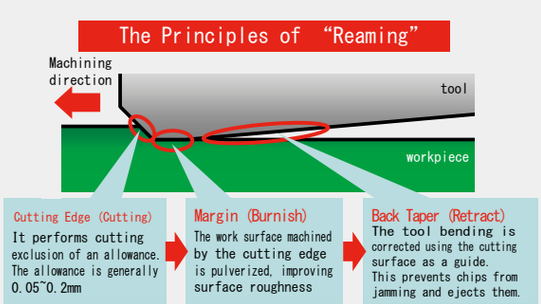
Here, we introduce the knowledge and various knowledge about the product TAKAMAZ a variety of machine tools. I hope you will help the daily work of customers.

The 15th About Reaming

Reaming is commonly used for small-diameter hole work (around ~φ20) where the inner diameter dimension and circularity, surface roughness, etc., demand accuracy. However, problems such as unstable hole diameters, poor surface roughness, and short tool life are common, and a lot of people avoid it, seeing it as "difficult machining". We would like to introduce you to reaming with improved surface roughness accuracy.

The Principles of "Reaming"

"Reaming", refers to the widening of an inner diameter machined by drilling, etc., to a hole dimension set by the cutting lip section, and further performing a burnishing (polishing) action while grinding the margin of the work surface.

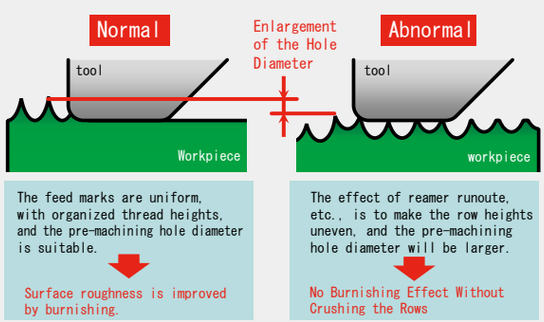


The reason of a problematic surface roughness is because of the reaming

① In reaming, the burnishing width is small, and when the hole diameter expands and the surface roughness concavities reach the μm level, proper burnishing is not possible (the burnishing volume is about 5μm)
② Although "Superoll" burnishing performs polishing while rotating a roller, in reamer burnishing, it is performed by rubbing the work piece with a margin part. These are the two main reasons given.

Countermeasure ①
Improvement of Tool Mounting Accuracy

In cases where center deviations and runout is large when mounting a reamer tool, burnishing will not be performed once the hole diameter becomes large, and will result in a finished product with feed marks machined by the cutting edge. In addition, each of the reamer blades will generate an uneven machining force. circularity and cylindricality will be poor, and waviness will be observed. Moreover when the reamer performs reaming in a warped state, the occurrence of seal marks is also seen during reamer retraction. Although the general benchmark is for center deviation/runout to be less than 5μm, it needs to be as close to 0 as possible. Even if reliable accuracy is produced by mounting a master to the holder, one should be aware that center deviation is still seen when the original reamer tool is mounted. In addition, in rotary type machines for parts in horizontal machining, tool mounting accuracy is a critical point, and centering holders for reamers are being appropriated in machining centers. Measures will need to be put in place such as countermeasures for mechanical aging, and the like.



Countermeasure ②
"Proper Lubrication with Cutting Oil"

Because the cut material is directly rubbed by the margin part during reaming, insufficient lubrication will result in deposition due to friction heat in addition to poor surface roughness due to the friction, and both accuracy and tool life will degrade. It is of course mandatory that a lubrication oil be interposed in those parts where there is high-speed metal-to-metal rubbing. Therefore, in reaming running out of cutting oil will cause poor accuracy, and is particularly fatal to surface roughness. Non-water soluble (oleic) cutting oils are recommended, but also using a water-soluble cutting oil but use an emulsion type of 20% or higher concentration. In the case of deep holes and blind holes, use an internal oil feed (coolant-through) type (especially for deep holes and blind holes), and be careful to supply oil to the machining parts without interruption.
In addition, because machining with depositions attached as is shall degrade surface roughness, remove these before machining.

Countermeasure ③
"Reliable Chip Ejection"

When the chips generated by the cutting edge are not ejected well, they get jammed between the tool and the cut material, damaging the work surface, and degrading surface roughness. Particularly when the prepared hole diameter is small but the allowance is too big, and the feed rate during machining is too fast, the chip thickness becomes too large, making them difficult to eject. Be sure to match the prepared hole setting and machining conditions to the tools used and the material cut. Properly adjust the cutting oil delivery method, supply amount, and delivery pressure. For through holes, a back-side ejection type tool is recommended so that chips do not enter the work surface.

Summary

In recent years, there have been demands for increased accuracy even in drilling due to the demand for increased component performance. Please take these points we have introduced here into consideration and use them for higher-precision reaming.