

Machining

Understanding Steep Taper Toolholders

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For over half a century, steep taper toolholders including CT, BT and NMTB styles have been the most popular type of toolholder. These 7/24 toolholders are a universal sight in just about every machine shop, to the extent that many never give them a second thought. But HAIMER realizes how critical a component these are in any machining process, and they want to shine some light on this unsung hero.

History of the Steep Taper Toolholder

The 7/24 angle (or 3.5 inches per foot) of the taper was specifically chosen as it more freely releases the toolholder from the spindle when compared to shallower, self-holding tapers such as Jacobs, Morse and Brown & Sharpe. This is ideal for quick changing of toolholders, either manually or automatically. The first patent for the steep taper toolholder was filed in 1927, and the taper style has been growing in popularity since.

Several styles of toolholder use the 7/24 taper. While the taper is nearly identical across the range, there are a few key differences:

- **NMTB Toolholders:** The NMTB (National Machine Tool Builders Association) toolholder was designed to be changed by hand. Unlike CAT and BT styles, it does not use a pull stud, and instead features a straight extension at the back of the taper that threads directly into the machine's drawbar.
- **CAT Toolholders:** As a major user of machine tools with automatic tool changers, Caterpillar Inc. championed the standardization of steep taper toolholders in North America. These toolholders utilize interchangeable pull studs with imperial threads, and feature a V-groove in the flange for the ATC arms to grip. This groove is why CAT toolholders are occasionally referred to as V-flange.
- **BT Toolholders:** These JIS (Japanese Industrial Standard) toolholders are very similar to their CAT cousins, and can be interchanged if hand loaded into a spindle. But note that the pull stud threads are metric, so pull studs are not interchangeable with CAT toolholders. Additionally, the BT toolholders feature a thicker flange, requiring different tool changer grippers in the machine's ATC.

Critical Considerations for the Taper

Machining precision and rigidity demands that the taper cone be manufactured to an extremely tight tolerance. The toolholder must provide both accurate and repeatable location within the spindle in order for the cutting tool to be positioned properly. Additionally, the surface area contact between the toolholder and spindle tapers must be high enough to provide a rigid connection for the axial and radial loads generated during machining.

At HAIMER, all of their steep taper toolholders are manufactured to AT3 tolerances or better. Grinding their toolholder tapers to this tight ANSI and ISO standard takes time and engineering know how, but it ensures proper spindle taper contact for all of your machining applications.

If you have questions about steep taper toolholders and the style that would be the most beneficial for your operation, ***contact them***. One of their in-house experts would be glad to help you match the right style to your needs.

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