▶ BY BILL KENNEDY, CONTRIBUTING EDITOR

Compound Cutting

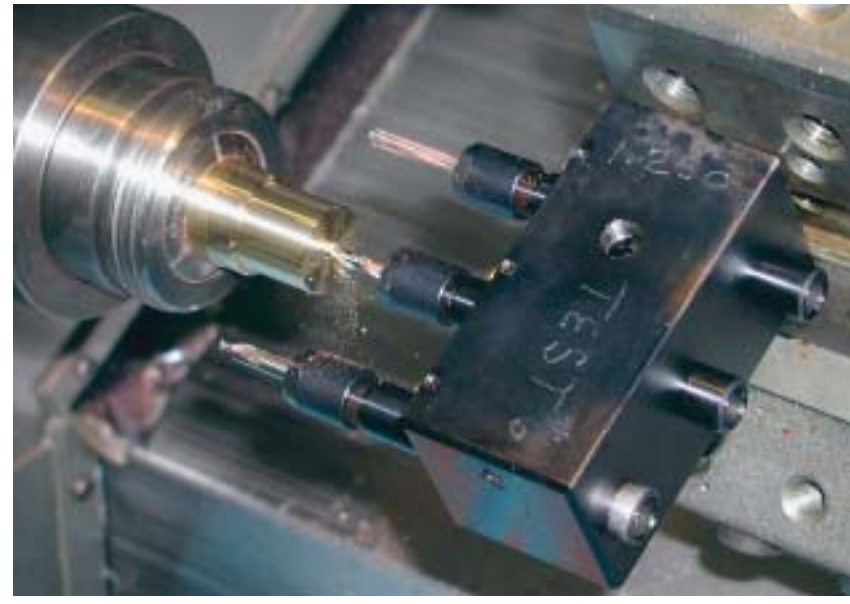
Multitool holders reduce lathe cycle times.

In metalcutting heaven, lathe spindles never stop. In a typical earthly shop, however, the actual time-in-cut constitutes only about 20 percent of the machine time required to produce a part.

Setup and maintenance consume approximately 60 percent of production time, turret indexing and travel another 10 percent, and the final 10 percent goes to changing tools, offsetting and gaging, and taking test cuts.

Obviously, cutting faster and longer boosts output. But lowering the time needed for setups, tool changes and turret indexing and travel also raises productivity.

Described below are three products designed to take a bite out of the time devoted to turret motion.



Foxwood Machine

Foxwood Machine developed the Turretgang to lower turret-indexing time. Soon after, the shop began selling the multitool holders to other companies.

Ganging Up

While a lathe's turret can hold a variety of tools that perform different processes on a chucked workpiece, it takes time to withdraw each tool from the part, index the turret and move the new tool into cutting position. Foxwood Machine Inc., a Rowley, Mass., job shop, recognized this drag on productivity.

"Indexing time was killing us," company president Frank Alexander said of the shop's use of a turret lathe to center-drill, drill and ream. "We would have to come away from the part, index the turret and return three different times."

Seeking to reduce cycle time and give his customer the lowest possible cost per part, Alexander challenged his staff to come up with a solution 2 years ago. They developed a working prototype of a bar-shaped toolholder that grips three round tools and clamps in an OD toolholding location on the turret.

"With the new holder, we're able to back off, slide along the X-axis and resume machining," said Alexander. "We dramatically reduced the cycle time." He added that cycle-time reductions could amount to as much as 2.5 seconds for each additional tool in a holder, depending on the machine.

The shop refined the design, named it Turretgang and began to sell it to other shops. Today, Foxwood markets the Turretgang through US Shop Tools, Anaheim, Calif.

Tools fitted in the Turretgang are located 1.250" apart. The holder, which has through-coolant capability, works best on parts with diameters of 2" or less. Larger parts can be machined by leaving one tool pocket empty. (Another option is to order a special designed for larger parts.)

Alexander said the multitool holder requires those familiar with turret

lathes to think a little differently. "They have to think about sliding along the X-axis," he said. Programmers use X-axis tool or wear offsets to locate each tool in the holder. The Turretgang can hold drills, reamers, boring tools, taps and threading tools, with the only limitation being tool diameter.

Foxwood discovered additional advantages of the Turretgang soon after developing it. One was that it let the shop cut complex parts on more machines. Like most job shops, Foxwood operates an array of machines with different tool capacities. Often, if complex parts needed to be machined in one chucking, they would have to wait for a machine that could handle a greater variety of tools.

"We create capacity," Alexander said. "Now, we can put Turretgang holders in those machines that have fewer stations in the turret."

Speeding Setups

Similar to Foxwood's concept, the Triplit multiple-tool holder from Jotco Inc., Cincinnati, also enables three tools to be mounted in a single turret station.

