

► BY ALAN ROOKS, EDITORIAL DIRECTOR

Changing Quick-Change

New quick-change technologies are enabling faster, more accurate tool changes.

While quick-change toolholding and tooling has been in use for many years, new products are making the tool-change process even more rapid, accurate and applicable to additional tools.



ITI TOOLING CO. INC., Ramsey, N.J., offers the Varia “Rapid-Change” tooling system for horizontal and vertical CNC lathes. Varia, like most modular toolholding systems, allows operators to preset additional toolholder heads while the machine is in operation and have these replacement heads ready for immediate exchange. According to ITI, Varia is different because by using its unique single locking cam-screw design, an operator can exchange a preset tool in roughly 7 seconds.

For example, when a cutting tool in a Varia live spindle unit or static toolholder is worn or breaks, the operator stops the machine and can immediately rotate the single locking cam screw a half turn. This action not only releases the toolholder’s lock, it also kicks the tool head forward slightly to break the seal between the toolholder head and the base unit, which remains on the turret. This double motion guarantees a much quicker removal, according to the company.

On many machines with live tooling, Varia’s single cam screw can be preoriented toward the operator for even easier access. Next, the operator removes the toolholder head with the worn or broken tool and replaces it with a preset one. The operator then rotates the single cam screw a half turn in the opposite direction, which pulls the toolholder head back into the base unit and locks it accurately and rigidly into place.

The Varia system is also safer than other modular toolholders, according to ITI Tooling. Unlike other systems, Varia’s single-cam lock design and its radial orientation eliminates the need for operators to reach into the machine to rotate a live tool spindle to locate multiple clamping screws.

“Because the Varia system uses interchangeable toolholder heads on a standard base toolholder or live spindle unit, one base spindle or static toolholder can in effect become many because of the different styles of off-the-shelf interchangeable heads that are available,” said Lee Hebenstreit, product manager for ITI Tooling.

Varia toolholders and live spindle units are available with a VDI shank and in various base-mount styles and are sized for most horizontal and vertical turning centers. The interchangeable heads are available in different sizes and are prepared with ER collet chucks, parallel bores, milling arbors, Morse tapers, Weldon styles and others.

T.M. SMITH TOOL INTERNATIONAL CORP., Mt. Clemens, Mich., develops standard quick-change tooling as well as special combination quick-change products. According to the company, many of its standard product designs are based on discussions with customers about improving quality and productivity by reducing downtime with faster, more accurate tool changes.

T.M. Smith’s SA16 quick-change system is one example of this process. A medical device manufacturer using T.M.

Smith’s standard ER-16 collet, collet-nut and drill-chuck system discussed its tool-change challenges with the company. The manufacturer operates several CNC multiple-spindle machines in several facilities and found that its tool changes were slowing production. Because of space constraints, loosening and tightening collets nuts during tool changes was cumbersome.



T.M. Smith quick-change shrink-fit system.

T.M. Smith combined two established technologies to provide a low-cost quick-change solution, applying shrink-fit technology to accurately hold the cutting tool in the collet along with its established quick-change locking technology. The result was a compact, quick-change tool system that uses the standard size 16-collet pocket integral on all the medical manufacturer’s live spindles and fits their close center conditions. Tools can now be preset into available collets, and because there is no collet nut to tighten, torque inconsistency is eliminated. Tool-change time has been cut from 5 minutes to less than 1 minute,

according to T.M. Smith.

ZETTL MIMATIC INC., Mount Prospect, Ill., introduced its mimatic mi modular quick-change system for driven toolholders. It offers a universal tool clamping system for different production areas with offline tool presetting via a length-adjustment screw. According to Zettl Mimatic, the system enables tool changes within seconds, interface concentricity of less than 0.002mm and secure holding force using form-locking technology. The toolholders are available in different sizes and use internal or external coolant.

The system is for CNC turning machines, machining centers, milling machines, turn/mill centers and transfer and special machines. Driven toolholders and basic holders are available in different versions, including:

- Shafts such as VDI, SK, BT, CAT, HSK and Capto,
- Straight and angle units,
- Single- or multiple-spindle versions,
- Gear multiplication or reduction units, and
- Central or offset units.

Modular mimatic mi toolholders are available in several variations, including:

- Tapping toolholders,
- Collet toolholders (internal and external nut),
- Hydro-Flex hydraulic toolholders,

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Cooling it through toolholders

Several recent product introductions offer through-coolant capability. Reasons for using through-coolant toolholders include allowing shops that do not use through-coolant tools to deliver coolant to the cutting edge, providing more accurate coolant placement and enhancing application of high-pressure coolant.

REGO-FIX TOOL CORP., Indianapolis, introduced a line of coolant flush disks for use with its ER collets. The new products are manufactured in Switzerland to ISO 9001/ISO 14001 standards and are identical to existing sealing disks in their assembly. Unlike previous models, the new coolant flush disks direct the flow of coolant to the tool tip from outside the tool.

The disks allow manufacturers without through-coolant tools to deliver coolant to the cutting edge, improving chip control vs. flood-coolant delivery. This increases productivity and tool life while lowering costs, according to the company.



Additionally, Rego-Fix coolant flush disks allow manufacturers with through-coolant tools to switch over to solid-carbide tools without coolant holes. This increases stability and performance, according to the company. The new disks are available in sizes ranging from 1/8" to 3/4" and can be changed quickly to accommodate different tool shank diameters.

