

## Tuning Up a Bench Grinder

By: Don Geiger

Bench grinders, such as pictured below, are used for a wide variety of operations in commercial and hobbyist's shops throughout the world. Whether it is used for shaping metal, removal of burrs, smoothing welds or the sharpening of keen edges on tools, if the grinder is vibrating and the metals applied to the surfaces of the wheels bounce it is an unpleasant experience and adversely affects the results.



A typical two-wheel bench grinder

I have used grinders all of my adult life for various purposes and have found there are two primary sources of vibration; 1- wheels that wobble left and right and 2- wheels that are not concentric to the axle, both of which can be corrected using the procedures described herein. Correcting left and right wheel wobble and making wheels run concentrically to the axle will, in almost all cases, correct vibration in the grinder and eliminate the bouncing of objects applied to the surfaces of the wheels.

### **Step 1:**

#### **Mounting the wheels**

Grinding wheels need a solid foundation. Wheels are usually provided with plastic bushings to adapt the large diameter hole in the wheel to the smaller diameter axle. Plastic bushings do not provide a solid foundation, may cause non-concentric run out of the wheel and contribute little to positioning the wheel perpendicularly to the axle. I suggest replacing the plastic bushings with appropriately sized steel bushings. Steel bushings will provide a solid foundation, positioning the wheel concentrically to the axle, and will improve the perpendicular position of the wheel in relation to the axle.



Steel bushings are available from: [www.geigersolutions.com](http://www.geigersolutions.com)

## **Step 2:**

### **Correcting left and right wheel wobble-**

Disconnect the power to the grinder and remove one of the side cover plates. Cut a disc from paper card stock about ¼" smaller in diameter than your wheel and cut a circle out of the center slightly larger in diameter than the cup washer on your grinder.

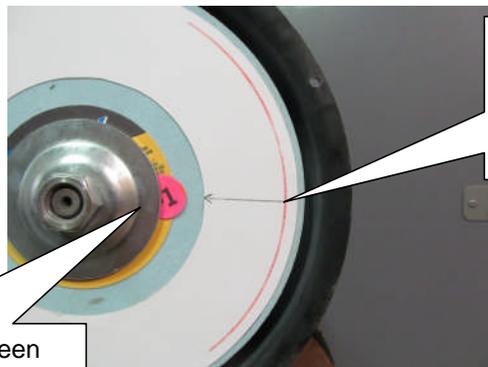


Adhere the paper disc to the outboard side of the wheel using photo mount spray.

Remount the side cover plate and plug in the grinder. Position the tool rest approximately 1/8" from the wheel and secure it into place. Rotate the wheel by hand to verify the tool rest is clear of the wheel. Put on an ANSI approved face shield. Turn on the grinder. Use the tool rest to support a colored pencil and lightly touch the paper card stock disc about ¼" from the edge of the paper disc. Stop the grinder and inspect the resulting mark. The center of the pencil mark indicates the apex of the wheel wobble on the outboard side of the wheel. The length of the mark indicates the severity of the wobble. A short mark indicates a more severe wobble than a longer one.



Place paper sticky dots between the edge of the cup washer and the outboard side of the wheel

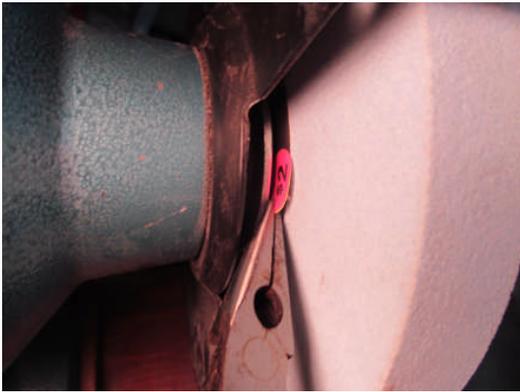


The middle of the pencil mark indicates the apex of the wobble.

Tip: Use several different colored pencils to distinguish successive marks from each other.

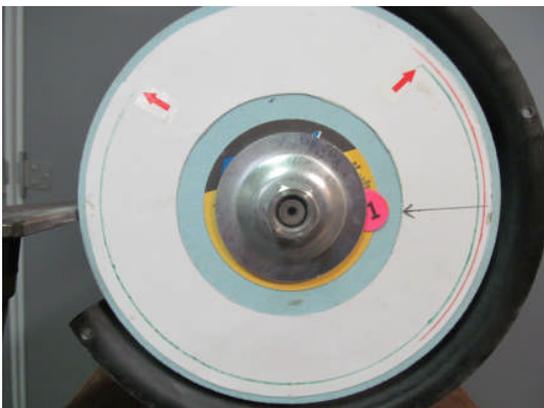
Unplug the grinder and remove the outside cover plate. Rotate the wheel to position so the mark you made is toward the rear of the grinder as shown above. Loosen the axle nut and without rotating the wheel or the cup washer on the axle, slide the cup washer about 1/8" away from the wheel and insert a small stack of 3/4" diameter paper sticky dots (like are used for price marking) between the edge of the cup washer and the side of the wheel on the radius line (marked with a black arrow in the photo above) from the

middle of the pencil mark to the axle. If the wobble is severe, start with a stack of about four or five dots.



Installing sticky dots on the inboard side of the wheel using needle nose pliers.

With the nut still loosened, pull the wheel toward the outboard side of the grinder, against the outboard cup washer and nut. Place an equivalent stack of paper sticky dots between the edge of the inboard cup washer and the surface of the wheel in a position 180° from the dots you placed on the outboard side of the wheel. *NOTE: I have found it helpful to use needle nose pliers to place the dots on the inboard side of the wheel.* Push the outboard washer and wheel toward the grinder and tighten the nut. Replace the side cover plate, plug in the grinder and start the grinder and re-mark the apex of the wobble. It may take multiple tries so be sure to use a different color of pencil each time and don't overlap the marks so you don't confuse the current mark from previous ones.



