Carbide Tools? Fad or Future?

Carbide in action. Note the presentation, with the tool level and the cutting tip at the center of rotation. To make this cut, the tool is simply eased forward into the wood.

by Mark F. Palma

In 1960, Jerry Glaser set out to make gouges for Bob Stocksdale using new–fangled aircraft steels. The debate at the time revolved around whether anything could surpass the widely used carbon steel of the day. The same questions lurking then can be heard around discussions over carbide tools as they gain popularity in the marketplace. Will the tool take a sharp edge? Hold an edge? Are they worth the money? Why would an experienced turner want them? Why change what is working?

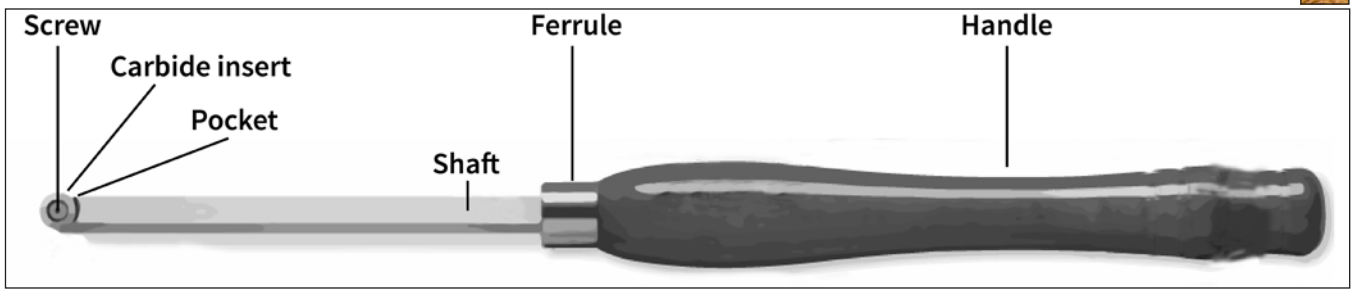
Jerry and Bob were on to something; carbon steel tools are less known to younger turners, who have only seen marketing for modern tool steels. With that in mind, let's approach carbide tools with an open mind, see why they are so popular, and understand the situations in which they can help turners of all levels.

History

The origin of carbide tools for turning is a little murky and probably in dispute. The Hunter Tool Company began manufacturing carbide tools in 2005 and is probably the first commercial manufacturer in America. The first tool review I could locate discussing the original Hunter Tool appeared in 2006. Craig Jackson started Easy Wood Tools, another leading purveyor, in 2008. Digging deeper, Jerry Glaser made three proprietary carbide bowl gouges around 1970; at least one of those tools is in a private woodturner's collection. But in my research I found a February 1948 *Popular Mechanics* article, "Turn with Carbide Tools," that shows wooden handled carbide tools that look surprisingly like modern tools, with a wood handle and a screw that secures a carbide insert on a hollow shaft. So, the idea isn't new, and the seeds planted decades ago have grown into a market segment.

Components

At a glance, a carbide insert tool appears to have three parts—a handle, a shaft, and an insert. Simple enough. Many a hobbyist or small machine shop has knocked together a tool on this basis. In fact, quality carbide tools are a system of six components that work together to create a safe, efficient tool.



The handle

The handle gives the user a comfortable way to grip and manipulate the tool. Shape, length, diameter, and material are variables to consider. Depending on your hand size, grip strength, type of turning, lathe size, and turning style, one design may have benefits over others for you. Most carbide tools come with wood handles.

The ferrule

The metal ring encircling the end of the handle where it meets the shaft ensures tool safety. Without a ferrule, the forces exerted on the handle could cause the handle–shaft connection to loosen, or the shaft to act like a wedge and split the handle.

The shaft

Shaft shape, cross section, length, and material vary from tool to tool. A hidden but important feature is how far the shaft is set into the handle. The deeper the shaft is set into the handle, the stronger the tool. Also, the tool balance changes depending on the depth that the shaft is embedded.

