



Enabling Your Ideas

Tormach Tooling System (TTS)

TTS Overview

TTS is a system of low cost tool holders designed to provide easy tool change in a milling spindle while maintaining excellent rigidity and precision tool location.

System Attributes

- Low cost
- Hardened and precision ground
- Quick tool change
- Precision Z height setting
- Minimal clearance height requirements

TTS Operation

Tool switching with TTS is extremely easy: Simply loosen the drawbar, slide out the current tool holder, then slip in the next and retighten. The unique geometry of the TTS tool holder ensures that, as the drawbar is tightened, the tool holder moves into an exact Z height while increasing rigidity. Here's how it works:

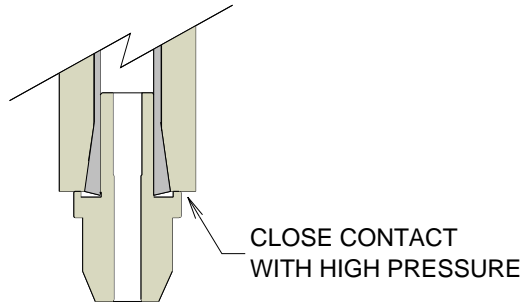


Figure 1 - TTS Contacts Spindle Face

Notice that the shoulder is undercut so it contacts the spindle itself, not the end of the collet. As the drawbar is tightened the collet will simultaneously squeeze the shank and move upward into the spindle taper. This simultaneous action, grasping while moving up, pulls the toolholder tightly against the spindle face. The high-pressure contact between the shoulder of the toolholder and the spindle is the equivalent of a zero tolerance fit; the vertical location of the tool is exact. The initial

placement, created by simply sliding the toolholder up until it stops, is normally within a few thousandths of an inch. The final location, after tightening the collet, is exact, highly repeatable, and not affected by the variable tension of the drawbar or wear on the collet.

The zero tolerance fit, in combination with the wide base of the shoulder, provides a significant increase in rigidity of the toolholder.



Reduced Clearance

The clearance required to remove a TTS holder is only 1.375". This clearance is only 34% of that required by standard R8 tooling.

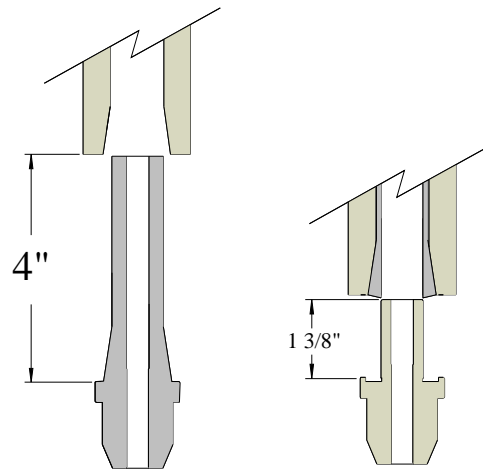


Figure 2 - R8 Clearance Comparison

This reduced clearance is particularly important on machines with limited quill travel. A simple tool change on an R8 toolholder can require the operator to move the table to one side, lower the table, or raise the head, all of which greatly impacts the time for tool change and runs the risk of losing the X, Y, or Z position reference. Round column drill-mills are more difficult since any adjustment on the height of the head results in a loss of position reference.



Off-Line Height Measurement

The ability to measure tool height off-line greatly improves the machinist's efficiency. Whether replacing a broken tool in the middle of a process, using the tool compensation table of a CNC controller, or just switching tools in a

manual process, off-line tool measurement is a great aid to the machinist.

The design of TTS allows a quick and accurate measurement with a height gauge. By comparison, the vertical position of R8 and most other taper systems is controlled at the taper. Any taper tool holder requires a specialized taper adapter for off-line tool measurement.



Operates with R8 and Morse Spindle Tapers

Tormach offers R8 and Morse taper #3 collets designed specifically for mounting TTS holders. Nearly any taper collet that can grasp a 3/4" shaft using a drawbar can be used in conjunction with TTS. TTS cannot be used on double angle spindles, where a nut pushes in the collet. TTS requires the collet to be pulled in by a drawbar.

No Machine Modifications

Unlike the addition of power drawbars or other enhancements for rapid tool change, TTS requires no modification to the machine. Changing to back to conventional tooling is just a matter of removing the collet.

Available Tooling and Accessories

ER 20 Collet Adaptors

ER 20 collets are an industry standard (DIN 6499) self-extracting collet. They are available in 1/64" increments from 1/32" to 1/2" in diameter. They are also available in metric sizes from 1 mm to 12 mm. This holder is very nice for almost all milling and drilling operations.



Set Screw Adaptors

These are the least expensive and most popular adaptors. They are most commonly used for general milling, facing. The 1/2" version can also be used on certain Silver & Deming style drills.



Jacobs Taper Adaptors

Used for mounting standard drill chucks. TTS Jacobs adaptors are available as JT1, JT33, JT2, and JT6. This covers most chucks from 1/4" to 1/2", but variations exist.



Boring Head

The boring head allows precision finishing operations on large diameter holes, and cylinders. The TTS adaptor fits to 7/8-20 UNF mounted heads or other tooling with the 7/8-20 thread. Boring head, carbide boring bar sets, and head adaptor are sold separately.



Machinable Blank

Make your own custom tooling. TTS geometry on the machine end, but unhardened steel (38 mm dia x 60 mm long) on the working end. The medium carbon manganese steel can be cut to make whatever you like.



Other Accessories

- #3 Morse taper adaptor
- R8 taper adaptor
- TTS height measurement fixture
- Small granite surface plate
- Varnish wooden tool holder
- Machine mounted holder and arm

Tooling Sets

The greatest value comes when buying our tool sets. Tormach offers complete tooling sets designed to match the type of work you do.

Manual Operations Tooling Set

Manual operations benefit from quick change, reduced clearance, and increased rigidity. Manual mill users generally don't need to measure tool height off-line nor will they use one tool holder per tool. The set has 4 tool holders.



- 1 each 1/2" Set Screw Adaptor
- 1 each 3/8" Set Screw Adaptor
- 1 each ER20 Collet Holder
- 3 each ER20 Collets (1/8", 1/4", and 3/8")
- 1 each JT1 Adaptor and Drill Chuck
- 1 each Precision TTS-R8 collet
- Various wrenches and instructions.
- Manual Operations Set is \$239

The set is discounted 12.56% over the cost of the individual components (total value of \$273.32).

CNC Operations Tooling Set

CNC operations work best with one holder for each tool in order to make use of the tool length compensation table in the CNC controller. This function also requires an off-line system for measuring the mounted tools. The CNC set includes a total of 15 tool holders plus a tool measuring set. This is an outstanding value and a great way to get started with a CNC that has been retrofitted from a manual machine. If your CNC machine supports a tool offset table but you're not using it, then you're not realizing the full benefit of CNC machining.



- 2 each 3/8" Set Screw Tool Holders
- 2 each 1/4" Set Screw Tool Holders
- 4 each 1/2" Set Screw Tool Holders
- 3 ER20 Collet Holders
- 9 of the most popular ER20 collets
- 4 drill chucks and JT adaptors
- 8" Dial Height Gauge
- Compact Granite Surface Plate
- TTS Height Measurement Fixture
- Precision TTS-R8 collet
- Varnished tool tray
- Various wrenches and instructions
- CNC Operations Set is \$745

The set is discounted 25.52% over the cost of the individual components (total value of \$1,000.29).