

Heating Up CNC Productivity: Ensuring Accuracy with Proper Tool Holding



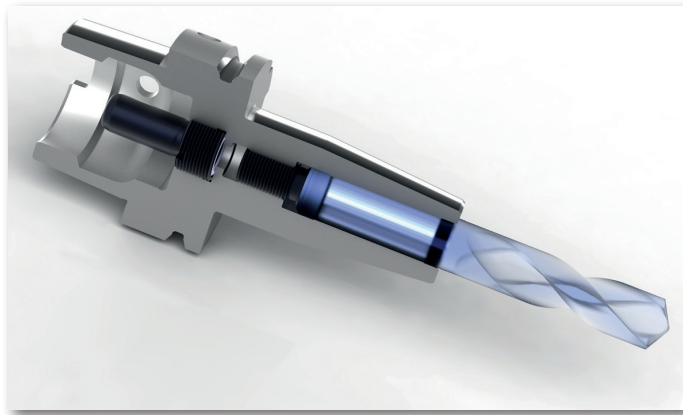
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Leitz Technical Brief

Troubleshooting Tool Holding Failure on New CNCs

Modern CNC machines are running more than 25% faster than their older counterparts. As CNC spindle RPMs and processing speeds increase, operators must consider the importance of the link between the machine spindle and the cutting tool. Faulty tool holding can have a negative impact on machine accuracy. Common issues resulting from poor tool holding are diminished cut quality, excessive noise, limited tool life and less than optimal feed speeds. Slowing the feed speed also overheats the cutting tool and dramatically reduces the tool service life. Almost as important as the tool itself, proper tool holding is critical to precision machining and ensuring high product quality. Tool holding is the first point at which deflection and run-out tolerances are introduced and can be tightly controlled.



Maintaining proper RPMs, feed speed, and ideal chip load are critical. Chip load, the amount of material cut with every revolution of the cutting edge, dissipates heat and protects the tool from premature thermal dulling. If not enough heat is taken away, the tool will run too hot, and the tool lifespan will be shortened significantly. To maintain the balance between material removal, speed and accuracy, the tool must run concentrically, with as little deflection as possible.

Reconsider Collets

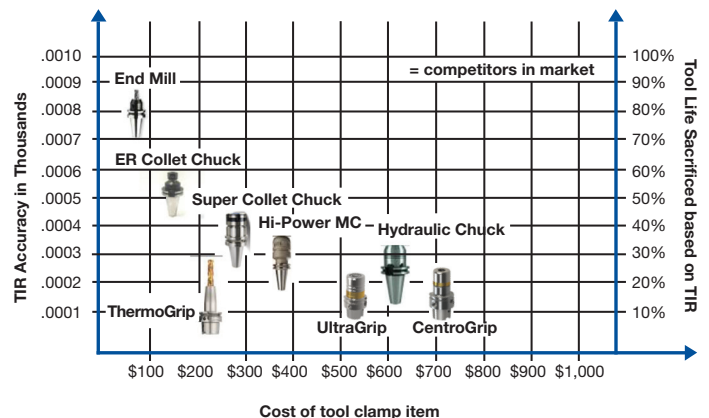
“Collet-free” tool holding systems offer the most effective means of controlling tool rigidity and center line. Collet chuck systems are simple and inexpensive, but they are also the most common source of performance problems.



Collets provide a flexible connection between the very rigid machine spindle and the cutting tool, but this connection can be easily damaged by improper handling, use or maintenance.

Other Options

The hydraulic tool holder works by using a fluid to compress an internal membrane within the holder body. The hydraulic fluid delivers uniform pressure around the membrane, allowing it to compress equally around the periphery of the cutting tool. Hydro chucks have been considered the best premium tool holding system, but they are expensive, and the flexible grease wall integral to this technology still allows deflection under cutting



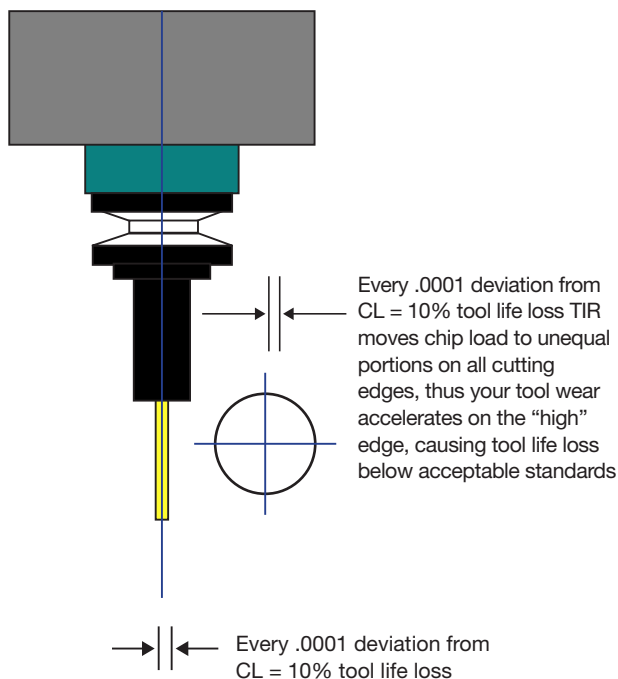
pressure. The performance results are only slightly better than collet chucks. Newer mechanical and deformation-style chucks are also interesting, but each has drawbacks with regard to system maintenance and cost.

Heat Shrink Technology

Heat shrink chucks offer the simplest and most rigid link between the machine spindle and cutting tool. Heat shrink chucks are inexpensive, one-piece tool holders, without moving or mechanical parts to wear or maintain. Electromagnetic induction heat quickly expands the chuck. Tools can be easily changed, and the chuck then shrinks tightly and concentrically around the shank, essentially creating a single-piece machining unit. This eliminates the possibility of tool run-out, deflection, and balance issues. By optimizing tool concentricity, you'll get precise cutting at the fastest possible speeds, greatly extending both tool and spindle life.

Typical TIR readings for assembled products

End Mill Holders.....	.0008 - .0012
TG/ER Collet Chucks0003 - .0008
HP ER/TG Collet Chucks.....	.0002 - .0004
SX/SK Super Collet Chucks.....	.0002 - .0004
Milling Chucks.....	.0002 - .0003
Hydraulic Chucks.....	.0002 - .0003
CentroGrip.....	.0002 - .0003
UltraGrip.....	.0002 - .0003
ThermoGrip.....	.0001 - .0002



Leitz ThermoGrip is the most advanced heat shrink chuck available. The annualized savings utilizing Leitz ThermoGrip can be astounding. You can reduce tooling costs up to 25%, and increase machine and operator productivity by up to 20%. ThermoGrip users have noted annualized savings of at least \$15,000 per shift, with expanded production capacity. The ThermoGrip system generally pays for itself within months, and the maintenance-free chucks provide virtually unlimited service life. Leitz ThermoGrip chucks are easily integrated alongside your existing system. They will quickly demonstrate clear advantages when comparing the performance of identical tools currently held in collet or hydro chucks.

Optimized process efficiency is a moving target, changing with every machine, tool or raw material. Leitz is committed to ongoing R&D, focusing on continuous acceleration and optimization of machining processes, helping shape the future of the customer applications and industries we serve.

Learn more about ThermoGrip here:

www.leitztooling.com/downloads/thermogrip.pdf

