

Tuning Your Lathe

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Picture Lead – 1464

Caption – The tools of tuning a lathe are simple, but the results are astounding.



A lathe should not be something that causes stumbles. This article guides you through the steps to a smoothly running lathe. One that is a pleasure to use and not something you fight. A turner needs to concentrate on what is being created, not to have his concentration interrupted by a balky lathe. A balky lathe can be of any age. New lathes need care as much as vintage lathes.

There is a single truth that covers all the varieties and models of lathes, they need care!

This article will step you through caring for your lathe. Lathes will vary, but much is the same. It is still important that you methodically work through each part of your lathe using the steps in this article as your guide to your own specific lathe.

Common Operations

Certain tuning operations need to be repeated on multiple surfaces. For brevity's sake, let's start with an explanation of each process.

File Maintenance – The ways, the bottom of the tailstock and the bottom of the banjo need to have any high points of metal knocked down. These burrs result from metal parts hitting each other. Putting the banjo and tailstock on and off will leave behind a few dings. The raised ridges of the dings serve to impede the movement of the tailstocks and banjo. The first step in file maintenance placing a sharp, clean bastard cut mill file flat on the ways and running it lightly across the surfaces. The intent is to knock down any ridges, not to remove metal.



Picture #2 – 1353

Caption – Use a bastard cut mill file to knock down any burrs on the surface. Use light pressure.



Picture #3 – 1360



Picture #4 - 1369

The second part of file maintenance is to address the edges. Angle a file diagonally and run it across the edges as shown in Pictures 3 and 4. Relieving the edges aids free movement. All edges should be relieved. Many of today's lathe will come with edges relieved and it is simply a matter of maintaining the edge.

Lathes should be cleaned and lubricated frequently, but filing is rarely needed.

Cleaning

Wrapping a block of wood with 180 – 220 emery cloth and running it across a metal surface removes rust, or machining marks and will improved abused surfaces. Wetting the emery cloth with mineral spirits aids in removing any abraded debris. Use a clean paper towel to remove any grit and residue.



Picture #5 – 1366

Caption – 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.

Picture #6 - 1374

Caption – Cleaning the inside and underneath sides of the ways. Be sure to finish with a clean paper towel.



Mineral spirits, or naphtha, is a good choice for dissolving the built-up grime on a lathe. Combining mineral spirits with either a green or maroon non woven abrasive is an effective combination. The mineral spirits loosens the grime and the abrasive removes it. The final step in the cleaning process is to wipe clean with a fresh paper towel. It is important that all the grit is removed from the metal

surfaces.

Picture #7 - 1377

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



Lubrication – Either paraffin wax from the canning section of a hardware store, or car wax, are excellent lubricates. Load a non woven abrasive pad with the wax and apply evenly. The non woven abrasive will help remove any wood sap spilled finishes, or excess wax from the ways. Finish by polishing with a fresh paper towel.

Oil based lubricants attract and hold dust. Dry based lubricants are formulated to avoid dust retention. Closely inspect the label and instructions on the brand that you select. Look for the language indicating the lube won't attract dust. These products are readily available with a search for "Dry Lube". Dust build inhibits free movement of metal parts.

The Ways

Remove the tailstock and banjo and set them aside. Go through the file maintenance process on the ways as described. Be sure to address the top, inside edge, and bottom of the ways. If any surface needs further refurbishment, work through the emery cleaning process. Your fingertips should feel a smooth surface as you run them across the ways and the edges.

If your lathe has a removable bed, treat the second set of surfaces in the same manner.

Picture #5 – 1383

Caption – Lathes with removable beds should have all edges chamfered and both sets of ways cleaned on all surfaces.



After File Maintenance, follow the steps in the Cleaning Process. All the faces of the ways should be cleaned, not all way faces should be lubricated. Do not neglect the inside edges of the ways that guide the tailstock.

Picture #6 – 1374



Caption – Cleaning the inside and underneath sides of the ways. Finish with a clean paper towel.

The bottom of the ways need to provide a solid grip for the locking plate of the banjo and tail stock and should not have any lubricant or wax on it. Clean, bare metal is the goal for the underneath side of the ways.

If your lathe has a removable bed, treat the bottom ways in the same manner as the top. Be sure to clean, wax, and polish the bearing surfaces which guide and hold the removable bed. If your lathe has a removable section of the bed, a swing away tailstock feature, or any similar feature, now is the time to clean, lubricate and polish the surfaces.

Picture #9 – 1384

Caption – Note the build up of grime that has been impeding the movement of this sliding bed.



When the surfaces are thoroughly smooth and clean, move to the Lubrication Process. Load non woven abrasive with paraffin wax, or car polish, and rub it on the ways. The non woven abrasive aids in spreading the wax across the entire surface of the ways. Polish with a clean paper towel.

An important point – apply wax to the inside surface of the ways, but do not apply wax to the underneath side.

Picture # 10 - 1377

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



Banjo

Place the banjo downside and remove the locking nut and locking plate. Work through File Maintenance, Cleaning, and Lubrication.

