

Reprinted with permission.  
American Association of Woodturners

There's a good chance that your favorite lathe tools were manufactured in Sheffield—the heart and soul of Great Britain's fabled steel industry. For turning tools, the tradition runs deep.

# Sheffield



Andrew Triplitt, a 26-year employee at Crown Tools, straddles a large stone grinding wheel running in water to shape turning tools. His father also worked for Crown.

By Nick Cook

**A**fter attending the 10th Seminar of the Association of Woodturners of Great Britain, I had the opportunity to spend a few days in nearby Sheffield. What a trip it was.

For generations, Sheffield has been synonymous with turning tools and cutting edges in general. Most of today's manufacturers of turning tools are either in Sheffield in South Yorkshire or originated there. Sheffield has been home to Robert Sorby Tools for more than 200 years; Henry Taylor Tools dates back more than 170 years. Crown Tools, 25 years old, and Hamlet Craft Tools—even younger—are both relatively new to the area. All are within a few minutes' drive of each other.

Ashley Iles Ltd.—another name you'll recognize—originated in Sheffield some 50 years ago and moved in 1966 to Lincolnshire, just 50 miles down the road.

## Why Sheffield?

I spent time with Peter Gill and Philip Proctor at Robert Sorby, Brian Gandy at Crown, and Barry Surplice at Henry Taylor. All were very hospitable and provided me with more information than I ever thought I needed to know about steel and toolmaking.

My first question was, "Why Sheffield?" What makes this place so special when it comes to steel and cutting edges?

Sheffield had it all. Natural resources—everything required to make steel and process it—right here in the middle of England. Ironstone or iron ore was in the ground. They had plenty of timber for making charcoal.

Sheffield's two rivers—the Don and Sheaf—provided water power to operate crushing mills, grinding wheels, tilt hammers, and work bellows for furnaces. At one time, the Sheffield area was home to

more than 160 water wheels.

Sheffield also had millstone grit and sandstone for making grinding wheels. And, of course, there was plenty of clay for making crucibles to cast steel ingots.

Today, most of Sheffield's steel is produced for more specialized uses such as machine parts, taps and dies, and carving and woodturning tools.

New technology has made it possible to produce proper steel for just about any use. The addition of various elements increase hardness, durability, toughness, and wear resistance.

## Today's M2 steel

It is the science of metallurgy that allows the manufacture of an infinite variety of steels. Some are tough, some are hard, and others are rust-resistant. Most of Sheffield's turning tools are made

from M2 high-speed steel, today's standard for general-purpose cutting tools. M2 steel contains:

- carbon, which influences hardness
- chromium, to improve high-temperature performance and abrasive resistance
- molybdenum, which combines with carbon to improve hardness
- vanadium, to refine grain structure and inhibit grain growth
- tungsten, for toughness

The percentage of these elements in steel varies from one manufacturer to another.



Mick Mylnek, a 38-year Henry Taylor employee, uses a hydraulic power hammer along with hand-forging to shape turning and carving tools.

## Forming your next turning tool

Your Sheffield lathe tools are handmade by a small fraternity of craftsmen. Henry Taylor, for example, employs just 11 workers. Up the road at Robert Sorby, you'll see 36 workers; over at Crown, 24.

The toolmakers select and buy their own steel in billets made to their own specifications. The steel is then formed at a rolling mill into specific sizes and shapes.

Once rolled, the steel must be annealed to make it workable again. The annealing takes place in clay tubes, which are filled

with coal and heated slowly, then slowly cooled. This reduces brittleness and produces a tough but not overly hard material ready for cutting, shaping, and machining.

The steel is then cut into specific lengths for the tool to be made. Bowl and spindle gouges are sent to the milling machine, where a flute is cut. Spindle roughing gouges are forged into shape while other tools are either ground to shape by hand or with surface grinders. (Excessive heat in grinding reduces hardness.)

The tools are then heat-treated or tempered. Depending on the intended use of the tool, it may be single-, double-, or even triple-tempered. (The temper determines the degree of hardness, resistance to wear, and edge retention.) Skews may be double-tempered, while bowl gouges and spindle gouges are usually triple-tempered. The goal is to get to a Rockwell hardness of somewhere between 62 and 65.

There are three heat-treating facilities in Sheffield. Each tool manufacturer usually sticks with its favorite facility to maintain quality control and to trace the course of the tools. Some tool-



Mick Gibbs, a 20-year employee at Robert Sorby, tests each tool for hardness. Robert Sorby uses an industrial diamond to determine Rockwell hardness.



Learn more about the early years of Sheffield's steel industry by clicking on the Sheffield link at [woodturner.org](http://woodturner.org).

makers test the hardness of each tool while others test samples of each type of tool.

Once the tools are heat-treated, the craftsmen grind the final shape. Some tools are hand-ground on large water-cooled grinding wheels by an employee sitting astride a wooden horse over the wheel. Others use water-cooled abrasive belts and a variety of jigs and fixtures. You'll find a few tools ground on a milling machine. Amazingly, you'll see no grinding jigs or fixtures—these fellows know exactly what it takes.

After grinding, the craftsmen polish and glaze the steel before mounting handles. The tools are then packaged and shipped off to distributors and dealers all over the world.

According to one manufacturer, about 75 percent of the woodturning tools produced in Sheffield are exported.

Peter Gill and Philip Proctor of Robert Sorby, Barry Surplice of Henry Taylor, and Brian and Edward Gandy of Crown Tools contributed to this article.