

## Safe, high-speed milling

Features - Workholding

JM Performance Products retention knobs support small-footprint machining for Brother Industries.

As milling technology trends toward extremely high speeds within smaller footprints, safety issues can't be ignored. Loose tools spinning at high rotations per minute (rpms) present the potential for a lot of damage to the machine, workpiece, and operator. Safety costs can run the gamut from damaged facilities to broken equipment to employee injuries. Meanwhile, no defined guidelines address the potential hazards that small footprint/high rpm machines present.

The retention knob is the main interface between the machine and the spindle, and when exposed to severe conditions, failures can result in a tool breaking loose during a cutting operation – producing a projectile that can injure employees and damage the spindle, toolholder, and workpiece.

Nagoya, Japan-based Brother Industries Ltd. identified the need to modify the standard used to manufacture their retention knobs, including the material tensile strength, to make them stronger to meet the machine's manufacturing demands.

JM Performance Products Inc. (JMPP) in Fairport Harbor, Ohio, developed its High Torque retention knobs to address the safety issues and responded immediately to Brother's updated specs with two BT30 knob options. The JM25084ACHTHS (with coolant hole) and JM25084AHTHS (without coolant hole) knobs incorporated Brother's dimensional and radius requirements along with JMPP's High Torque design features and higher tensile material.

Most standard retention knobs are being designed and manufactured to the standards put in place more than 40 years



High Torque retention knobs are longer than a traditional retention knob but share the same head dimensions. The additional length also increases durability of the retention knob; a standard knob has less shank elasticity and will fatigue faster. Photos courtesy of JMPP

ago, while the evolution of the tooling and the mills has been progressive and responsive.

JMPP testing demonstrates how standard design retention knobs often expand the toolholder, leading to excessive vibration, chatter, and mill harmonics. In addition to affecting finishes, tolerances, and tooling life, this vibration and chatter, caused by a lack of concentricity, can damage the mill's spindle and draw bar.

## Upgraded materials

One key factor in retention knob failure is material strength. JMPP proactively migrates 30- and 40-taper retention knobs from traditional 8620H material to 9310H to ensure their durability and strength. The material upgrade increases tensile strength by 40%.

### High torque retention knob advantages

- Reduced harmonics
- Increased taper contact
- Improved set-up times
- Increased rigidity
- Balanced by design
- Works in any new or used toolholder made to industry specifications

JMPP laser marks parts with a date on each knob. The date-in-service feature, which includes a unique serial number for traceability, shows how long the knob has been in use, ensuring safety as retention knobs are a perishable, consumable part. A typical retention knob is good for 1-to-3 years, depending on machine use. The operator can enter the unique identifier serial number to show how long a knob has been in service and when a tool change should be made.

The Brother example is part of a continuing trend of manufacturers being progressive in trying to push capacity while also considering safety. JMPP is also working with Kitamura for knobs for its 6ft x 9ft, 7Mycenter 30 taper horizontal machine, which offers 2,362rpm on all axes.

JMPP President John Stoneback says, "The industry as a whole needs to recognize the potential for machine spindle interface problems that these small footprint/high rpm machines represent. Our High Torque retention knobs have inherent design elements that meet these issues head-on and we're hoping that machine builders, tooling builders, and distributors will join us in getting this vital message out."