SANDVIK COROMANT USA, Fair Lawn, N.J., introduced the CoroTurn HP toolholder, which targets high-pressure coolant at an insert's cutting edge to provide better chip control, enable higher cutting speeds and extend tool life. Designed for turning centers, vertical turning lathes and multitask machines, the toolholding system channels high-pressure coolant through small nozzles close to the insert's cutting edge.

Traditionally, coolant has been used to flood the machining zone. With the high cutting speeds attainable by today's cutting tools, temperatures in this area can reach 1,800° F or higher, which leads to instant evaporation of the coolant and the creation of a pressurized vapor zone. CoroTurn HP avoids this temperature buildup by delivering coolant directly to the insert's cutting edge. This allows for increases in cutting speeds without sacrificing tool life, according to the company.

The CoroTurn HP enhances chip control by delivering high-pressure coolant to the cutting area at an angle that creates a wedge effect. This effect pries away cut metal and creates smaller chips. The result is more reliable performance at high cutting speeds.

Multitask machines in particular use high-pressure coolant in turning operations. Disturbances due to swarf accumulation when machining high-temperature superalloys can cause machining problems. According to Sandvik Coromant, CoroTurn HP can be used in these applications because of its wedge effect, especially in medium and finish turning, in which chip thickness is more controllable and the fluid wedge easier to apply than in roughing operations.



Sandvik Coromant

DO-GRIP parting insert with Jet-Cut direct jet cooling. The insert features a coolant hole that passes from the toolholder through the insert, with an outlet near the cutting edge. The new DGNC inserts are for parting and grooving stainless steel and high-temperature alloys.

When machining these materials, temperatures build near the cutting edge and built-up edge occurs. BUE can be reduced or even eliminated by efficiently cooling the cutting edge.

During grooving and parting applications, chips can prevent the coolant from reaching the cutting edge. The new DGNC inserts allow the coolant to reach the cutting edge while cooling the insert body internally.

Materials such as titanium, Inconel or austenitic stainless steel tend to strainharden during cutting and form long, tangled chips. Coolant supplied to the cutting zone decreases flank and cratering rates. This leads to substantially longer tool life and finer surface finishes. Using Jet-Cut, the coolant supply can be directed to the DGFH-C blades used on regular blocks, or through the SGTBU-C blocks, which have coolant passages and connecting ports.

—A. Rooks

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- Thread tightening toolholder cutters,
- Morse taper shank toolholders,
- Weldon and whistle notch toolholders, and
- Shell mill toolholders.

Operators using the mimatic mi system insert the toolholder into the driven toolholder's spindle. Three balls inside the mi interface guide the toolholder into the proper position. The toolholder is turned until it locks, then the clamping ring is fixed by hand and clamped with a hook wrench. To unclamp the toolholder, the steps are reversed.



Zettl Mimatic

TOOL FABRICATION CORP., Milwaukee, offers quick-change toolholders for manual machine tools. The McCrosky Wizard quick-change chuck makes multiple-tool jobs on manual machines continuous processes, which increases productivity and reduces operating costs, according to the company.



Tool Fabrication

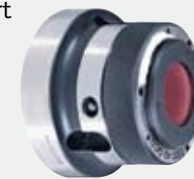
The chuck portion of a Wizard assembly consists of the body and the spring-operated locking collar. Both are hardened and ground to ensure accuracy. The bottom of the bore in the chuck body is beveled to correspond with the bevel on the end of the collet, and two slots are provided to engage the driving lugs on the collet, permitting the driving force to be transmitted directly from the chuck to the collet.

The locking collar, which locks the collet into the chuck and permits easy disengagement, is spring-operated. It is knurled on the outside and has two inside latches.

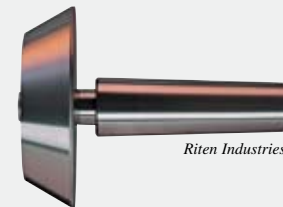
When the operator pushes the Wizard collet with the new tool into the chuck, the driving lugs on the collet press against the underside of these latches, forcing the collar backward against the spring. As the collet passes completely into the chuck body, the spring closes the collar and locks the collet securely in the chuck. △

Quick-change workholders

RITEN INDUSTRIES INC., Washington Court House, Ohio, offers quick-change collet chucks used for high-volume turning of bar stock and other workpieces up to 3 1/8" in diameter. Riten's new line of collet chucks includes three quick-change models for both bar and secondary work. Each model features a preloadable quick-change bayonet cap that reduces setup time, particularly on smaller batch runs requiring frequent collet changes. Accuracy and repeatability are guaranteed to ±0.0002" TIR, with speeds up to 6,000 rpm.



Riten quick-change collet chuck.



Riten Industries

Riten bell-head live center.

Depending on size, prices range from \$1,400 to \$4,300.

Riten also offers interchangeable bell-head live centers. These centers are spring loaded to compensate for thermal expansion in the workpiece, and include a selection of five interchangeable bell-head adapters. Contact face diameters range from 0.25" to 6.06", and a female head is available with a maximum 2" opening. Shank styles include 2 through 6 Morse taper, Brown & Sharpe, Jarno and straight shank. Centers range in price from \$200 to \$725, while adapters run from \$98 to \$295.

—A. Rooks

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