The Sharpening Process and Methods That Work

By
Don Naples
Wood Artistry, L.L.C.

The sharpening process is a topic frequently discussed among woodworkers. When demonstrating the Lap-Sharp™, we are often asked about other sharpening systems or methods and how they compare to the Lap-Sharp™. Frequently we are told of methods or information that is useful to woodworkers, but also some that is misinformation. This misinformation frequently causes woodworkers to have difficulty in achieving the sharpening results they want. They then assume it is an error in their approach, when it is actually a process error. This document is intended to answer the questions we most frequently hear, to provide sufficient data to qualify the information provided, and to help woodworkers sift through the methods and machines so they may come to a conclusion of what will work best for them.

My recommendation to any woodworker is to note the data provided, consider what seems logically correct or shows proof in concept, test the methods to see what works for you and then use the method you prefer repeatedly to gain expertise in achieving the level of sharpness you desire. What is sharp for one person may not be sufficient for another. Woodworkers have different tools, some of which may not hold a really fine edge that tools with a different type of steel will. The type of work, species of wood being cut, and figure of the wood grain should all be considered when sharpening. The test I apply to a plane iron is to sharpen to a point that one may achieve shavings of about .001 (one thousandth) of an inch. This provides excellent performance with a smoothing plane on figured woods and also works well with other planing.

Scary Sharp - ***Not so scary and not so sharp***

This method is widely promoted and does work to a point. It can be made to work even better if one understands how it works and its limitations. There is enough information readily available about this method that I won't repeat it here other than to state the basic features. It consists of progressively finer wet or dry abrasive applied to a flat surface which is then used as a honing surface and abrasive. Here are some reasons why this method does not work well.

1. One step in the process recommends applying an adhesive spray to the underside of the abrasive paper and then applying it to the flat surface (usually a thick glass). This will hold the abrasive in place, but at the risk of creating small bumps from uneven coating of the adhesive. It is important to keep the glass very clean as any particles trapped on the surface of the glass will also cause bumps. Either of these flaws will cause less than optimal results when sharpening.
2. Another approach is to wet the back of the paper and use the surface tension created when applied to a flat surface to hold the abrasive in place. Anyone who has tried this has eventually seen the paper move and at the wrong time, causing a cut or tear in the abrasive that must be worked around when continuing the sharpening process. In addition, a small wave can occur with the pressure of the tool against the abrasive surface. This wave can cause rounding of the edge and tips of the tool.
3. The abrasive used in wet or dry paper has a grit consistency of about 55 percent. This means there is a mixture of pebbles and boulders (relatively speaking) that are used to attempt to create a smooth cutting edge.
4. Silicon Carbide is the abrasive used in wet or dry paper. It breaks down very quickly, and then begins to burnish the metal. It is not a useful abrasive for removing any significant amount of metal. If the back of a plane iron has a rolled edge, using silicon carbide paper will use reams of abrasive to achieve a flat surface. This is one of the main reasons this sharpening method causes such difficulty in achieving the desired results. To prove this point, rub a steel tool on some wet or dry abrasive. After a half a minute, look at the surface. You should see it is beginning to shine. Now take a fresh sheet of abrasive of the next finer grit and take one or two swipes with the tool where you previously abraded the surface. You should now see fresh scratches in the previously shiny surface. The initial abrasive broke down quickly and began to polish the metal. The new but finer abrasive will then cut through the polished surface and it too will quickly break down. This is why it is difficult to sharpen with this method. If the tool was previously flat and sharp, a few swipes of wet or dry paper can reestablish a reasonably sharp edge, though not as sharp as is possible.
5. A better approach with Scary Sharp is to use Aluminum Oxide Micro Finishing Film. It has a grit consistency of 98 percent, does not break down as quickly as Silicon Carbide, is available in sheets from 100µ (150 mesh) down to 9µ (800 or P2000 mesh*), has a 3mil film backing (for flatness), and may be used with or without water.

6. When sharpening at the 10µ level and finer, take extreme care to keep the abrasive clean and free from abraded material and worn abrasive. If a buildup of abraded material occurs, it creates lumps that gouge tracks in the surface of the tool being sharpened. These tracks create a miniature serrated edge and will prevent the tool from being as sharp as is possible.
   This issue becomes more pronounced as you progress to even finer grit lapping abrasives of 1µ and sub micron sizes. This is why the Lap-Sharp™ is supplied with Trizact™ and polishing paper at the finer grit levels. Trizact must be used wet, but does an excellent job as the abraded material falls into the valleys of these apex structured abrasives, thereby staying out of the way of the sharpening process.

