Sharpening Jigs and Safety

Jim Rodgers

As the use of sharpening jigs increases, so, too, do the instances of sharpening accidents. Injuries that result from fragmented grinding wheels and tools and holders that have slipped have sent woodturners to the hospital with serious injuries to hands and/or eyes.

Sharpening jigs were developed so that we could quickly and repeatedly produce a tool shape, bevel, and edge. When using these jigs, however, woodworkers need to be aware of some potential dangers. Tools can slide off the face of the grinding wheels and wedge between the wheel and the frame of the grinder; the arms of sharpening jigs can slip outward away from the wheel, causing the tip of the tool to move down the surface of the grinding wheel until the tool grabs at the wheel’s equator and instantly wedges itself, fracturing the wheel and potentially injuring the operator’s hand; tools can slip forward in the tool holder itself causing similar problems.

While mechanical failure of sharpening jigs contributes to some injuries, human error is usually the cause. Here’s why:

• The person sharpening the tool is distracted and the tool no longer rides on the wheel. A quick turn of a person’s head can easily cause the movement of a tool off a 1”-wide grinding wheel, jamming it between the wheel and the body of the grinder.
• An improper handhold on the jig can cause fingers to be driven into the still-running grinding wheel.
• Too much pressure is applied to the tool causing mechanical slippage of the jig’s arm.
• Improper grinding-jig geometry is set, placing the tip of the tool too close to the maximum diameter of the wheel (the equator).
• The process of sharpening tools is hurried.
• Small-diameter tools are improperly placed in jigs not meant to handle their smaller size.

Proper use of grinding jigs

• Firmly lock the jig’s extension arm and recheck it by pushing or pulling on it.
• Establish a more acute bevel angle on your turning tool. Placing the tool high on the sharpening wheel’s surface reduces the possibility of an accident.
• Reduce the amount of downward pressure applied during sharpening; this will save tool steel and reduce heat buildup.

Using a simple shopmade template to set up your sharpening jig for repeatable distances saves time and tool wear.

Wrong way! If the sharpening jig slips, fingers will contact the rotating wheel before the jig does.
Identifying Grinder Wheels

Most manufacturers use a system for identifying grinder wheels. There are variations—a number of manufacturers modify the identification system to meet their needs, and not all use the complete sequence of identifying codes. Some wheels carry an absolute minimum of information. It is possible, however, to figure out the code on most wheels.

There are two systems, quite similar. One is for identifying bonded wheels (made of such substances as aluminum oxide and silicon carbide). The other is for diamond and CBN (superabrasive) wheels.

I have tried to simplify the systems to cover only the types of wheels woodturners generally use.

Identifying a Bonded Wheel

Number and Letter Sequence

<table>
<thead>
<tr>
<th>Prefix</th>
<th>S1</th>
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<tbody>
<tr>
<td>Abrasive Type</td>
<td>A</td>
</tr>
<tr>
<td>Abrasive Grain Size</td>
<td>80</td>
</tr>
<tr>
<td>Grade (Hardness)</td>
<td>K</td>
</tr>
<tr>
<td>Structure</td>
<td>S</td>
</tr>
<tr>
<td>Bond Type</td>
<td>V</td>
</tr>
<tr>
<td>Manufacturer’s Record</td>
<td>05</td>
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</tbody>
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Prefix: Manufacturers’ symbols indicating the exact kind of abrasive. This is optional, and often manufacturers do not use it.

Abrasives Type: Identifies the primary grain used to make the wheel.

A Regular Aluminum Oxide
WA White Aluminum Oxide
Z Aluminum Zirconium
C Silicone Carbide
SG Seeded Gel (Ceramic)

Abrasives Grain Size: Indicates the size of grit particles going through a screen. For example, 80 grit is what goes through one row of screen with 80 wires in one linear inch. 120 grit means there are 120 lines of screen, making the size of the grit going through a 1” (25 mm) linear line of screen smaller. The measurements range from coarse to very fine. I have found that woodturners use the medium-grit range (46, 54, 60) and fine (70, 80, 90, 100, 120, 150, 180). We most commonly use 46 grit for shaping a tool and 80 grit for sharpening. Some turners use a finer-grit wheel to keep the tool sharp, such as 120 grit.

Grade (Hardness): Hardness is rated from A to Z with A being the weakest bond and Z being the strongest. A weaker bond is preferred for grinding harder materials like tool steel. Most of the wheels we use are in the I to K range. An increase in the hardness grade by one or two letters can make a dramatic difference. A move from an H to an I, for example, could double the life of the wheel.

