



# Wood Lathe Safety Rules

A wood lathe is used to produce round objects like spindles and bowls. The work to be turned is usually mounted on the lathe between the headstock (drive) spindle and the tailstock. For some work, the tailstock is not needed and the work is only attached to the drive spindle. The headstock is driven by a motor that is either variable speed or through pulleys that allow the speed of the spindle to be changed. The work to be turned is attached to the headstock spindle by means of a drive center (spur center) that is driven into the work, a faceplate, or by securing the work to a chuck mounted on the spindle. The selection of drive center, faceplate or chuck is dependent on the type of turning to be produced. On some occasions, the work will be secured to the drive spindle by one means initially and then secured by another means to continue the turning.

The tailstock has a live center on the end of the tailstock spindle that is pushed into the end of the work to be turned to support that end of the work. As the headstock turns the work, the live center rotates on bearings. The tailstock slides back and forth on the lathe bed as need to suite the length of the turning. Various types of live centers can be used depending on the application.

Hand held turning chisels are used to cut the turning to the desired shape. The cutting end of the turning chisels are supported by a tool rest while the other end of the chisel, the handle, is held in your hand. In many cases, the handle is held close to the body for additional support and control.

## **Lathe Safety Rules:**

1. Keep a balanced stance at the lathe so you do not fall or lean against the centers, workpiece or other moving parts. Do not overreach or use excessive force to perform any machine operation.
2. Turn off the lathe before cleaning. Use a brush to remove chips or debris – do not use your hands.
3. It is not necessary to lockout or unplug the lathe when installing chucks or mounting the work.

4. Keep your hands clear of the faceplate or chuck. Contact with them can cause serious injuries.
5. Do not operate this machine when tired, or under the influence of drugs or alcohol.
6. Never leave the lathe when it is running. Turn the power off and do not leave the machine until it comes to a complete stop.

**Start with a Risk Assessment to ensure a safe work area:**

1. A three foot perimeter around the lathe should be kept clear of people, debris and sawdust that might impair traction or footing to avoid slips and falls.
2. Be aware of what turners call the "red zone" or "firing zone." This is the area directly behind and in front of the workpiece, the areas most likely for a piece to travel as it comes off the lathe. A good safety habit is to step out of this zone when turning on the lathe and keeping your hand on the switch in case you need to turn the machine off. When observing someone else turn, stay out of this zone
3. Eye Protection. Safety glasses with side shields must be worn.
4. Face Protection. It is not uncommon for a piece of the turning to break off, or for the entire turning to come off and fly towards the lathe operator. The result can be cuts, bruises and broken bones. It is therefore required that you wear an ANSI Z87+ certified face shield when turning.
5. Dust Protection. All sanding dust is a carcinogen and a dust mask must be worn while sanding. Most tropical and spalted woods are irritants that can cause respiratory distress. A dust mask must be worn while turning and sanding these woods and is recommended for all materials.
6. Eye, face and dust protection can be provided by a Powered Air Purifying Respirator (PAPR). The PAPR provides the additional protection of keeping sanding dust out of your eyes. The sanding dust of all woods can be irritating to the eye and for many tropical woods is toxic.
7. Remove or fasten all loose clothing or jewelry such as long sleeves, wrist watches and bracelets. Tie back long hair. These items might get caught by the turning and rapidly pull you into it resulting in serious injury or death.
8. Give the work your undivided attention. Looking around or carrying on a conversation can result in serious injury or death.
9. Do not wear loose fitting gloves or anything that would allow a hand, fingers or clothing to be wrapped around the revolving turning.

**Operational Safety Rules:**

1. Approach your work in the Club Shop and on the lathe with a safe attitude!
2. Make all lathe and turning adjustments with the power shut off.
3. Keep the floor around the lathe clean and free of stock, shavings and sawdust to minimize the danger of slipping.