Figure 1

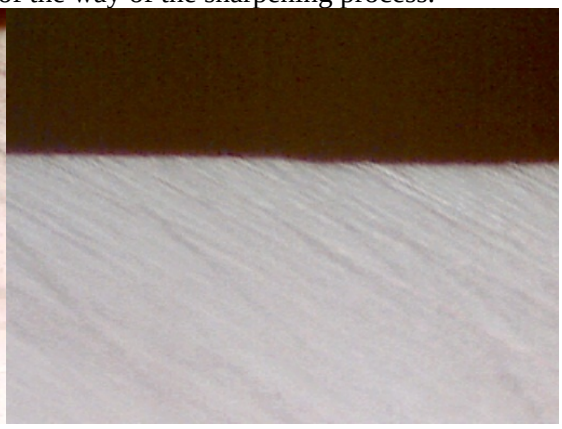

Figure 2

Figure 1 shows 200x magnification of tracks on a chisel bevel after sharpening on a Lap-Sharp™ with **1µ** lapping film . The lumps of abraded material caused the gouges in the surface.

Figure 2 shows the chisel bevel sharpened on a Lap-Sharp™ with **5µ** Trizact without deep gouges.

7. Never use cloth backed abrasives for flattening, as the cloth will compress and cause a rounded edge. This rounded edge may also be created with wet or dry abrasive or water stones and is one of the most common reasons woodworkers do not achieve the desired performance of their tools. Often, one will use a tool that works rather than the correct tool that does not work as well. When looking at the reason for a poorly performing cutting tool, this fault is most frequently one of the culprits.

Figure 3

Figure 3 is a plane iron that has been sharpened by a woodworker (not me) with the scary sharp method. I then put it on the Lap-Sharp™ and abraded the back until the scoring was even across the back, but had still not removed the worst part of the rounded edge. The scary sharp method would take a long time and much abrasive to remove this flaw, even if it did not introduce additional flaws in the process.

Lap-Sharp compared to a wet stone grinder - The Lap-Sharp excels in providing flat honing of woodworking tools. Laminated tools such as Japanese chisels and plane irons as well as laminated cast steel plane irons should not be hollow-ground, as the hard steel in laminated blades is brittle and may more easily chip if hollow ground. Likewise, carving tools are not hollow ground. Hollow grinding western style plane irons and chisels is acceptable, and some prefer it as it reduces sharpening time when using a manual method of honing steel tools. Hollow grinding creates a weaker edge to the tool as the cutting edge is thinner. This edge will require more frequent sharpening, as the thinner steel edge flexes and wears more quickly. This is especially true when sharpening planer or jointer knives. These knives are then used with motor driven machines. I know of no manufacturer that produces planer or jointer knives with a hollow grind.

1. A wet stone grinder cannot flatten the back of a tool. Some attempt to do this by holding the tool onto the side of the wheel. There is no provision for flattening the wheel side surface; the finish is limited to the abrasive grit of the wheel. Assuming a 220 grit wheel, you will have a 60 micron finish on the back of the tool -- far too coarse for use as a cutting tool. The scoring left from the wheel leaves a serrated edge.
2. When wet-grinding the bevel edge, some wet-grinders use a filler to reduce the coarseness of the wheel and create a quasi-finer abrasive. To return to the original grinding capability of the wheel, one must dress the wheel with a tool which wears away the stone. After a number of times of doing this, the expensive wheel must be replaced.
3. Some wet grinders recommend stropping the hollow-ground tool on a leather wheel dressed with a polishing compound. This stropping rounds over the edge of the tool. On a bench plane a rounded bevel severely reduces the ability to work properly and fine shavings are not possible. A rounded back edge of a block plane causes similar poor results. You can still shave the hair on your arm or cut a piece of paper but the edge that produces fine wood shavings in a plane will be compromised.

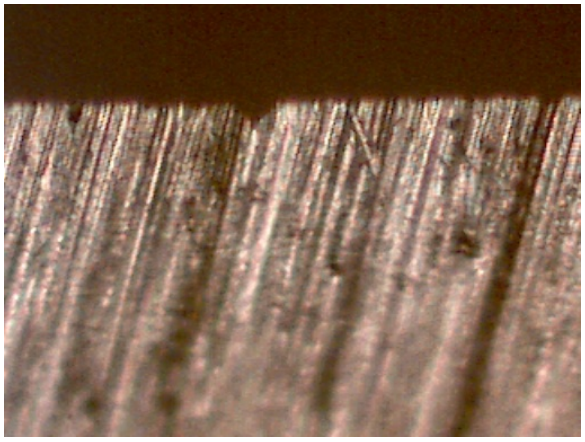

Figure 4

Figure 4 shows a X200 magnification picture of the edge of a plane iron bevel sharpened and stropped on a Tormek™ Super Grind 2000 by a professional sharpener who sells this product.

4. When using a wet grinder, you will achieve a finer cutting edge by using water stones or oil stones to finish the sharpening process. With the stones, the back can be flattened and the bevel edge refined to have a sharp finished edge.
5. The pricing of a sharpening system should include all that is needed to achieve a finished edge. A popular Swedish sharpening system starts at $400.00 with the most basic accessory kit of $140.00, a 4000 and 8000 grit waterstone at $110.00, a honing guide $??.00, plus a method of flattening the back of a tool $??.00 and you quickly get into the $700 price range for a sharpening system.
6. The Lap-Sharp may be used wet or dry, (1) provides a flat grind so it can flatten the backs of tools and sharpen both western, Japanese, and laminated cast steel tools, and sharpen carving tools, (2) has interchangeable discs of a wide range of PSA backed replaceable abrasives to 1µ (finer than an 8000 grit [1.2µ] water stone), (3) provides a polished edge that requires no stropping, (4) does not require additional manual sharpening to achieve a finished edge, (5) and is comparably priced with a wet grinding system.