Structure: Basically the spacing between abrasive grains, represented by a series of numbers, with the structure becoming more open as the number increases. A 1 would be very dense. We are after a more open structure, which would probably be 5 or above.

Bond Type: The most common bond types are vitrified V and resin B. Vitrified is basically a vitreous glass much like pottery or glassware fired in a kiln, which is why there is such a fuss about not using a chipped or dropped stone made with this material—it may be cracked and can blow up. Resin is more commonly found in cut-off wheels, but can also be found in diamond and CBN wheels. There are other bond types such as Rubber R and Silicate S.

Manufacturer’s Record: A private manufacturer’s marking to identify a wheel. The use is optional.

Identifying a Superabrasive Wheel

The marking system for superabrasive grinder wheels is somewhat different. Number and Letter Sequence

| Abrasive Type | D |
| Abrasive Grain Size | 80 |
| Grade (Hardness) | N |
| Concentration | 100 |
| Bond Type | M |
| Bond Modification | 77 |
| Abrasive Depth | ½ |
| Manufacturer’s Record | 4 |

Abrasives Type: The letter D indicates that the abrasive is diamond. The letter B or CB is used for CBN.

Abrasives Grain Size: The number 80 represents the average grain size fitting through a linear inch of wire mesh (e.g., 120 grit would mean 120 lines of mesh).

Grade (Hardness): Like conventional wheels the letter N identifies the hardness of the wheel. Resin- and metal-bonded wheels, however, are produced with almost no porosity and the grade of the wheel is controlled by modifying the bond formulation.

Concentration: The number 100 is known as a concentration number, indicating the amount of diamond abrasive contained in the mix in the wheel. The number 100 corresponds to an abrasive content of 25 percent by volume. For CBN wheels, the number represents a concentration of 24 percent by volume. Concentration numbers of 75 or higher are are preferred. For CBN wheels, Norton drops the concentration section. Norton refers to the concentration as the grade and uses the letter W for 100 concentration, T for 75 concentration and Q for 50 concentration.

Bond Type: The letter M or N indicates the bond is metallic. Another bond is resin, represented by the letter B or R. There are also vitrified wheels V.

Bond Modification: This is the manufacturer’s notation of any special bond type or modification. It is optional information.

Abrasives Depth: The working depth of the abrasive section, generally measured in inches. For example: ¼” (6 mm). This is very important in determining the life of the wheel and its initial cost. A bond layer of ¼” provides about half the life of a bond layer ⅛” (3 mm) thick.

Manufacturer’s Record: As with the bonded wheels, this is optional information on the manufacturer’s private identification code for the wheel.

Safety Note

Grinder wheels can explode as they rotate at high speed. It is absolutely necessary to wear an impact-resistant faceshield when using a grinder.
well, but still allowed for uncontrolled side movements that contributed to most accidents. Currently two manu-
factures, Sharp Fast and Oneway, have introduced jigs that eliminate the accidental sideways movement while maintaining the proper sharpening geometry. As a teacher of woodturning at both high school and adult levels, I would not be without such a jig!

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A safer way to hold the jig is on the top. If a slip occurs, the hand is protected.

Potential danger: Using a long fixture arm and a blunt sharpening angle brings the tip of the tool too close to the wheel’s equator. If the arm of the jig slips or too much pressure is exerted, it could cause the tool to jam against the wheel.

Wear safety gear
A faceshield or safety glasses should be worn while at the sharpening station. Eye injury is possible while sharpening as a result of flying debris. When dressing a wheel for cleaning or reshaping, wear a dust mask. The aluminum oxide dust from a grinding wheel is potentially damaging to lungs.

Proper hold
When holding the sharpening jig, never place your hand between the jig and the grinding wheel. Place one hand on the handle of the tool and the other on top of the jig. Accidents occur when the hand hits the rotat-
ing wheel during a slippage.

Light touch
Sharpening should be done with a light touch; this reduces the amount of metal being removed and the heat buildup during the sharpening. A light touch also allows the operator to react quickly when a slippage occurs, perhaps saving a finger.

New sharpening jigs
Until recently, most sharpening jigs managed the sharpening geometry well, but still allowed for uncontrolled side movements that contributed to most accidents. Currently two manu-
factures, Sharp Fast and Oneway, have introduced jigs that eliminate the accidental sideways movement while maintaining the proper sharpening geometry. As a teacher of woodturning at both high school and adult levels, I would not be without such a jig!

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Better: Create a more acute bevel angle on your tool, which will place it higher up on the wheel in a safer position when sharpening.

Consider learning how to hand sharpen turning tools. This allows you to place a toolrest close to the grinding wheel, eliminating many potential dangers.