4. Make sure all guards are in place and fastened securely.
5. Check the condition of the stock to be turned. Be sure that it is free of loose knots, warpage, checked ends, cracks or uncured glue joints, which can cause it to be thrown out of the lathe. Only experienced turners should turn a workpiece with cracks, splits, checks, bark pockets, knots, irregular shapes, or protuberances and then the work should be turned with extreme caution.
6. Securely fasten the stock to be turned to the drive center, face plate or chuck.
7. Remove the chuck wrench or key from the chuck before starting the lathe. Also remove the knockout bar from the spindle.
8. Position the tailstock so that the live center is 1" – 2" from the end of the workpiece and lock it in place. Advance the tailstock spindle with the handwheel in order to seat the live center into the workpiece. Use enough pressure to secure the workpiece between the centers so that it will not fly off, but do not use excessive pressure. The tailstock ram is capable of exerting excessive pressure against the workpiece and headstock. Excessive pressure can damage both the workpiece and the lathe bearings.
9. Position the tool rest properly and only when the lathe is turned off. It should be parallel to the turning and as close as practical to the work and repositioned as the diameter of the work changes. This distance will vary depending on the type of chisel/gouge being used. Typically, the tool rest should be about 1/8" to 1/4" from the workpiece. For conventional turning chisels, the proper height of the tool rest is the center ( $\pm 1/8"$ ) of the turning. For scraping tools, e.g. EasyWood Tools, the tool rest should be positioned so that the top of the chisel is at the center of the turning.
10. When using a faceplate, be certain the workpiece is solidly mounted with stout screws (#8 or #10 hardened steel screws as a minimum, or #10 or #12 Sheet metal screws). Do not use dry wall or deck screws. When turning between centers, be certain the workpiece is firmly mounted between the headstock driving center and tailstock center.
11. Hold turning tools securely on the tool rest, holding the tool in a controlled but comfortable manner. Always contact the tool rest with the tool before contacting the wood
12. Ensure the belt guard or cover is in place.
13. Check that all locking devices on the tailstock and tool rest assembly (rest and banjo) are tight before operating the lathe.
14. Test each setup by revolving the work by hand to ensure that it clears the tool rest and bed.
15. Start the lathe at the lowest speed to verify that the work is securely mounted and clears everything prior to increasing it to the operating speed.
16. Use the correct chisel at the right speed for the operation to be performed. Do not force a turning chisel or attachment to do a job for which it was not designed. The right tool will do a job safer and better.
17. Keep turning chisels sharp and clean for best and safest performance and position the chisels properly in relation to the workpiece.
18. Use low speeds for roughing, for long turnings, for large diameter work and for unbalanced work. If vibration occurs, stop the machine and correct the cause. If the lathe is shaking or

vibrating, lower the speed. If the workpiece continues to vibrate, always stop the machine to verify why. Refer to Table 1 for speed recommendations.

19. When sanding or finishing, remove the tool rest from the machine to prevent getting your hand caught between the turning and the tool rest.
20. When turning large diameter pieces, such as bowls, always operate the lathe at low speeds.
21. Never use dull turning chisels. Sharp chisels help prevent tool grabbing in the work and from being jerked from the operator's hand.
22. When roughing a square blank to a cylinder, start 2"- 4" away from the tail end and take light cuts towards the tailstock. The second cut should start 2" – 4" to the left of the first cut and cut from left to right as in the first cut. Proceed with additional cuts until the workpiece is rounded except for the last 2"- 4" at the headstock end. Finish rounding by working towards the headstock end in a similar manner, except the cutting direction is right to left. Always cut towards the end of the workpiece. Attempting to start at an end is dangerous because the tool can catch and be forced from your hands.
23. When shaping the turning, move the turning chisel so that it cuts "downhill" (from large diameter to small diameter). Trying to cut uphill can cause the chisel to catch and result in serious injury and/or a broken/damaged turning.
24. When parting off stock, adjust the lathe speed to about 500-700 rpm and hold the parting tool in one hand and catch the workpiece as the tool separates it from the waste stub.
25. Spring Calipers may be used to take measurements while the lathe is turning. Note however, that the measurements are only approximate. When using any fixed gap device (e.g. a wrench), the entry points must be well rounded to prevent the entry points from being caught by a rotating turning. This can cause the tool to be thrown back at you or cause the workpiece to break and be thrown back at you. These measurements are also approximate. To obtain accurate measurements, a digital caliper should be used. When using a digital caliper take the measurement on the turning only when the lathe is stopped.
26. Do not attempt to engage the spindle lock until the spindle has stopped turning.
27. Make no adjustment except for speed change with the spindle rotating.
28. Do not stand in line with any large diameter part being turned or allow anyone else to do so.
29. When stopping the lathe, never grab the turning, faceplate, or chuck to slow it down. Let the work coast to a stop.
30. Sanding can be performed while the turning is rotating in the lathe. Sand to a smooth surface by either using sandpaper folded into a pad or by using a strip held between the thumb and forefinger. **DANGER! Do Not** wrap the sandpaper around your fingers. It could grab and pull your hand into the turning or chuck causing serious injury. Set the lathe speed to about 500 rpm. High speeds can build friction while sanding and cause heat checks in some woods. Use light pressure to prevent breaking the turning or pulling it out of the chuck. Start with sandpaper no coarser than 120 grit and sand through 320 grit if finishing with a film finish like shellac, lacquer, or polyurethane. Sand to at least 600 grit if you are finishing with an oil. Progress through each grit without skipping any grit. Stop the lathe and use a tack cloth to remove any sanding dust between grits and prior to finishing.

