Finding and fixing the causes of vibration and wobble

by Dennis Belcher
photos by Doug Haas

Vibration, a bane of woodturning, can make a good cut difficult and, in its extreme form, dangerous when the lathe starts walking across the floor. Vibration and wobble can stem from a variety of sources. Sometimes there is a single cause and other times there are multiple sources. Here's what to check.

Stand

Stands must be of solid construction and provide for securely attaching the lathe. The stand needs to be stable on the floor, with no rocking. Make sure all the feet are in full contact with the floor and adjust as needed with adjustable legs (photo **1**), levelers, or shims.

If your lathe has to be moved before you can use it, select a spot, adjust the stand and lathe as needed, and mark the floor for each leg. This makes stability predictable and repeatable.

Adding mass to the stand will help the lathe dampen vibration. My primary lathe and stand weigh 600 pounds, plus 500 pounds of metal plate on the stand shelf, for a total 1,100 pounds of mass, photo **2**. You can use sandbags, second-hand barbell sets, or steel plate from a junkyard, whatever you can get.

More weight is not an end-all. You can still make a lathe walk across a floor regardless of the weight, by some combination of speed and out-

1 - *Adjust legs, or use shims, to make sure your stand sits solidly on the floor.*

2 - *Additional weight helps a lathe absorb vibration. Use steel plate, barbell sets, or sandbags.*

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of-balance workpiece. Use common sense. While the lathe needs to be securely attached to its stand, be careful not to stress the lathe bed while fastening it. Lathe beds can be distorted by tightening to a surface that is twisted. Make the stand solid to the floor before you position the lathe on it. Look for any daylight between the lathe legs and the top of the stand. Use washers or thin metal shims, to fill any gaps before tightening the bolts, **3**.

3 - *A washer was inserted between the lathe and the stand to fill the gap, before tightening the mounting bolt.*

Lathe

Lathe vibration can cause key fasteners to loosen. Check to see that all machine screws and Allen bolts are tight, photo **4**.

4 - *Check that all bolts connecting the headstock to the lathe ways are tight.*

Movable headstocks are a frequent source of vibration. Make sure the headstock is firmly fastened to the ways, and that the nut on its locking plate is properly adjusted, photo **5**.

The stability of the headstock can be improved by cleaning the locking plate beneath the ways. The plate's grip can be improved by roughing the contact surfaces with 220-grit emery cloth and then cleaning with mineral spirits; clean the underneath side of the lathe ways with mineral spirits applied with non-woven abrasive. The locking plate and underneath side of the ways should never be waxed.

5 - *Movable headstocks must be securely locked to the ways. Check the locking plate beneath the ways.*

Heavy lathes flex less than light lathes. You can determine how well your lathe handles vibration with a simple test. Mount a slightly off-balance blank on a chuck or faceplate and slowly bring the speed up. When the vibration becomes noticeable, make a note of the RPMs. Leave the piece mounted, but remove the faceplate or chuck from your lathe and try the same test on a different lathe. Comparing the speed at the point of vibration indicates which lathe is better at absorbing vibration.

Inspect the threads on the spindle nose for accumulated grime and/or thread damage, **6**. Remove any residue in the threads with a stiff brush dipped in mineral spirits.

6 - *Clean the headstock threads with a stiff brush and mineral spirits. Use a fine triangular file to repair any damaged threads.*

7 - *Clean the gunk off the spindle shoulder and threads, to make sure your chuck or faceplate seats tightly. Clean the chuck too.*

Damaged threads can be repaired with a small triangular file. Pay particular attention to the spindle shoulder just past the threads, because this surface registers with chucks and faceplates. Any irregularity on the surface of the shoulder will be transmitted to your chuck/faceplate, photo **7**. Clean the shoulder with non-woven abrasive and mineral spirits. Wipe with a clean paper towel to remove any cleaning residue.

Chucks and faceplates

Size your chuck or faceplate to the workpiece – a large workpiece on a small chuck can be the source of wobble and wood movement. Loose Allen bolts on chuck jaws can compromise the grip. Verify that everything is tight.

