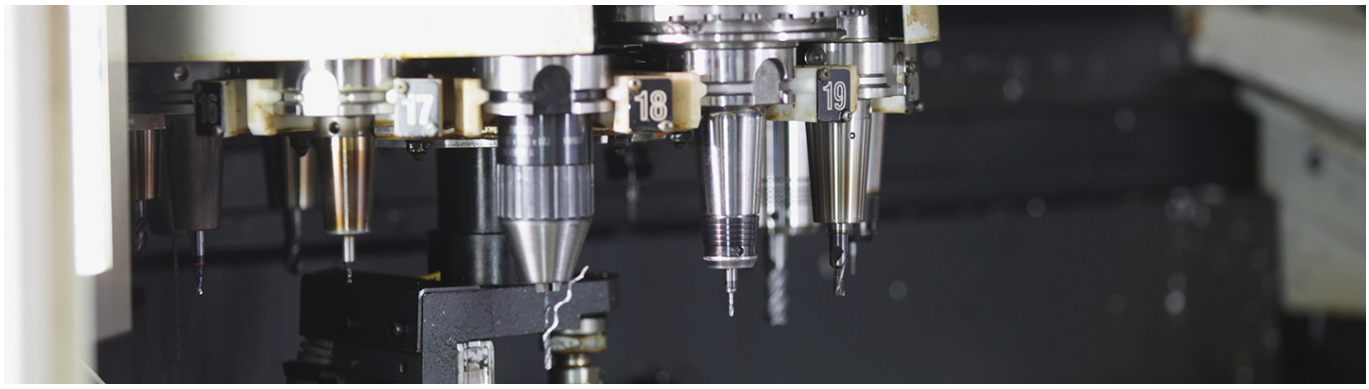

Innovate

What's New and Next in Metalworking?

Bill Leventon | Mar 01, 2017

Here's a look at tool innovations that will make your job much easier.

Regardless of your satisfaction with your metalworking process, it's always a good idea to consider new ways of doing things. If you're struggling with a problem, why not look for cutting-edge tools, adopt a different way of thinking or learn about an advanced form of technology? Here are five recent developments in metalworking that provide solutions to common problems and potentially benefit both you and your customers.

Challenge: Reduce cycle times, produce more parts
Solution: Roughing and finishing with the same tool

Tooling has now gone beyond being confined to single functions only—especially with today's high-speeds and throughputs on 5-axis and other multiaxis machines. For example, Sandvik Coromant's innovative PrimeTurning™ tools can rough and finish parts in simultaneous passes allowing production levels to increase.

"You can go in one direction and perform high-feed roughing," says John Winter, product manager at Sandvik Coromant. "And you can actually come back with the front of the tool and traditionally turn to finish the part."

See how it works here: "IMTS 2018 Video: Get a Hands-On Look at Why Sandvik Prime Turning Reduces Cycle Time"

Challenge: Cutting superalloys such as titanium at high speeds with aggressive cuts
Solution: Focus on spindle connections

In many manufacturing segments, but especially in aerospace and defense, cutting very difficult materials like titanium requires rigidity—and very good thermal deformation resistance. The less bend that occurs at the tool location, the better. With higher feeds and speeds of today's rpm-rich machines, there is one key way to help limit that bend: At the spindle.

Some spindle connections may be able to handle substantial torque, but the cutting forces necessary to generate such high torque can also generate large bending moments on the tool, explains Doug Ewald, a vice president at Kennametal.

"[T]here are many cases where you have a very rigid machine tool, a super cutting tool, but a weak spindle interface, so you will really not be able to get the same performance on that machine than if you had a more optimized and stable spindle," ***says*** Ewald.

To help prove its case, independent static-deflection testing found Kennametal's KM4X bends roughly 40 percent less than its HSK product using the same load and operating conditions. It also found that it produces a 50 percent better surface finish and 20 percent longer tool life.

What's your take? Talk to your peers ***in the community forum*** *.*

Challenge: Build accurate parts faster without waiting for lab results
Solution: Metrics in every machining process—including the tooling

The information age is catching up to part making and moving right on to the cutting tool. Sensors aren't new, but where and when you can capture information is evolving—and it's happening pretty fast.

"We now have the ability to validate quality and adjust for it in real time based on data accuracy," ***says*** Dan Skulan, general manager of industrial metrology for Renishaw.

"Quality that comes from in-machine automatic process control, using sensors and software together, helps make certain that the information being examined at a management level is accurate and actionable."

And it doesn't end with process control alone. Sensors and software are also on cutting tools themselves now—including Sandvik Coromant's suite of "CoroPlus" digital tools, tooling-performance dashboards, tool libraries and built-in software applications for real-time reporting.

"Everyone's a software company now," ***notes*** Modern Machine Shop's editorial director Mark Albert.

Challenge: Extend tool life and cutting ability
Solution: Affordable shrink-fit tool holders

Shrink fitting uses the expansion and contraction properties of metals to ensure that tools are held firmly in place. The process starts with a tool holder with a bore diameter slightly smaller than that of the tool shank. Heat from a shrink-fit machine expands the bore diameter so the tool shank can be inserted. Air cooling then returns the holder metal to its normal temperature, contracting the bore around the shank so that the holder has a firm grip on the tool.

While shrink fitting itself is not new, Osny Fabricio, senior metalworking product manager for MSC

Industrial Supply Co., points out that ***shrink-fit machines*** have recently become more affordable.

“In the past, you were talking about a really expensive machine,” he says. “But now it’s a totally different situation. There are different sizes and options that even small companies will be able to afford.”

The entire process typically takes less than 30 seconds, notes Fabricio. The high gripping forces produced by shrink fitting make it particularly well suited for high-speed, high-torque machining. The process ensures concentricity between the tool and the holder during machining, improving surface finish, reducing tool wear and thereby extending tool life.

Challenge: Achieve tool accuracy and increased productivity
Solution: Grooved back ends

Forces during machining operations can sometimes cause movement of a tool in its seat. Even small movements of this kind can harm machining precision and the length of a tool’s life. As a result, some tools now have helical grooves in their shanks. Once engaged with corresponding features in the holder, the tools will lock in place and perform the desired function.

According to Fabricio, this innovation is particularly important in the aerospace industry, where high-strength materials like titanium and Inconel are routinely machined. And, now that a number of toolmakers are offering similar features, having helical grooves has become a standard for machining high-strength materials.

“When you machine materials like this, they tend to pull the tool out of the holder,” Fabricio explains. “But that won’t happen when the tool has a back end with this kind of thread.”

Challenge: Manage post-processing needs for parts made by additive manufacturing
Solution: The Ambit system

Metal parts made using additive manufacturing (AM) processes normally require post-processing operations to improve their surface finish. Amazingly, there’s a way to complete AM component fabrication and CNC surface finishing in one setup, thanks to the Ambit system from Dallas-based Hybrid Manufacturing Technologies.

Ambit can reportedly turn any industrial CNC machine into a hybrid system capable of both CNC milling and AM (neither of which is adversely affected by combining the two). The system features a number of nontraditional processing heads and docking systems that easily change between AM and CNC in seconds.

Ambit can be added to new machines before they’re sold and also retrofitted into units already in the field. And get ready for this bonus—it also has the potential to transform virtually any CNC machine into a 3D printer.

What timesaving innovations do you use in your shop?

