



# Tuning Your Drill Press

*How to find and eliminate vibration, play and wobble*

by Robert M. Vaughan

*To check for wobble in a chuck, place a dial indicator on the table with its plunger perpendicular to the chuck. Unplug the machine and turn the spindle pulley; the gauge will read any eccentricity.*

Whether you buy a new drill press, a used one or you inherit one from granddad, you should periodically check its precision. Provided you've chucked in a straight, sharp bit, your press should run steadily, and it should bore clean holes. But there are basically three things that can prevent top performance in your press: vibration, play and wobble (runout).

## Taking out vibration

Vibration usually originates at a press's drive system. If you feel vibration, open the head cover, turn the machine on and see if the pulleys idle smoothly and without noise, beyond the humming of the belt. If they don't, kill the power, remove the belt and check its condition. If the belt is brittle or has bumps or cuts, replace it. Next, hand spin the pulleys to see if they have any cracks or are out of round. Before replacing a pulley that wobbles, try retightening its setscrew. If there's a rumble or growl when the pulleys are spinning, dirty or worn bearings are likely the problem and should be replaced.

## Removing quill side play and spindle end play

A press can develop side play between the head casting and the quill. To check for this, lower the quill and then shake it (not the chuck) from side to side to see how much slack there is. If the head casting is split at the front, there should be a bolt and locknut that will allow you to snug the halves together to take some of the play out. If your press has a solid head, then a remedy for side play is unlikely.

To check spindle end play, lock the quill, and try to move the chuck up and down. If there's end play, then the slack is probably between the quill and the collar above the upper quill bearing. To fix this, loosen the collar's setscrew, and slide the collar back to its original position. If you're lucky, a plate will be on the front of the head to access the collar. If not, the feed lever and the pinion will have to be removed along with releasing tension off the quill's return spring. This procedure is tricky and somewhat dangerous, so if your machine's instruction manual doesn't cover how to disassemble the spring assembly, have a professional do the work.

## Wobble and how to find it

A wobbly chuck usually results from poor techniques. For example, you get a bit hung up in a workpiece and it swings around and bangs the column; or you let a workpiece dance around on the table while you're drum sanding the inside of a tight curve.

To detect and measure wobble, you'll need a dial indicator mounted on a magnetic base. First, chuck in a precision rod of known straightness. I use a 1/2-in.-dia. by 2-in.-long hardened, ground-steel dowel. Next, put the indicator's base on the table or column, so the plunger is touching the end of the rod. With the press unplugged and the head cover open, hand turn the spindle pulley and watch the indicator to pinpoint maximum fluctuation. Stop turning when the rod is at its farthest from the plunger. Wrap a piece of masking tape around the chuck, and mark a reference point above the plunger with a felt-tip marker. You can also check the outside of the chuck in this way (see the photo on the facing page). If I get more than .003-in. at the tip of the rod or more than .002-in. on the chuck, I feel it's time for some corrective action.

## Correcting wobble with a smack

Rather than replacing your machine's most expensive parts (quill, spindle and chuck), you may be able to smack wobble out (see the bottom photo). Since a shock force knocked things out of alignment, an equal-and-opposite blow (within reason) can line things up again. Move the arm of the indicator out of the way, and then mount a hefty steel rod in the chuck and put on your safety glasses. Position the chuck so you can smack the rod directly opposite your mark. Your first tap should be a light one—similar to driving a 5/8-in. brad into soft pine. Chuck your precision rod, reposition the plunger and rotate the spindle to observe any change. Repeat until you've got less than .002-in. wobble.

## Chuck removal

Occasionally, you'll have to remove a chuck to install a mortising yoke or to clean and repair the chuck. The backs of most chucks (including the key-and-scroll Jacob's type and the hand-tightening Albreicht type) have a tapered hole, which mounts either onto a matching tapered stud on the spindle nose or onto an adaptor that connects to the spindle. Chucks that mount directly to the spindle nose are usually held on either by a plain friction-fit or by a combination of friction and a threaded collar with snap ring.

If there's a ring with holes around the top of the chuck, you can unscrew this collar to force the chuck down off the spindle. To turn the collar, most press manufacturers provide a spanner (similar to an open-end wrench). Stick the spanner's pin into a hole in the lock ring, and insert the handle of the chuck-key into a chuck hole. Grip the key for leverage and loosen the collar by turning the spanner clockwise (see the center photo). Keep turning, even though it'll feel like the collar is tightening again as it bears against the top of the chuck. If it doesn't break free, wrap a cloth around the chuck, and clamp it in a drill-press table vise. Then try to unscrew the collar.

Chucks without collars can often be popped off with an ordinary open-end wrench. First, lower the quill to expose the top of the chuck, and lock the quill. Then take a wrench that fits over the shaft between the chuck and the quill, and dislodge the chuck by snapping the wrench upward, as shown in the top photo. If the chuck doesn't come off, rotate the spindle a half turn, add some Liquid Wrench and try again. Your next options are to try either prying the chuck off with a set of Jacob's-brand removal wedges or taking the quill assembly out of the head and bringing it to a machinist or service center to have the chuck removed.

To remove a chuck from an adaptor, first use a drift wedge to dislodge the adaptor (with chuck). Then drill a hole in a block of



*There are two ways to remove most chucks. For chucks without a collar (above), lower and lock the quill and insert an open-end wrench above the chuck. Snap the wrench upward to pop the chuck off. To remove chucks with threaded collars (right), grip a chuck hole by inserting the handle of the chuck-key, and turn the collar clockwise with a spanner.*



*The author uses a hammer to remove wobble (below). He taps a chucked steel rod and then rechecks for runout with a dial indicator and a precision rod.*



wood to accept the Morse-taper end of the adaptor. Split the block in two, and clamp it around the adaptor in a vise. Twist the chuck off with the key or a pipe wrench.

## Chuck remounting

To remount taper-fit chucks, first clean the mating surfaces with a dry rag and press the chuck onto the spindle by hand. Next, retract the chuck's jaws and strike the bottom of the chuck squarely with a wooden mallet. Or reseat the chuck by lowering it evenly against a piece of plywood laid on the press's table. If the spindle's nose is worn, a couple of drops of cyanoacrylate (super glue) can often hold it in place, and the resulting bond still can be broken easily when needed. Finally, check concentricity with the indicator and the straight rod again, and, if needed, fine-tune things with a few hammer taps on the heavier rod. You'll be amazed how light a blow it takes to align things. □

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