Picture #11 – 1387

Removing the locking nut and pressure plate from the banjo.



Picture #11 – 1390

Caption – Place a file flat across the bottom of the banjo and run it over the full length. Use a light touch.



Picture #12 – 1391

Caption - Remove any dings from the outside edges of the banjo.



Picture #13 – 1392

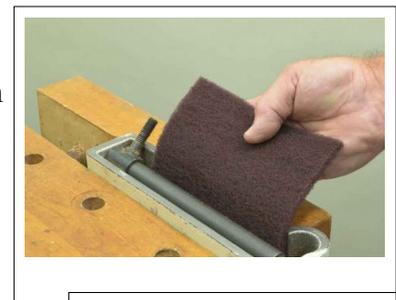
Caption – Also smooth the inside edges of the banjo.



The next focus is the eccentric locking rod underneath the banjo. Clean so that it rotates freely. Work through the steps in the Cleaning Process. Remove any rust with emery cloth and wipe away any residue. Lubricate the rod with a dry lubricant to avoid dust buildup.

Picture #14 – 1399

Caption – Remove any rust or grime from the eccentric locking rod with mineral spirits and non woven abrasive. Do not wax.



Picture #15 – 1402

Caption – Apply a lubricant that does not attract and hold dust to the locking rod.

Inspect the ends of the eccentric locking rod. Remove any debris and lube with a dry lubricant.



Picture #16 – 1406

Caption – Clean both ends of the banjo locking rod. Lubricate with a dry lubricant.



The locking plate should be cleaned but not be lubricated. The banjo is held in place by the contact between the underside of the ways and locking plate. It needs to be a firm grip to hold the banjo against the forces of turning.

Picture #17 – 1405

Caption – Locking plates can be circular or rectangular. They should be cleaned, but not waxed or lubricated.



Typically banjos are held in place with the use of an eccentric rod. As the rod is turned by the banjo lever, the locking plate is drawn up against the underside of the ways and the banjo is held tightly in place. There is a sweet spot where maximum locking force are applied and yet the banjo moves freely when unlocked. The nut of the locking plate needs to be adjusted until that sweet spot is found. The position of this nut increases, or decreases, the pressure between the banjo and the ways. If the nut is too loose, the banjo will not hold its position. If the nut is too tight, then the banjo is difficult to move.

It helps to mark the position of the nut before it is removed. It should not be assumed that the locking nut was in the correct spot when you began. Different lathes have different sweet spots.

Return the banjo to the ways to inspect and clean the tool rest post hole. Start with a visual inspection and then by inserting a finger inside to tool rest post hole. If you feel any ridges, these need to be removed. Low spots will not interfere with smooth movement of the tool rest, but high spots will. Warp emery cloth around a dowel and abrade away any high spots.

Picture #18 – 1410

Caption – Inspect the inside of the tool rest post hole.

(This picture could easily be left out.)



Clean any grime inside the post hole with rolled up non-woven abrasive and mineral spirits and wipe clean. If the tool rest does not move freely, use emery cloth.

Picture #19 - 1413

Caption – Clean the inside of the post hole with rolled up non woven abrasive.



Remove the tool rest clamp handle. Clean the threads and inside and out, and lubricate with dry lube.

Picture #20 – 1414

Caption – Use a stiff brush to clean the threads of the tool rest clamp.

(Again, picture 20 could be deleted.)



Tool Rest

Clean the tool rest post and examine it for marks or scoring. Remove any ridges with emery cloth or a file. The low spots do not interfere with the free movement of the tool rest. Remove any grime with a clean paper towel and mineral spirits. Your tool rest should not encounter resistance as it enters the banjo. Dry lube aids smooth movement.

Picture #21 - 1424

Caption – Remove dings on the tool rest post with emery cloth, or a file.



Inspect the end of your tool rest. The edge should be chamfered so that the tool rest enters the post with ease.

Picture #22 - 1421

Caption – Relieving the end of the tool rest post so that it easily enters the post hold.



If your tool rest is soft steel, remove any dings with a bastard cut mill file. Low spots are as much of a concern as the high spots. Any variations in the tool rest will be transferred to your turnings.

Picture #23 -1428

Caption – Draw a file with both hands over the full length of your tool rest removing any dings.



If the tool rest is hardened steel, dings can be removed by filing with a diamond honing card or diamond sharpening stone.

It is important that the tool rest is true across its entire face, so file the entire length of the tool rest.

Tail Stock

Address the tailstock surfaces working through File Maintenance, Emery Cleaning, and Cleaning processes.

Picture #24-1439 **(This needs to be shot again or use two arrows. One arrow to the edge and one arrow to the flat)**



Caption – Run a mill file over the flat bearing surfaces and each edge.



Next step is to remove the locking plate. Locking plates can be either round or rectangular. Both types apply force against the underneath surface of the ways to lock the tail stock in place. Locking plates should not be lubricated. Clean the plate with mineral spirits and the non woven abrasive. A clean locking plate and underside of the ways make a tremendous difference in how easily the tailstock moves.

