



MACHINING / CUTTING

Turning to High Torque Retention Knobs

Suppliers of CNC machines, cutting tools, and toolholders increasingly emphasize the importance of retention knobs to minimize vibration and chatter issues on CNC machines

[AM Staff](#) | Feb 14, 2018

CNC horizontal and vertical machine, tool and toolholder manufacturers and distributors spend years establishing strong relationships with customers by providing top-quality, precision equipment. Such relationships can be undone by a small, less than \$30 part — the retention knob, a sometimes overlooked but critical component in machining operations.



In fact, the problem of machine vibration and chatter is so common in CNC operations that use drawbars to hold tapered toolholders securely in the spindle that many are adopting a policy of selling only one style, the High Torque retention knob, or at least encouraging customers to invest a few dollars more for that item, one that many of do not offer.

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After all, many machine-tool builders and suppliers know a hard truth: when machinists experience vibration, chatter, and fretting after purchasing equipment, they tend to blame the new spindle, toolholder or high-end carbide cutting

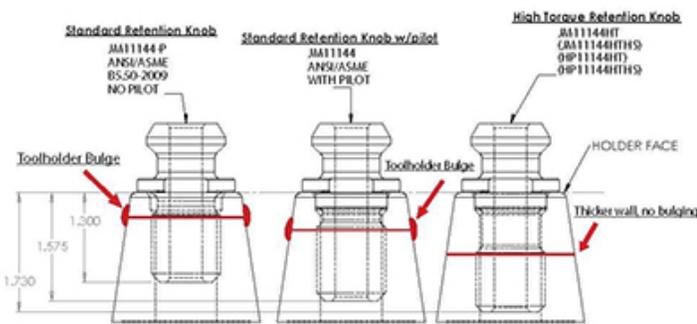
tool. This is despite the fact that improper seating of the toolholder due to poorly designed traditional retention knobs is likely to be the cause of the vibration. When that happens, it reflects poorly on the supplier and may cost them future business opportunities with those shops.

According to Craig Gilsinger, applications/quality manager for JTEKT Toyota Americas with more than 20 years' experience, such real-world incidents are the reason JTEKT regularly recommends High Torque retention knobs for use on its vertical and horizontal machining centers.

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“If the cutting conditions are poor, the customer immediately assigns blame to the machine,” Gilsinger explained. “So, we regularly recommend [the High Torque retention knob] to customers. It not only ensures the equipment will cut better, but also that it won't get blamed for machining issues when it is not the cause.”

More often than not, he said, investigations of vibration and chatter issues point to improper seating of the toolholder in the spindle.



That is because when a standard retention knob is tightened, it can produce a bulge in the taper that prevents full contact and correct seating in the spindle. As a result, the toolholder is unable to pull completely into the spindle, and consequently cannot make contact

High Torque retention knobs work with all existing toolholder designs, including BT, DIN, ISO, and CAT, from 30 to 60 taper.

with up to 70% of its surface.

“We have seen many situations where retention knobs have been overtightened,” Gilsinger explained. “A guy goes to the workbench and uses a wrench and a hammer to tighten the retention knob, and it is certainly not to the proper torque with this method. This ends up distorting the taper, and so the tool does not seat in the taper correctly.”

This may lead to multiple problems that often are blamed on suppliers' equipment: vibration and chatter, poor tolerances, non-repeatability, poor finishes, shortened tool life, excessive spindle wear and tear, run-out, and shallow depths of cuts.

Surprisingly, this known design flaw with its far-reaching consequences is frequently overlooked or even dismissed.

So, when JTEKT Toyota Americas learned about the High Torque retention knob offered by [JM Performance Products Inc.](#) (JMPP), the machine-tool supplier quickly decided to recommend it with each machining center purchase, as well as on its full turnkey systems.



The High Torque retention knob is designed with a longer reach, so that it threads deeper into the threaded bore of the toolholder. Consequently, all thread engagement happens in an area of the toolholder where there is a denser cross-section of material to counter deformation.

The JMPP retention knob also features a precision pilot, and is balanced by design to increase rigidity. What is more, to guard against the High Torque retention knob being over-tightened, which can still produce a bulge, the company provides specifically calculated torque specs based on drawbar pressure.

By combining the High Torque retention knob with the proper torque, spindle contact with the taper is improved near to 100% every time, which reduces vibration and chatter significantly.

High Torque retention knobs work with all existing toolholders, including BT, DIN, ISO, and CAT toolholders from 30 taper to 60 taper.

For Dan Carlstrom of Carlstrom Associates, a manufacturer's rep for toolholders, milling products and workholding systems, the 'light bulb' moment came when he recommended the High Torque retention knob to a customer struggling with a boring product he had sold them.

"The customer was having a problem holding size on a component, so they had to take multiple boring passes and then do a final reaming pass to get this hole to size," Carlstrom recalled. "When they put the High Torque retention knob on the toolholder, the boring tool was able to cut the hole to size, in tolerance, in one pass.

"They never gave me total cost savings," he continued, "but needless to say it was significant. It also solved a huge headache for them."

Carlstrom, who emphasizes that his company does not represent or sell JMPP's High Torque retention knobs, said that whenever he runs a test of his product for a customer he does so with the knob installed to eliminate poor seating in the spindle as a variable that could affect performance.

"When I run an end-mill test, a toolholder test, or a boring bar test, I will not run it without the High Torque retention knob, period," Carlstrom said. "I know it will make my tools, which I get paid for, run properly."

By recommending or supplying High Torque retention knobs, suppliers also can earn the respect and gratitude of their customers, which may result in increased loyalty and referrals, all of which provides them with a competitive edge.