Users have a tendency to allow the tool shaft to overhang the toolrest farther than is appropriate or safe. I readjust my toolrest whenever the insert is one-to-two lengths past the toolrest.

The pocket

Quality carbide tools have a well-formed and carefully engineered pocket to hold the insert. Its shape supports the cutter recommended by the manufacturer, often in two directions. The pocket should be perfectly flat. This may take an initial light touch up with a diamond sharpening stone if any burrs are present.

Keep the pocket free from debris and make sure the carbide insert sits in the pocket without rocking or touching the pocket edge. Although there is sometimes temptation on the part of turners to grind away the pocket or attempt to shim a larger insert than the tool is designed to accommodate, avoid those practices as they compromise safety and the tool may not perform properly. The pocket also keeps inserts that are not round from accidentally rotating, should the insert work loose, a happenstance that could cause a serious injury.

The screw

The screw is the unsung hero and the most abused part of the carbide insert tool. Although it is the least expensive part, if not properly cared for, it can ruin the entire tool. The socket hole in the screw must have all debris removed before the tool is inserted into the socket to remove the screw. You can use a toothpick, dental tool, bent paperclip, sewing needle, or anything that can dig out the debris without damaging the socket. All but Hunter Tools use an Allen socket. Hunter Tools use a Torx screw, which can handle about twice the force of an Allen screw before stripping.

Do not substitute a different screw. The taper and diameter of the screw head and how it fits into the insert are critical to securing the cutter. Whenever you loosen the carbide insert, lubricate the screw with machine oil. If you turn wet wood, you should take the insert out at the end of the session and wipe oil on the pocket and place a drop on the screw threads.

If your Allen wrench has rounded corners at the tip (a common wear pattern), replace the Allen wrench so that you do not strip the insert.

Carbide insert

Carbide inserts vary in size, shape, and profile. For example, round inserts vary from 6–18mm in diameter. Shapes range from round–to–square, square–radius, diamond, hexagon, teardrop, and rectangular. Profiles include flat top, cup top cutters, to negative–rake scraping inserts. For safety, only use the replacement cutter designed for your tool. The wrong insert can create risk of either the cutter breaking, binding, or working loose.

Manufacturers also design inserts to be indexable (so you can rotate them to expose a fresh edge) and replaceable. They are designed to wear and be replaced inexpensively. Just as using a dull conventional turning tool puts the operator at risk, the same holds true for carbide inserts.

Safety and carbide insert tools

The same guidance for Personal Protection Equipment applies to conventional tools and carbide insert tools. This includes adequate face and lung protection.

Carbide insert tools come in an array of shapes and sizes. Like conventional tools, each is designed for a narrow range of tasks.

The toolrest should be adjusted so that the tip of the carbide insert is at center height when the handle and shaft are level. Do not overhang the toolrest excessively. Replace any chipped or cracked inserts. Carbide is relatively brittle and can become shrapnel if it shatters. Dropping a carbide insert onto a concrete floor necessitates exchanging the impacted insert for a new one—a trip to the emergency room is not worth the risk.

Make sure the insert is not moving on the shaft. Lastly, do not over-engage the insert in the wood. Note where the insert is cutting and only use a portion of the insert at a time. Radiused and round tools are generally safer than square inserts, and smaller inserts are safer than larger ones. Never let two sides of an insert engage the work at once; the tool may grab or become trapped in the wood. Lastly, never use any tool that is damaged.

How carbide inserts work

The profiles of flat top, cup, and negative–rake inserts determine how the tools behave when they touch spinning wood.

Flat–top

Flat–top inserts are most prevalent. These inserts have a profile (or relief angle) on the underside. They come in square, radiused, diamond, teardrop, hexagon and round forms, and they are all scraping tools. If you hold a flat–top tool next to a traditional scraper, you will see they effectively have the same profile. These inserts can remove wood quickly and cleanly. Most flat–top cutters are designed to be rotated in increments as they dull.

Cup

Introduced to the marketplace by Hunter Tools, cup inserts use a sharp, upwardly projecting rim that severs the wood fibers. They can cut

Cup inserts excel at cutting endgrain cleanly. they can cut and catch aggressively. Even the small cup can quickly remove a lot of material.