Confirm that the threads of your chuck are clean of any debris and that the mating surfaces are clean for full contact with the headstock shoulder. Likewise, clean the threads and mating surfaces of the faceplate, and verify that the mounting screws are of appropriate diameter, and tightly installed.

Verify that your chuck/faceplate runs true with a simple test. Mount your chuck and set the lathe to a slow speed. Rest a marker on the toolrest and slowly bring it in contact with the chuck body (**8**). If there are gaps in the marked line on the body, the chuck is not running true. A faceplate can be tested in the same way.

The source of a chuck not running true may be imperfect mating with the spindle shoulder. This can be remedied by adding a large, flat washer to fill any gaps between the chuck or faceplate and the spindle shoulder (**9**).

Mounting

It is a good practice to retighten chuck jaws after making the first cuts. Particularly with green wood, the jaws may dig in and compromise the hold. With a faceplate, look for any gaps between the wood and the metal and retighten or flatten the workpiece as necessary.

Green, soft, and punky wood present special problems when between centers. The drive spur can begin to drill its way into the wood, causing the blank to drift off center and wobble. It is always a good practice to check periodically

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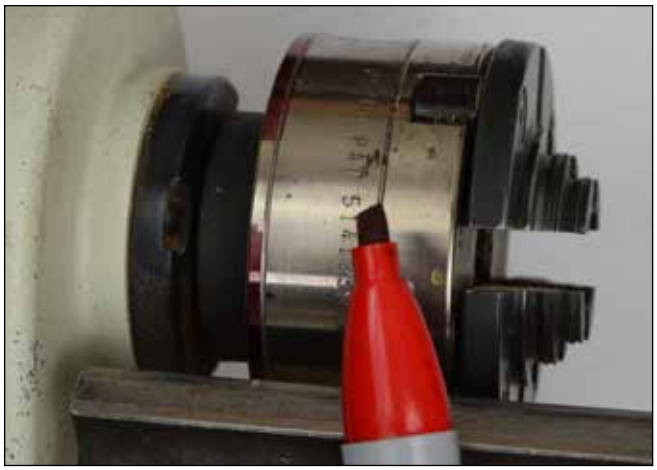

8 - *With the lathe turning slowly, the marker makes a dashed line on the scroll chuck, indicating it is not running true.*

9 - *A flat spindle washer can fill a gap between chuck or faceplate and headstock, to improve seating and reduce wobble.*

that the workpiece is securely held at both ends. Wobble may also be caused by a loose banjo or tailstock. Check that both are locked down.

Speed

Speed is a critical factor in vibration and wobble. Always start slow and gradually increase the speed until you experience vibration. Then slow the speed down until the vibration stops and you can begin to true up the workpiece. As you remove wood and the vibrations diminish, gradually increase the speed, find the point of vibration, back off speed again, remove wood again, and repeat until the workpiece comes into balance.

Imbalance

Examine the blank for voids and protrusions that would make it out of balance. There may be a choice between changing the mounting points to a more balanced center line, or focusing on grain balancing while leaving the blank out of balance. If you choose grain balancing, causing an out-of-balance condition, you can remove the blank from the lathe and remove excess wood from the heavy side.

Wood movement

Green wood can move in a short period of time. What was a perfectly balanced workpiece can become dramatically unbalanced in the time it takes to eat dinner. The best course is to complete the project without interruption, and do not allow the green wood to stay on the lathe any longer than necessary. Wrapping a green blank with plastic when you have to step away will retard wood movement.

As walls become thinner, the workpiece may begin to wobble each time you take a cut. Wood wobble and vibration can become pronounced just before you cut through a wall, so check the wall thickness, paying particular attention to the wall thickness at the bottom.

Final Thought

Always remember that not every piece of wood should be turned. The wisest decision is to not turn a blank that exceeds the capabilities of the lathe ... or of the turner.

Dennis Belcher is a member of the Wilmington Area Woodturners Association and a frequent demonstrator. See his work at dennisbelcher.com. ❐