Jotco

The Triplit holder incorporates three tool pockets. It can grip drills, endmills and boring bars.

Featuring a 1¼"-dia. straight shank that's clamped in the machine turret, the holder's front end has three tool pockets on 1" centers.

Collet holders or bushings in the pockets grip drills, endmills and boring bars. In addition, Jotco offers holders for threading, grooving, turning and profiling inserts. The holders feature identical X- and Z-axis tool-tip dimensions, which eliminates having to reset tool geometries. Each tool pocket is ported for through-coolant delivery.

Jotco President John Young pointed out that the multitool holders, introduced earlier this year, significantly reduce lathe setup time. "The more tools you have in the turret, the more likely it is that the tool you need [is] already on your machine when it comes time to do a setup," he said. "If your center drill is already in the turret, you don't have to go get one, put it into the turret, get your touches and enter offsets. Depending on the operator and the tool, that may take 5 [to] 10 minutes per tool."

The holder also can save time when filling a repeat order of parts. A shop can preload and store a Triplit fitted with the tools used for the parts. Then, when the repeat order comes in, the shop simply plugs the holder into the turret.

Young cited two additional benefits of the holder. First, the extra tool capacity it provides can eliminate a secondary operation on another machine. This would improve part quality by reducing tolerance buildup. Second, it can free up turret stations for specialized tools or heavy-duty tools.

"If a guy wants to take ⅜" DOC at 1,000 sfm with a 2" boring bar, he'd want to clamp the bar directly into the

Multitalented tool

Another way to speed the transition time when changing tools is to eliminate the transition altogether, by making one tool do the work of several.

An example of such a multipurpose tool is the EcoCut multiple-tool system from Ceratizit.

Distributed in the U.S. by Allied Machine & Engineering Corp., Dover, Ohio, EcoCut features a drill-like tool body fitted with a single helical insert. The tool drills, bores, chamfers, faces and, by reversing the direction of rotation, turns. Among its unique qualities is the ability to drill flat-bottom holes.

Ceratizit

A single EcoCut tool drills, bores, chamfers, faces and turns.

The biggest advantage of the EcoCut, though, is that it lowers chip-to-chip time, said Chris Drozdowski, North American cutting tools business manager of Ceratizit USA Inc., Columbia, S.C. As an example, he cited a part requiring a drilled hole, steps in the bore and on the OD, and facing.

"With conventional tooling, it would take three or four standard tools," he said. "You would need an indexable or solid-carbide drill, and if the callout were for a flat bottom, you may also require a boring bar or a flat-bottom endmill. You would need a boring bar for the steps in the bore and another tool to turn the OD. The EcoCut can do all those applications with just one tool.

"In some cases, we've taken a typical 3-minute cycle time with four conventional tools to down under 2 minutes."

—B. Kennedy

The following companies contributed to this report:

Allied Machine & Engineering Corp.
(800) 321-5537
www.alliedmachine.com

Ceratizit USA Inc.
(800) 334-1165
www.ceratizit.com

Foxwood Machine Inc.
(978) 948-2793

Jotco Inc.
(888) 228-6026
www.jotcoinc.com

Sandvik Coromant Co.
(800) SANDVIK
www.coromant.sandvik.com/us

US Shop Tools
(800) 243-7701
www.usshoptools.com

turret," Young said. "The Triplit can hold his center drill and smaller tools and make another station available for that 2"-dia. bar."

Simulated Turret

The recently introduced "mini-turret" offers a different approach to raising productivity. Part of the Capto line from Sandvik Coromant Co., Fair Lawn, N.J., the multiple-tool head is specifically designed to work on multitasking machines with tool magazines and B-axis spindles.

Users of these machines, which include Mazak's Integrex series, Mori Seiki's MT Series and Okuma America's MacTurn turning centers, often produce parts that involve turning and off-axis processes, such as milling.

The mini-turret, which stores in the machine's magazine like any toolholder, holds three tools. When it is clamped in the multitasking machine's B-axis, any of the three can be presented to the workpiece by simply changing the B-axis position. This lets the user perform multiple turning operations while minimizing the time spent loading tools from the tool magazine.

Jim Grimes, a Sandvik tooling systems product specialist, said, "You just change the orientation of the B-axis spindle and you have a different tool. The cycle times are a lot shorter because you are indexing a turret, not changing out each tool from a tool magazine."

Many elements determine the final floor-to-floor cycle time for a part. But the seconds that these innovative toolholders save between cuts can add up to a real improvement in overall productivity.

Sandvik designed its "mini-turret," which can be fitted with three tools, specifically to work in the B-axis of multitasking machines.