Negative–rake inserts look superficially like other flat top inserts, but their cutting action is subtle and produces a cleaner surface.

wood aggressively and must be respected as they can catch if you attempt to remove too much wood at once. Many hollowing systems use a cup type cutter either as their standard cutter or an upgrade because they cut endgrain fibers well. Cup inserts should be randomly rotated after each use to evenly wear the cutter. This is accomplished by loosening the screw and spinning the cutter.

Negative–rake

Introduced by Easy Wood Tools in 2018, the negative–rake profile reflects the geometry of negative–rake scrapers in traditional tool lines. They are not susceptible to catches, scrape wood in a more conservative, controlled manner, and work well on difficult materials like acrylic pen blanks. They are intended to be rotated in the same manner as flat–top inserts. This style of insert is currently sold as a replacement insert for existing tools, rather than as stand-alone tools.

Sharpness

A frequent criticism from turners who use traditional tools is that carbide inserts are not as sharp as a tool fresh from the grinder. There may be some truth to this contention, but there are important subtleties lost in that argument.

A properly sharpened steel tool (particularly if it has one of the more exotic metallurgical compositions) coming off a CBN wheel or wet grinder almost certainly exceeds the sharpness of a carbide insert. However, that initial sharpness disappears with use. As long as the tool is contacting rotating wood, the edge is becoming duller. Add into account knots, bark inclusions, and the inherent variables of wood, and a sharp edge can be short-lived. Having watched turners use a conventional turning tool for long periods of time without returning to the grinder, I am sure that their “sharp” tool is often far duller than a carbide insert tool.

Carbide inserts may not have the same initial sharpness as a freshly sharpened conventional tool, but their edge retention exceeds conventional turning tools. In a recent experiment I turned one hundred 4–6” (10-15cm) bowls with one carbide insert.

Probably the best compromise between the two camps is the most obvious. Do ninety percent of the work with a carbide insert tool, then take a freshly sharpened traditional tool to the work for the last pass or two to take advantage of the best features of each tool.

In the workshop

The simple presentation of carbide inserts to the wood blank reduces the learning curve for new turners. There is no bevel to learn to ride. The widespread availability of carbide tools and mini lathes has made woodturning more accessible and increased the likelihood of first project success.

If carbide insert tools have a fault, it may be that their simplicity can lead to carelessness. With traditional turning tools, little metal touches the work at one time. Properly used, the same is true for carbide inserts. Things go wrong when too much of the insert engages the work at once.

Unlike traditional tools that need frequent sharpening, carbide inserts can hold a functional edge through several projects. Because they dull at an imperceptibly slow rate, we tend to compensate by pushing ever harder on the tool without recognizing it is past time to rotate the insert. Perhaps a worse habit is the turner that keeps rotating the cutter to search out the least dull edge, rather than replacing the insert. These inserts were made to be replaced, and neglecting this simple task ensures a poorly performing and potentially dangerous tool.

Carbide insert tools provide an easy way to enter the craft and achieve success with little or no frustration. If it brings gratification to these folks, and perhaps they develop enough interest to join a club or the AAW, how could that not be a positive outcome? My conversations with tool reps indicate that it is the influx of turners into this hobby through developments such as mini lathes and carbide tools that has funded the research and development of many other turning products.

These tools offer options for turners who trained on traditional tools. It's worth asking whether a tool that can turn a hundred 5" bowls without any trips to the grinder could have a role in your shop. I use only carbide insert tools to rough-turn bowls. Any dirt or bark comes off quickly and the carbide inserts seem to endure more abuse than the sharpened edge of a bowl gouge. I do all my hollowing and box making with a cup insert, as I find they cut well in situations where traditional tools struggle. In difficult grain and in situations where I am working deep in a vessel, a small cup or negative–rake insert can get me out of trouble. For acrylic pen making a negative–rake insert does a superior job to a traditional tool.

Of course I still rely on traditional tools! But I have found that carbide insert tools are serious tools that have earned a place in my shop.

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