

# kummer

## PRECISION HARD TURNING



**HIGH PRECISION HARD TURNING :**  
**ECONOMICAL ALTERNATIVE**  
**TO GRINDING**

**Finish-turning of hardened metal parts subject to particularly severe requirements for dimensional and geometrical tolerances as well as for surface finish**

# kummer PRECISION HARD TURNING

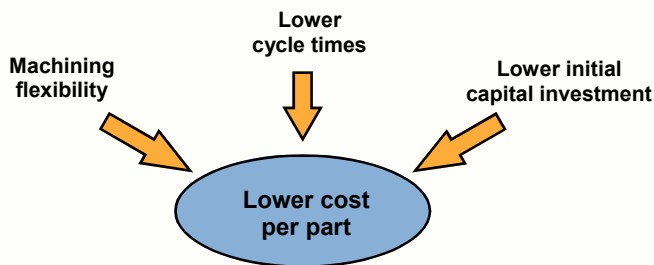
## ➤ An economical alternative to grinding

The high rigidity of the Kummer chucks enables full exploitation of the CBN cutting tool potential, thus qualifying hard turning as a very competitive alternative to grinding

Many grinding operations for the finish machining of hardened parts can now be replaced by precision hard turning operations.

Furthermore, several consecutive grinding operations can often be replaced by a single hard turning operation (one single chucking).

## ➤ The benefits of hard turning

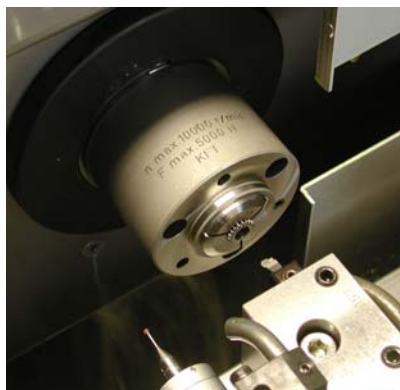


## ➤ The Kummer precision applied to hard turning

The Kummer concept of precision does not stop at highlighting a very fine degree of CNC resolution, nor at commissioning basic machines based on static geometric tests of the spindle nose at a given point of time which, although highly accurate, has no direct link with the true conditions of practical machining. While we agree that criteria such as these are indispensable as a base, we maintain that they are just that : the potential of a system to deliver high precision. Building on that base, the qualities concerned must be exploited to their full extent, at all stages of the complex process which constitutes machining metal parts at high levels of productivity. Thus, in our concept of precision, the true challenge is that of turning the potential accuracy of the system into measurable quality of the machined parts. We reach this goal thanks to the rigidity and the neutral thermal response of the machine, while mastering harmoniously all of the numerous influencing factors such as parts clamping, sequence of operations, feeds and speeds, material deformation, tool wear... always keeping in mind productivity and especially guaranteeing the reliability of the machining solution.

**High precision and high productivity Kummer chucks :**  
 The solution for finish machining of hardened metal parts in "grinding" quality with the productivity and the flexibility of hard turning.

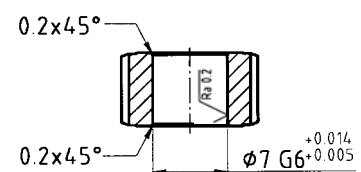
**Application : high precision ID bore single point turning on a hardened gear**



Machining cycle	3"
<u>Loading / unloading</u>	<u>2"</u>
Total	5"

Hence 720 parts / hour

In-process gauging : + 1"



## ➤ Kummer precision hard turning : the key for success

Working with Kummer, specialist in hard turning, not only ensures the selection of the right precision turning equipment but also brings along the experience and the know-how necessary to perfectly master the complete hard turning process. Following elements must be considered to ensure a successful hard turning operation for high volume high precision parts :

- ≠ **Hardness range** : precision hard turning generally covers hardened steel or other alloys not exceeding a hardness of 64 HRC.
- ≠ **Cutting speed** : the cutting tools available for high precision hard turning are generally from CBN type (Cubic Borazon Nitride). This type of inserts require minimal cutting speeds to avoid the risk of premature tool wear. The Kummer "microspeed" line of high precision chucks featuring spindle and chucking devices for speeds up to 12000 rpm are therefore especially recommended for hard turning applications involving small size parts.
- ≠ **Machine rigidity** : Since the cutting forces developed by the hard turning process are particularly important, it is therefore essential that all elements belonging to the rigidity loop correspond to the highest standard :
  - ultra rigid base
  - Slides mounted on preloaded roll bearings guideways
  - Rigid toolholders system
  - Direct spindle motor suspended on preloaded ball- or hydrostatic precision bearings
  - Specific chucking device designed to minimize the deformation on the part

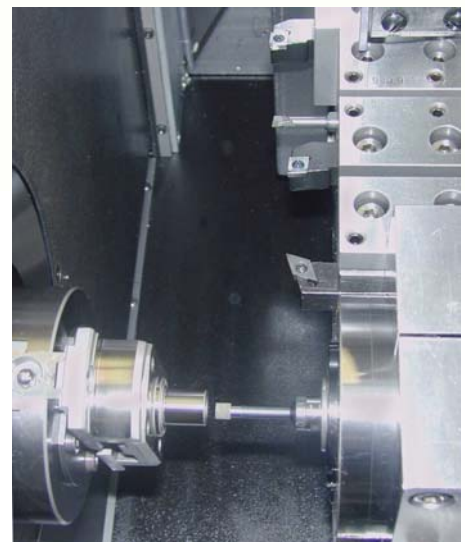
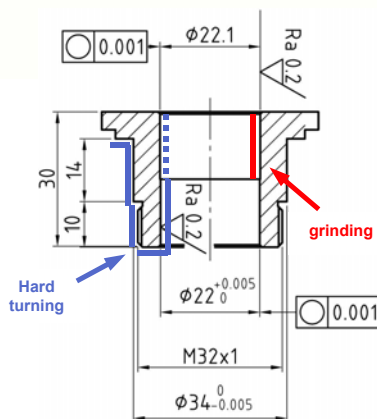
## ➤ Hybrid process : Combining precision hard turning with grinding on a high precision chucker Kummer K200 "hard turning"