Picture #25 – 1433

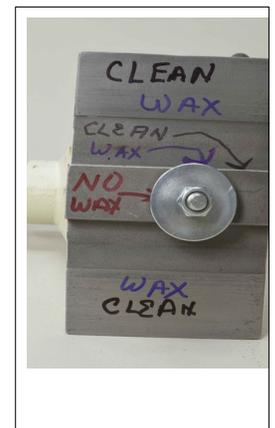
Caption – Some lathes will have rectangular locking plates and springs.

Clean the spring and posts if the locking plate has springs with a toothbrush. Lubricate the springs with a dry lubricate. When the springs and posts are fouled, the locking plate will not release.



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.



Remove grime, rust and residue from the ends of the locking lever in the tail stock with toothbrush and mineral spirits and lubricate with a dry lubricant.

Picture #27 - 1445

Caption – Clean and lubricate the locking level on the tailstock.



The design of the locking mechanisms has a sweet spot. A spot where maximum force is applied to the pressure plate. The sweet spot will vary from lathe to lathe and model to model. If you experience tailstock slippage, adjust the locking nut until you determine the sweet spot for your specific lathe. Tightening the locking nut increases the locking force. If the tailstock is difficult to move, loosen the locking plate nut. Trial and error may be necessary.

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 lubricate.

Next focus is the tailstock quill. Clean the inside of the quill with a twisted paper towel, a test tube brush, a shot gun cleaning rod, or a Morse taper cleaner. Mineral spirits aids in loosening grime. The condition of the interior of the quill is of critical importance to all tail stock operations. Insert a finger into the quill and feel for any ridges. Ridges compromise the holding power of the Morse taper and need to be removed. Low spots are not a concern. 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 #28 1039

Caption – A dirty or damaged quill comprises all operations of the tailstock.



Use the hand wheel to advance the quill. If it can be removed, do so. On some lathes the quill can be removed from the tail stock. In other cases the quill can not be removed.

Picture #29 - 1449

Caption – Remove any dings from the quill channel with a file on edge, clean the outside of the quill, and lubricate with a dry lube.



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 of the quill. Clean the outside of the quill with mineral

spirits, and lubricate with dry lube and polish.

Picture #30 - 1445

Cleaning the threads of the tail stock spindle lock.



Unscrew the tail stock spindle lock and inspect and clean the threads.

Movable Headstock

Slide the headstock 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 from the underneath side of the lathe and clean in the same as you cleaned the tailstock locking plate. If there are slippage issues with the head stock, address the slippage in the same manner as the tail stock.

Headstock

The quill of the headstock should be address in the same manner as the tailstock quill.

Clean the Morse taper of the headstock spindle, but do not lubricate it.

Grime on the spindle shoulder cause chucks to be difficult to unscrew. It is important that the flat be thoroughly cleaned.

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 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 the application of thread lock.

Belt

On most lathes, power is transferred from the motor to the spindle with a belt. 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 your lathe and loosen the belts. Use your finger to check the underneath side of the belt. The belt should have no fraying, cuts, or cracks. It is better to replace a belt before it breaks than when the lathe is running.

If there is any grim on the underside of the belt, or dirt buildup in the pulleys, it should be removed. Loosen the belt and turn it inside out so that the underneath side can be cleaned with a toothbrush. Thoroughly brush away any buildup. In a similar manner, use a toothbrush, or a brass brush, to clear any debris from the pulleys.

Picture #31-1452

Caption – Check the condition of your belt and pulleys.



Motor and Electronics

It is a good practice to clear any dust and shavings from your 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. Use low air pressure or a vacuum cleaner.

Picture #32 1454

Caption – Using an air hose with low pressure to clear dust from the motor and controls.



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

Aligning the headstock and tailstock

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 the headstock and tailstock. Bring up the tailstock so the points almost touch. Lock down the headstock and tailstock. The tailstock locking lever should be tightened 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 center line 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 misaligned. If it is, remember to always nudge the tailstock in the direction that trues the center-line as you bring up the tailstock.

Picture #32 – 1457

Caption – Check the alignment of the centers on both axis.



Check for play in the headstock. With movable headstocks, release the locking lever and turn the headstock to improve the closeness of the two points. Once this is done, lock down the headstock.

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

Picture #33- 1271

Caption – Loosening then re-tightening the bolts holding a headstock to the ways may improve the alignment.



If still misaligned, the stand may be causing a twist in the lathe bed. This twist can show up as misaligned of the centers. Verify that the stand is solid to the floor and then loosen any bolts holding the lathe to its stand. Recheck the center line gap and if the two points are now aligned, shim the lathe bed so that it does not twist as it is tightened to the stand.

Conclusion

Sometimes the 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. The time spent tuning up your lathe will reward you many times over.

Dennis Belcher retired from a 30+ year career in the investment world to his lifelong passion of working with wood. He is a member of the Wilmington Area Woodturners Association. Dennis demonstrates for clubs and participates in juried art shows in the eastern half of the country.

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