As a general guideline, high-carbon steel sparks remind some turners of sparklers. At the grinder, you should notice a complex shower of sparks.

As a general guideline, high-speed steel (HSS) sparks remind some turners of tracer bullets and tend to be individual sparks. Note: This test is not always conclusive for HSS.

tiny rounded particles rather than a large ingot of steel. The particles are then compressed under heat and high pressure. This process yields a more consistent steel and one with greater toughness (a steel's ability to resist breaking under stress or shock).

The other term is **cryogenic treatment** of steel. This is a cold treatment of between 100–300˚F below zero. According to Dr. Wright and Jerry Glaser, cryogenic treatment done as a step in the tempering process (after the first temper, but before the second) yields a tool that is more uniform in its heat treating and will offer increased steel toughness.

Some experts question whether cryogenic treatment performed after the heat-treating process produces any improvement in the steel's properties.

Observations, conclusions

First, beware of generalizations because the test results were for a single tool from the company's inventory. All tools were purchased in the last two years through regular retail catalog channels or new through Internet sales.

Second, let's not forget that a turner can achieve gallery-quality work with any of the tools listed on *page 53*. With that said, some tools will hold an edge poorly compared to other steels and some will not hold up to heating as low as 525˚F (bluing occurs around 570˚F).

The more serious problem resides in purchasing tools sold as HSS but are in fact not. If a company spot-checks its supplier and discovers that the tools don't meet HSS standards, it has several choices. It can relabel that shipment, deleting the HSS claim. Or it can refuse the batch, insisting that the supplier correct the problem.

As a turner, I am afraid "buyer beware" does not work with steel content and how well it was heat treated. I may have to use a tool to find out its properties. This is a challenge for the inexperienced turner to judge.

There are some good buys among the legitimate HSS turning tools. And, many tools are a sound choice for someone just entering the world of woodturning.

Other tool shortcomings

The design adequacy of the tools (shape and thickness of the steel, not the edge profile) is a hard one for the beginner to judge. Some of the tools were lightweights or had designs that were not well thought out. Also, proper heat treating is an unknown.

For consistent and predictable tools, true HSS must be performed correctly. One of the Sheffield, England, toolmakers reported that his company performs a hardness spot test on each batch of tools delivered from its heat-treating facility. If even one sample doesn't measure up to the company standards, the entire lot is returned to the heat treater.

Remaining questions

Important questions remain about steel for turners:

- How would each of the steels react to "bluing," which can easily occur at the grinder and even while in use.
- Much has been made about differences of sharpness in steels: Some turners believe high-carbon steel gets sharper than HSS, others believe M2 gets sharper than the high-wear steels such as A11, M4, 2030 and 2060.

These topics are ideal for a follow-up article.

Special thanks for assistance with this test to Jerry Glaser, retired toolmaker of 45 years and AAW Honorary Liftetime Member, and Dr. Jeryl Wright, vice president of Technology for Crucible Materials Corporation and one of the largest makers of specialty tool steels in the USA. Both men are woodturners, so knowledge of both steel and woodturning are special strengths of these two individuals.

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