TAKAMAZ RYU-GI vol.17

Are you having problems with deep hole boring? There is a groundbreaking tool, the "Hydro-bush for Lathe Holders" that can solve the hole boring problems you have been having up to now.

Hydro-bush for Lathe Holders

The Evolution of Deep Hole Boring

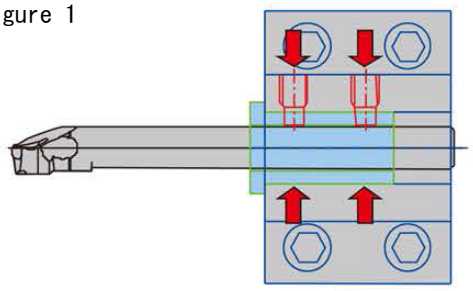
The Occurrence of Waviness and the Its Causes

In deep hole boring using a boring bar, there are cases where turning is abandoned completely, or cutting have to be performed at lower rpm speed due to the generation of waviness, reduced tool life, or cutting chips and others. The generation of waviness in particular may be tied to mechanical rigidity, or machine performance may also be suspected. However, the main reasons for the generation of waviness are the rigidity of the workpiece itself, chucking rigidity, tool rigidity, tool grip rigidity, and others. The gripping rigidity of the tool is of particular significance in machining with boring bar with long projection. The "Bushing method", a boring bar fixing method where a bushing prepared on a per-size basis is inserted into the turret holder and then fixed with two bolts after inserting the bar into the bushing, is mainstream, and not limited to TAKAMAZ. It has been adopted for such reasons as easy modification of free projection, ease of use, and low cost of mounting.

Boring Gap Problems

However, the fact of being able to insert the bushing and boring bar into the holder shows that a clearance exists, resulting in tolerance ranges of outer diameter +0.013~0mm and inner diameter 0~-0.013mm in the H6 tolerances for ϕ20, generating a maximum clearance of 0.026mm. This exists between the bushing outer contour and the turret holder inner diameter, as well as between the bar outer diameter and the bushing inner diameter; meaning that a maximum clearance of 0.052mm is generated. In fact, because machining is performed in pursuit of the tolerance median, this mostly does not result in leading-edge values, and gaps will surely occur. Even if the bar is securely fixed with bolts, it is still fixed only in the vertical directions, and gaps will occur in the horizontal directions. (See Fig. 1)

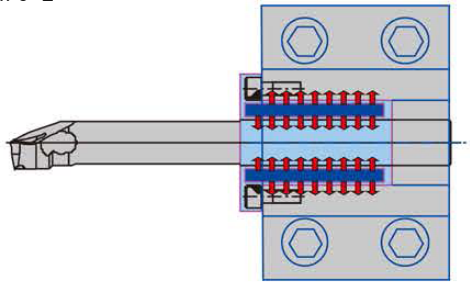
Figure 1



Solving the Gaps Problem

To solve this problem, we have fabricated a hydro-bushing for lathe holders using the hydro-fixing method used in machining center holders. Using this product makes gap-free fixing possible by expanding the elastic film into a cylinder relative to the turret holder inner diameter and the tool outer diameter, and making it uniform. (See Fig. 2)

Figure 2



In addition, bolt fixing the hydro-bushing at the end of the turret holder makes it possible to realize 2-surface binding, affixed as one unit, as well as making shapes possible. (See Fig. 3) As a result of testing, it was confirmed that the dramatic increase in tool gripping rigidity increased spindle speed and eliminating waviness that blur patterns on continuously-machined parts were eliminated, and that tool life increased. Beyond these, it is also thought that the wider selection range of cutting conditions and chip breakers can also contribute to improved cutting process.
However, during application of this method, it will be necessary to fabricate round shank tools without flat surfaces, as well as the special fabrication of the hydro-bushing, dedicated turret holder, and all parts.

The effects such as:
- Shortened cycle times through increased speeds
- Improvement on the freedom of tip and cutting condition selection
- Stable machining due to increased tool life, etc.,

can be obtained, making it possible to realize higher-efficiency machining.

Figure 3