The following pictures are of a Japanese blue steel chisel bevel taken at 200x Magnification

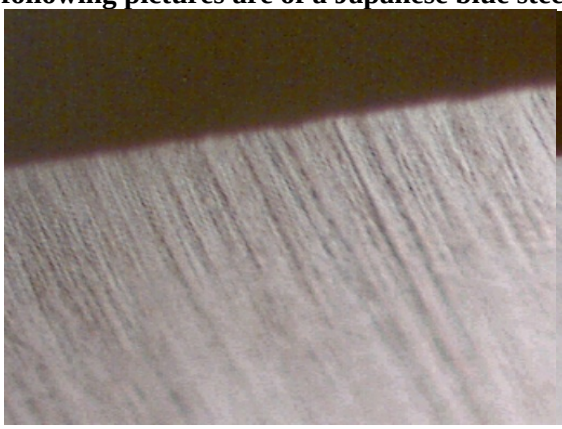

Figure 5 (A10)

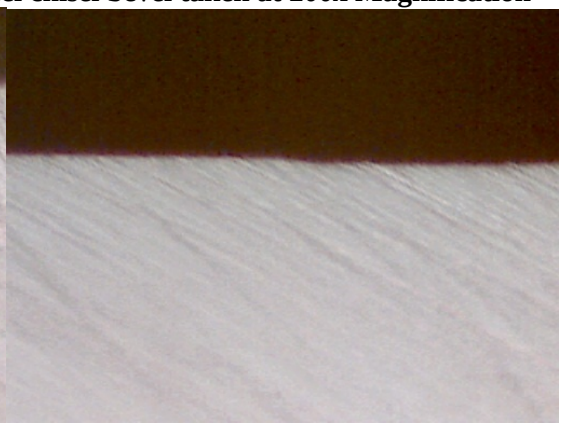

Figure 6 (A5)

Figure 7 (3µ)

Figure 8 (1µ)

Figure 9 (JIS 4000)

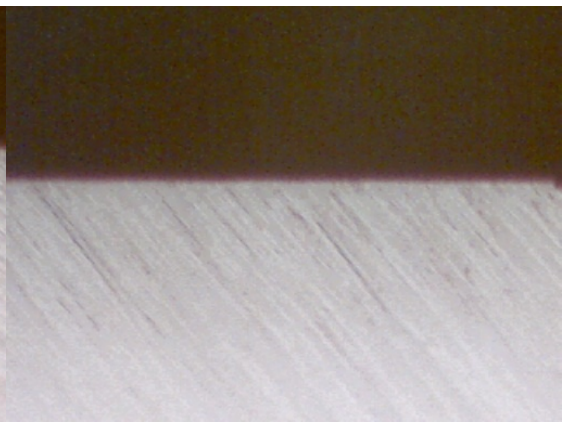

Figure 10 (JIS 8000)

Figure 5 sharpened on a Lap-Sharp™ with 10µ Trizact.
Figure 6 sharpened on a Lap-Sharp™ with 5µ Trizact.
Figure 7 sharpened on a Lap-Sharp™ with 3µ Polishing Paper.
Figure 8 sharpened on a Lap-Sharp™ with 1µ Polishing Paper.
Figure 9 sharpened with Japanese Kingstone
Figure 10 sharpened with 8000 Grit Japanese Waterstone

7. In addition, the Lap-Sharp:
    a. requires no soaking of the abrasive or removal of water tray to prevent softening of wheel,
    b. no dressing of a wheel to remove grooves, flatten, or to change back to original grit
    c. is foot switch activated so one can position the tool in place with both hands prior to starting the abrasive rotation,
    d. is also slow in rotational speed (less than 200 RPM) to avoid significant friction heat and provide easier control of the tool being sharpened especially when items are hand held,
    e. is direct drive and uses needle bearings, so no belts to adjust or replace, has less vibration, and does not depend on a friction created by a small rubber wheel that is pressed against a larger plastic one
    f. it can quickly sharpen the flat sides and edge of hand scrapers (one must still roll the burr),
    g. it may be used as a stationary sander for small projects including fine adjustments of angles on wood blocks used in segmented bowl turning, has a larger surface area than grinders so an even edge may be more easily achieved,
    h. can flatten the soles of small planes and other objects,
    i. the rotation of the motor is reversible so it may easily be used to sharpen knives and create even wear on hand held flat items, it can sharpen the flat side of profile shaper knives,
    j. has a planer/jointer jig option that performs a flat grind on knives to 25 inches in length,
    k. has an optional jig for turning and carving gouges that enables one to achieve very sharp tools quickly and without removing much of tool's steel in the process,
    l. has diamond and CBN abrasives available for hard metal and carbide tools,
    m. it is constructed with a cast aluminum housing that provides a stable platform that does not tip.