31. Finishing can be performed on the lathe. When using a wipe-on finish like Danish Oil, apply the finish with a brush and let it soak in for a few minutes. It can then be “wiped off” and polished using 600 grit sandpaper followed by a soft paper towel. The sanding dust created will help to fill any pores in the wood. Hold the paper towel between your thumb and forefingers and let it rub the rotating surface of the turning. Apply a second coat of finish if desired, let it sit for 15 minutes and then buff with a soft paper towel. **DANGER! Do Not** wrap the paper towel around your fingers or hand. Do not use a cloth rag. It could grab or get caught in the chuck and pull your hand into the turning or chuck causing serious injury. Use light pressure to prevent breaking the turning or pulling it out of the chuck.

**DANGER! Serious Injury or Death Can Result if Parts Being Turned Are Thrown From the Lathe.** Listed below are conditions that can cause this to happen:

1. Excess speed for the condition or size of the work being turned.
2. Improper glue joints, or not thoroughly cured glue on parts such as bowls and other laminated parts.
3. Inferior material with knots, checks or cracks.
4. Improper seating of drive or live centers in headstock spindle or tailstock spindle. Both spindles have Morse tapers and require the centers to be fully inserted and seated.
5. Improper mounting of the work to faceplates and chucks.
6. Splits or checks that develop while turning due to changes in moisture content or temperature.
7. Excessive vibration caused by out-of-round conditions.
8. Dull turning chisels.
9. A catch. A catch is when the chisel digs into the turning.
10. Use of a gouge on large diameter face plate turning
11. Trying to remove an excessive amount of material in one pass.
12. Having the tool rest too far away from the work.
13. Having the tool rest too low, causing the turning chisel to dig in.
14. Tool rest too close so that the work strikes it on startup.
15. Failure to readjust the tool rest as the diameter or position of the turning changes.

**Table 1 – Recommended Lathe Speeds**

<b>Recommender Lathe Speeds*</b>			
<b>Diameter of Work in inches</b>	<b>Roughing rpm**</b>	<b>Minimum Cutting rpm***</b>	<b>Maximum Cutting rpm****</b>
Under 2"	1520	3000	3000
2" to 4"	760	1600	2290
4" to 6"	510	1080	1500
6" to 8"	380	810	1125
8" to 10"	300	650	900
10" to 12"	255	540	750
12" to 14"	220	460	640
14" to 16"	190	400	560
16" to 18"	175	325	450
20" to 24"	175	260	375

\*As the length of the spindle increases, the speed may need to be reduced to minimize flexing or a steady rest used.

\*\* Roughing speed =  $3000 \div \text{Diameter}$

\*\*\* Minimum speed =  $6000 \div \text{Diameter}$

\*\*\*\* Maximum speed =  $9000 \div \text{Diameter}$