and residue from the ends of the locking lever in the tailstock with toothbrush and mineral spirits, then dry-lube. Also clean and lube the spring and posts, if the locking plate has them.

Like the banjo, the tailstock mechanism has a sweet spot. If the tailstock slips, or is difficult to move, you'll need to adjust the locking nut to find it.



**Quill 1039.** A dirty or damaged quill compromises all operations of the tailstock. Clean it with mineral spirits and a twisted paper towel.



**Quill channel 1449.** Remove any dings from the quill channel with a file on edge, clean the outside of the quill, and dry-lube.

## 5. Quill

Return the tailstock to the ways for easy access to the quill and hand wheel. Use a stiff brush to remove accumulated dust where the hand wheel shaft enters the tailstock and apply a dry lubricant. Clean the inside of the quill with mineral spirits and a twisted paper towel, a brush, or a Morse taper cleaner. Its condition is crucial to all tailstock operations. Insert a finger to feel for any ridges and remove them, though low spots are not a concern.



**Locking lever 1445.** Use a small stiff brush to clean and lubricate the locking lever on the tailstock.

Use the hand wheel to advance the quill. If it can be removed, do so. Remove any dings in the walls of the channel that runs the length of the quill with a mill file on edge and wipe away any metal filings. Some tailstocks have a screw that rides in this channel. A burr can develop and interfere with smooth movement. Clean the outside of the quill with mineral spirits, dry-lube, and polish.

Finally, Unscrew the tailstock spindle lock to inspect and clean the threads.

## 6. Headstock

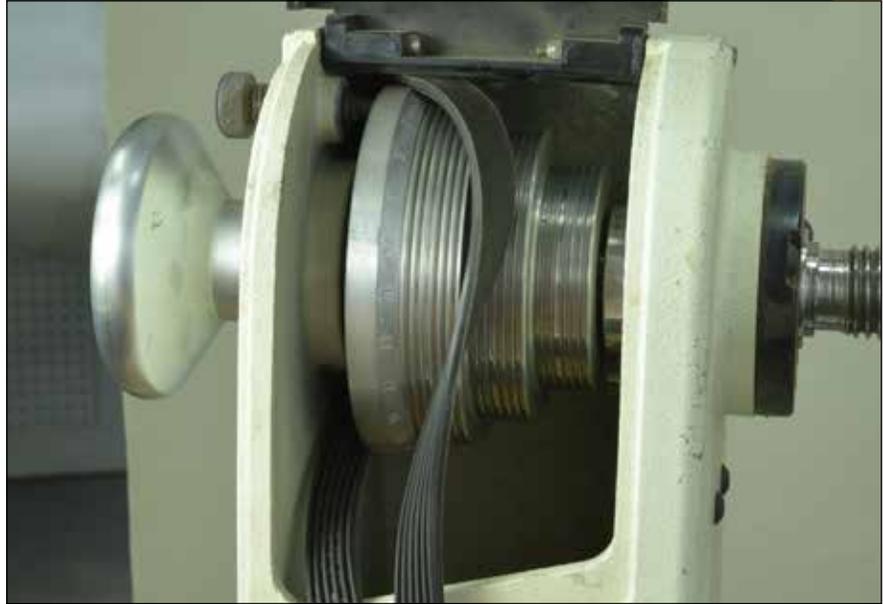
The quill of the headstock should be addressed in the same manner as the tailstock quill. Clean the Morse taper, but do not lubricate it.

Grime on the spindle shoulder will make chucks difficult to seat and unscrew. Thoroughly clean the flat.

If the headstock is movable, slide it to the far end of the lathe, clean the ways, wax and polish where it normally would sit. Again, do not wax the underside of the ways. Use a wrench to remove the locking plate and clean in the same as you cleaned the tailstock locking plate. If there are slippage issues with the headstock, address the slippage in the same manner as the tailstock.

## 7. Bolts

Bolts and nuts on a lathe will loosen and each fastener should be periodically checked. Bolts may be used to fasten the lathe bed to its stand, to lock down the headstock, as a part of the motor mounting and in a multitude of other functions. Take your time and check each bolt and nut. They should be tight, but do not over-tighten. Nuts/bolts that have a pattern of loosening can be locked down with a thread-locking compound.



## 8. Belt and pulleys

On most lathes, a belt transfers power from the motor to the spindle. The belt and pulleys need to be in good condition for efficient and consistent transfer of power. There is a simple test of belt condition. First unplug the lathe and loosen the belts. Use your finger to check the underneath side of the belt. It should have no fraying, cuts, or cracks. It is best to replace a belt before it breaks when the lathe is running.

If there is any grime on the underside of the belt, or dirt buildup in the pulleys, remove it. Loosen the belt and turn it inside-out to clean the underside with a toothbrush. Thoroughly brush away any buildup. Use a toothbrush, or a brass brush, to clear any debris from the pulleys.

**Belt and pulleys 1452.** Check the condition of the belt and pulleys, clean everything, and replace any frayed or cracked belts.

