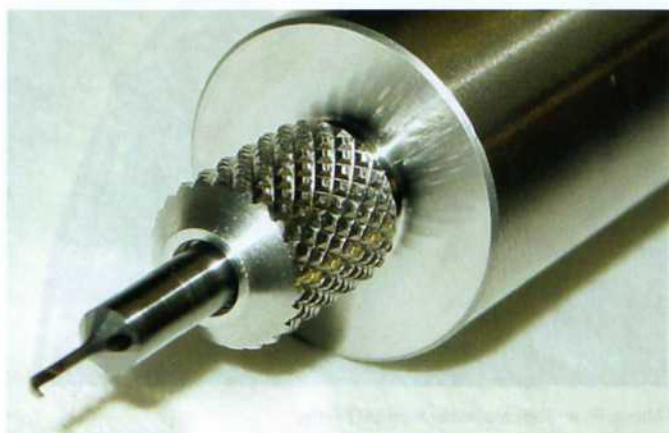


### Very small holes

Sometimes it seems that parts are just getting smaller and smaller. With this decrease in size comes tighter tolerances and accompanying challenges in machining. Following are two tools specially designed for hole-making and reaming in small dimensions.

### Micro Boring



Above: Multidec Bore Micro holder & quick-change boring bar with thru-coolant, from Genevieve Swiss Industries.

For boring small holes, 1 mm to 8 mm in diameter, the Multidec-Bore Micro offers a variety of cutter shapes in coated or uncoated carbide. The tool holder fits in a standard chuck, and the cutter insert is secured in the tool holder with a special nut that allows changing inserts by hand. The toolholder locates the insert axially and radially, so no adjustments need to be made after changing inserts. The Multidec-Bore Micro is made by Utilis of Switzerland and distributed in North America by Genevieve Swiss Industries, Inc.

### Orbitally Floating Micro Reamer Chucks



Above: Orbitally floating micro reamer chucks from Genevieve Swiss Industries.

Misalignment between a micro reamer and a very small hole in a part can result in inaccurate reams or broken reamers. Or, if you use a conventional floating chuck, it will allow the reamer to misalign with the axis of the hole, resulting in a less-than perfectly round hole. Genevieve Swiss Industries offers a selection of orbitally floating micro reamer chucks. These allow offsets of up to 0.009", while still keeping the reamer parallel to the axis of the hole. Versions of these chucks are available in ER8 and ER11 sizes.

### Making possible the impossible



Above: Coolant driven right-angle head and coolant-driven keyway cutter, from Eltool.

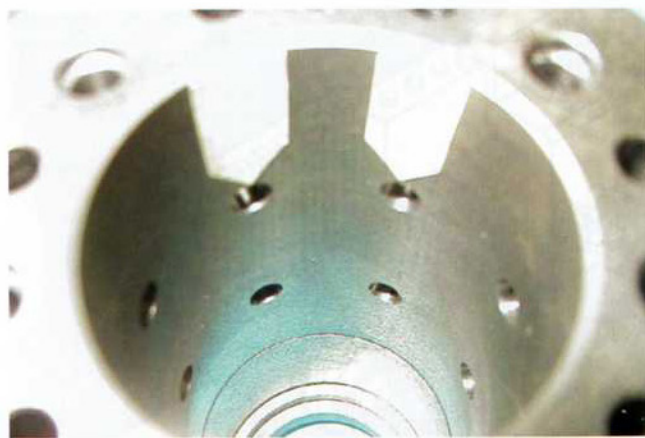
The task: drill more than 100 holes inside an aircraft fuselage component, parallel to the bed of the machine. Sounds like a lot of fixturing and hand-drilling, right? Not necessarily. At Precision Machine and Manufacturing in Grove, OK, they make just such a part on a Toshiba 5-axis vertical machining center. When it comes time to drill all those holes, the tool of choice is a coolant-powered right-angle drill head, said Wade Caudill, product development engineer at Precision.

## how it works

Able to fit into openings as small as one inch in diameter, the Titespot head from Eltool Corp., Cincinnati, OH, uses high-pressure coolant to drive a positive displacement ball piston motor. Depending on the load, the coolant pressure needs to be between 200 and 2000 psi, said Ed Crotty, vice president of marketing at Eltool. The speed of the unit depends on the load, the coolant pressure and flow rate. For example, with 6 lb/in of load, the speed might be 5000 rpm at 450 psi and 9000 rpm at 1000 psi.

Since the head doesn't depend on the spindle for power, it is possible to mount the Titespot head and use the spindle as an indexing device, which is what Precision Machine does when drilling all those holes. The figures [below and right] show holes drilled with at Titespot unit inside a hydraulic pump housing.

Besides drill heads, Eltool also makes a coolant driven keycutter that machines keyways right on the machine, so a separate broaching process is not needed.



Above: Close-up of hydraulic pump housing showing holes drilled radially in small bore at multiple positions, taking advantage of small profile and indexability of a coolant-driven right-angle head from Eltool.

### Mother of invention

All these products started out with someone recognizing a need or problem. If you're having trouble with something in the shop, you're probably not the first person to encounter it. If you have the idea that "this process can be done more efficiently," you're probably right. Ask around. Check the Internet. Someone out there may have already created a solution. If not, maybe this is your opportunity to invent one. It can solve your problem and could become a whole new product line for your company.

Many in the machining business find that part of its attraction is that every day there's something new to deal with. And that's why new technologies are being developed all the time — and old ones dusted off and brought back in new applications — to help keep those parts coming off the machines.



Left: Coolant-driven angle head drilling multiple rivet holes in a prototype leading wing frame component on a Cincinnati Machine V5 vertical machining center.

### For more information

Command Tooling Systems: [www.commandtool.com](http://www.commandtool.com), Dorian Tool: [www.doriantool.com](http://www.doriantool.com), Eltool Corp.: [www.eltool.com](http://www.eltool.com), Emuge: [www.emuge.com](http://www.emuge.com), Genevieve Swiss Industries, Inc.: [www.genswiss.com](http://www.genswiss.com), Iscar Metals, Inc.: [www.iscarmetals.com](http://www.iscarmetals.com), LMT-Fette: [www.lmtfette.com](http://www.lmtfette.com), "Thread Whirling on CNC Turning Machines": [www.index-werke.de/shared/technologie/tn12-003oe.pdf](http://www.index-werke.de/shared/technologie/tn12-003oe.pdf)

Above: Hydraulic pump housing machined with coolant-powered, right-angle head from Eltool.