Notice the length of the second line (the ends are indicated with the arrows). If the wheel was perfectly true with no side-to-side wobble, the line would go all the way around. This one is about three quarters of the way, which I find acceptable.

Do the same for the other wheel. Re test and add or remove sticky dots until you are satisfied with the results.

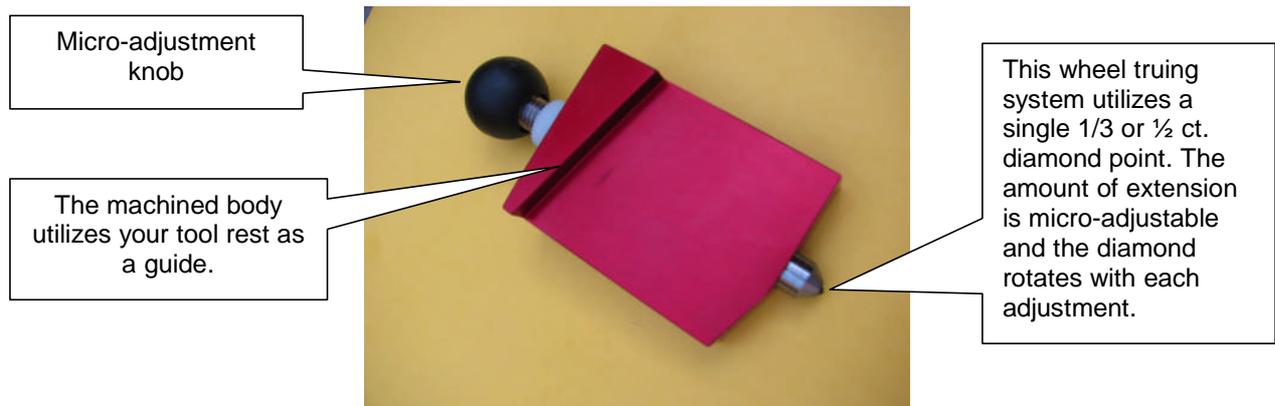
Once both wheels have been corrected for wobble, tighten the nuts on both wheels (recommend torque: 8 to 10 foot lbs.) and replace the factory guards.

Put on an ANSI approved face shield. Stand out of the line of fire (to the side of the grinder) and start the grinder. Position yourself where you can reach the electrical plug in case you need to pull it if there is a problem. Let the grinder run for 10 minutes. Turn the grinder off.

### **Step 3:**

#### **Truing the wheels so they are concentric to the axle-**

Eccentricities in the circumference of the wheel can be corrected by removing high spots in the aggregate. To effectively do this requires a diamond wheel truing system- not just a hand-held wheel dresser. How a wheel truing system differs from a typical wheel dresser is the position of the supporting body relative to the wheel is maintained by a guide and the position of the diamond is maintained and controlled and is micro-adjustable. This enables one to remove the high points of a non-concentric wheel, thus making it concentric to the axle. Unlike gravimetric balancing systems, that use weights to counter balance eccentricities in the circumference of the wheels (treating only one symptom; vibration in the grinder), truing the circumference of a wheel treats the cause of the problem: out of round wheels.



“Wheel balancing systems treat only one symptom: vibration in the grinder. If eccentricities in the circumference of the wheels are not corrected, tools and other objects brought into contact with the surfaces of the wheels will still bounce. ”

Don Geiger

#### **To true the wheels using Geiger's Tru-N-Dress:**

Position your tool rest within 1/8" from the wheel and the top surface of the tool rest needs to be positioned at or slightly below the axle of the grinder. Do not position the tool rest upward. Rotate the wheel by hand to ensure it does not contact the tool rest. Tighten the tool rest securely. Ensure the edge of the tool rest facing you is smooth. If there are any nicks or bumps on the edge of the tool rest, remove them using a fine file. It is advisable to slightly chamfer this edge as well.



Place the **Tru-N-Dress** on the tool rest and retract the position of the diamond until it barely touches the face of the wheel when you slide the **Tru-N-Dress** left and right across the tool rest. Once the starting position of the diamond is set, put on an ANSI approved dust mask and face shield. Start the grinder. Slide the **Tru-N-Dress** left and right across the face of the wheel 6 to 8 times and then rotate the round black adjustment knob clockwise about 1/16<sup>th</sup> of a turn to advance the position of the diamond.



Traverse the **Tru-N-Dress** back and forth 6 to 8 times and then slightly advance the position of the diamond again (about 1/16<sup>th</sup> of a turn). Repeat this procedure a few times then stop the grinder and inspect the wheel. Repeat as necessary until it appears that the diamond has contacted the entire circumference and width of the wheel. Repeat the same procedures on the other wheel.

After tuning up your grinder you should experience:

- A reduction in grinder vibration
- A reduction in tool vibration
- An improvement in the condition of bevels on tools
- Sharper edges on tools



An additional benefit to truing and dressing the wheels with the **Tru-N-Dress** is that it levels the aggregate of the wheel very effectively. The greatly improved wheel surface will result in much smoother bevels and sharper cutting edges on your tools.

To maintain the wheels, continue to use the **Tru-N-Dress** to remove metal particles that get imbedded on the surfaces of the wheel and don't return to using a hand held wheel dresser. By continuing to use the **Tru-N-Dress**, your wheels will remain in optimum condition.

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