## 9. Motor and electronics

It is a good practice to clear any dust and shavings from the motor and electronics. Electrical components generate heat, which is cooled with air flow. A buildup of debris inhibits air flow, making the electrical components run hot. High pressure air can damage electrical components, so use low air pressure or a vacuum cleaner.

Inspect the electrical cords and plugs for signs of wear or fraying.





**Alignment** 1457. Check the alignment of the centers, looking down and looking in from level.



**Realign** 1271. Loosening then retightening the bolts holding a headstock to the ways may improve alignment.

## 10. Alignment

The final step in tuning up your lathe is to check the alignment of the headstock to the tailstock. Insert centers with points in both and bring up the tailstock so the points almost touch. Lock down the headstock and tailstock, and tighten the tailstock locking lever to remove play from the quill. If the two are centered on each other, the lathe is in alignment. If the points are off, then the centerline of the lathe is off.

The first corrective step is to loosen the tailstock and see if play in the tailstock is the cause of misalignment. If it is, remember to always nudge the tailstock in the direction that trues the centerline.

With a movable headstock, release the locking lever and turn the headstock to improve the closeness of the two points. Then lock it down.

With a fixed headstock, loosen the hex bolts between the headstock and the ways and use the play to adjust the points, then re-tighten.

If still misaligned, the stand may be causing a twist in the lathe bed, which is showing up at the centerline. Verify that the stand is solid to the floor and then loosen any bolts holding the lathe to its stand. Recheck the centerline gap and if the two points are now aligned, shim the lathe bed so that it does not twist while you tighten it down.

## Conclusion

Simple things can make big differences. A well-maintained lathe doesn't fight you, it simply supports your efforts. Pay attention to your lathe, it will tell you when it needs care. Time spent tuning up your lathe will reward you many times over.

**the article should talk about cleaning and lubing the headstock locking pin and it does not. Dry lube is appropriate. Thinking, clean with a brush, replace the spring if worn, and lube. This would be another picture with caption.**

*Dennis Belcher is a member of the Wilmington Area Woodturners Association. He also demonstrates for clubs; contact him and see more work at [DennisBelcher.com](http://DennisBelcher.com)*



## LATHE pix not used



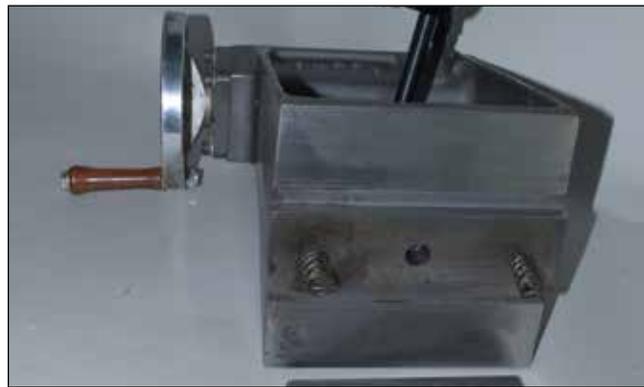
Picture #32 1454  
Caption - Using an air hose with low pressure to clear dust from the motor and controls.



Picture #30 - 1445 - wrong pic this is #27  
Cleaning the threads of the tail stock spindle lock.



Picture #26 - 1473 Note to editor. Use # 1440 with typing in lieu of my printing.  
Caption - After cleaning, lubricate the tailstock surfaces that make contact with the ways.



Picture #25 - 1433  
Caption - Some lathes will have rectangular locking plates and springs.



Picture #18 - 1410  
Caption - Inspect the inside of the tool rest post hole.  
(This picture could easily be left out.)



Picture #20 - 1414  
Caption - Use a stiff brush to clean the threads of the tool rest clamp.

(Again, picture 20 could be deleted.)

## LATHE pix not used



Picture #12 - 1391  
Caption - Remove any dings from the outside edges of the banjo.



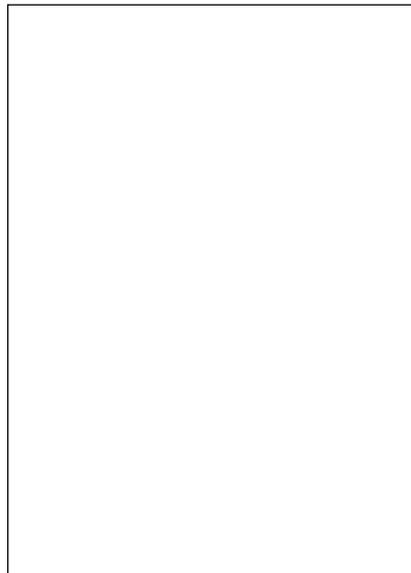
Picture #13 - 1392  
Caption - Also smooth the inside edges of the banjo.

Explore!

The August 2014 issue of the American Woodturner has an in-depth article on maintaining and renewing Morse tapers. This article is a must read.



Picture # 10 - 1377 dupe  
Caption - Load a non-woven abrasive with wax and apply to the top and side surfaces of the ways, but not the bottom.



Picture Lead - 1464  
Caption - The tools of tuning a lathe are simple, but the results are astounding.

Picture #6 - 1374 dupe  
Caption - Cleaning the inside and underneath sides of the ways. Be sure to finish with a clean paper towel.