Hard turning and/or grinding depending on the surface finish requirements, i.e. when the turning grooves are not allowed, or when the boring bar length-to-diameter ratio may limit by design the tool rigidity and jeopardize the dimensional and surface finish requirements. The hybrid process is also recommended when hardened steel parts locally feature a hardness exceeding levels appropriate for hard turning.

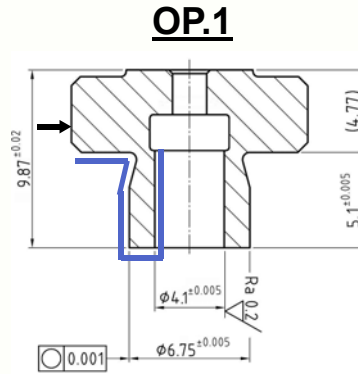
This process combines hard turning and grinding operations in one chucking operation.

### Kummer K200 "hard turning" features :

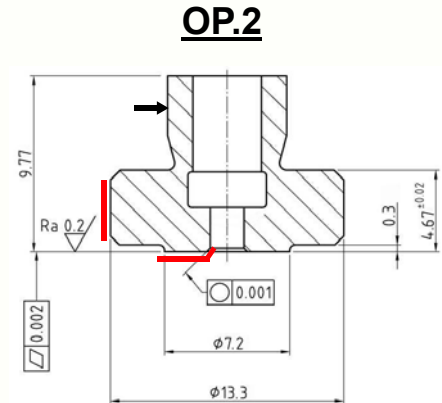
- Rigid base filled with water based concrete
- Hydrostatic spindle 6000 rpm
- Additional grinding spindle 100000 rpm



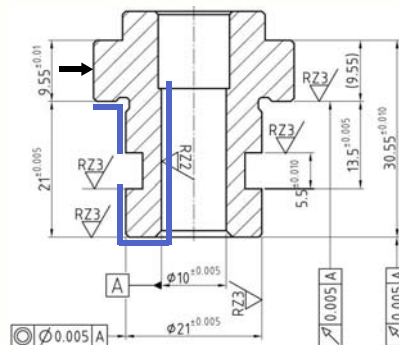
## Hard turning applications



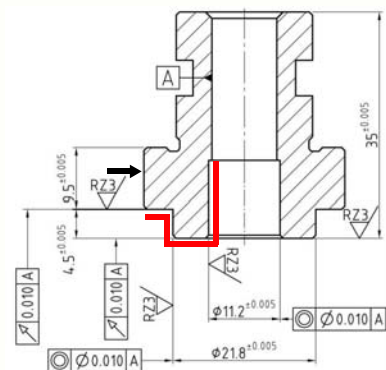
Max. spindle speed 12000 rpm  
Machining cycle 8"



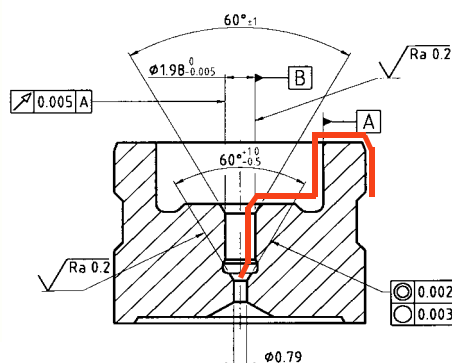
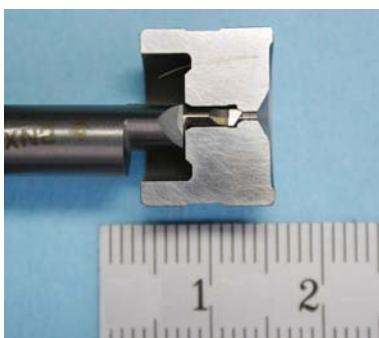
Max. spindle speed 12000 rpm  
Machining cycle 6"



Max. spindle speed 5700 rpm  
Machining cycle 21"



Max. spindle speed 5100 rpm  
Machining cycle 11"



The Kummer "microspeed" line of high precision chucks featuring spindle and chucking devices for speeds up to 12000 rpm are especially recommended for hard turning applications involving small size parts.

Max. spindle speed 12000 rpm  
Machining cycle 8"

We invite you to give us details of your specific machining problem.

We will be glad to demonstrate our capacity to master your tolerances in a way that is productive, cost-effective and reliable.

**Kummer Frères S.A.**  
CH – Tramelan  
Tél. +41 32 487 54 52  
Fax +41 32 487 64 03  
e-mail info@kummer-precision.ch  
www.kummer-precision.ch

**Kummer GmbH Werkzeugmaschinen**  
D – Weinstadt-Strümpfelbach  
Tel. +49 7151 / 96 7780  
Fax +49 7151 / 96 7772  
e-mail kummer@kummer-germany.de  
www.kummer-germany.de

**Kummer America Corporation**  
USA – Rockford IL  
Phone (815) 654 1700  
Fax (815) 654 1788  
e-mail kummeramerica@worldnet.att.net