

Technology

Tool Stability Solution for Deep Hole Drilling

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Reaching deep inside a workpiece to drill holes can be a real bear. You've tried taper length and aircraft drills, but even those made of solid carbide are apt to wander when hanging out of the chuck unsupported. Maybe you've combatted the problem with special extended-reach drill holders, although these are not only expensive, but limited to specific fixed lengths. A double angle or ER-style collet extension might be worth a try, yet these aren't exactly compact, and any runout or imbalance is exaggerated at long length to diameter ratios—if drill walk isn't bad enough, you're now left fighting the holder itself as it flexes and vibrates. Hole accuracy becomes questionable, tool life is poor, and productivity suffers as you reduce feed rates in an attempt to keep the drill running true. Surely there's a better way.

Kennametal thinks so. The Latrobe, PA, tooling manufacturer recently developed a hydraulic chuck extension that meets these challenges while also increasing flexibility and reducing costs. Michael Schuffenhauer, Senior Global Product Manager Tooling Systems at Kennametal, says the company has been producing hydraulic chucks for the past 30 years, and has become quite knowledgeable about the technology behind them as a result. This new tool leverages that extensive experience.

"We asked our customers, 'How do you drill holes in deep cavities and complex pockets? Do you have problems with reaching past clamps and fixtures?'" he says. "We wanted to know how they were dealing with these issues, and the effectiveness of their existing solution. Then we set out to develop a better one."

Happiness Through Hydraulics

Kennametal's new line of hydraulic chuck (HC) extensions meets that goal handily. Michael Schuffenhauer lists a number of key features that make the product unlike any other currently available. These include:

- Runout to within 3 μ m (0.00012 in.) at 2.5 x D (half that of its nearest competitor), providing exceptional tool life and hole quality.
- Because it's balanced to G2.5 at 25,000 rpm, vibration is greatly reduced at higher spindle speeds.
- Vibration is further dampened by the hydraulic clamping mechanism within the chuck body.
- Internal channels make through-the-tool coolant easy to set up—no hoses or adapters needed.
- An ultra-slim design allows, for example, a 12-mm drill to be clamped in a 20-mm chuck body (or a 1/2-inch drill in a 3/4-inch shank).
- A variety of reducer sleeves is available for both inch and metric sizes, providing maximum flexibility at minimum cost.
- Drill and reamer shanks down to 3 mm (0.125 in.) can be accommodated.
- Suitable for rotating and stationary applications alike.

"Our HC Extensions are for customers that need the flexibility of a modular system but want to avoid the expense and limitations of a custom solution, as well as the constraints that come with traditional toolholders," Michael Schuffenhauer says. "We believe the improved performance and ease of use offered by this new product will soon make it the leading drill extension on the market. It's quite simply a great design."

Cruising Easy Street

Ease of use means no need for heat shrink machines. Tool lengths are adjustable up to 10 mm (0.393 in.) axially. A specially ground chamfer on the end of the shank eases insertion into the hydraulic chuck. Prepared wrench flats provide safe and convenient handling, without the need for a torque wrench. A one-piece design eliminates concerns over contamination and downtime due to maintenance. And most importantly, the clamping mechanism eliminates operator-to-operator tightening variations.

"That's an important point," notes Michael Schuffenhauer. "With traditional collet nut systems, the amount of torque applied during tool changes can vary widely, increasing the chance of runout or tool slippage. The same can be said for competing hydraulic extension chucks. But with our solution, there's no chance of over- or under-tightening. It's not only extremely accurate, but it's extremely accurate every time."

A Peek Inside

For all its performance, the design is simple—just set any h6 tool shank inside the HC Extension and turn the clamping screw on the end of the unit until seated. This causes a hydraulic piston within the unit to move forward, compressing the locating sleeve, and gripping the tool. Again, total runout as measured $2.5 \times D$ from the chuck face will not exceed $3 \mu\text{m}$ (0.00012 in.), and the extension's superior balance characteristics make it an ideal choice for today's high rpm machine tools.

At the end of the day, says Michael Schuffenhauer, customers want to achieve the safest, most economical, and predictable way to machine parts, hopefully with tooling and equipment that is easy to use. The HC Extension meets all of these criteria and more. "If you look at it from a high level, the HC Extension gives you the flexibility of a collet system with the precision of shrink fit, and easier setup than either. You get the best of all worlds. And because of the HC's extreme accuracy and balance, you don't have to settle for substandard tool life and performance as would with purely mechanical clamping systems. We're very pleased to have it as part of our portfolio."

To view the full line of products from Kennametal, visit MSCDirect.com.

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