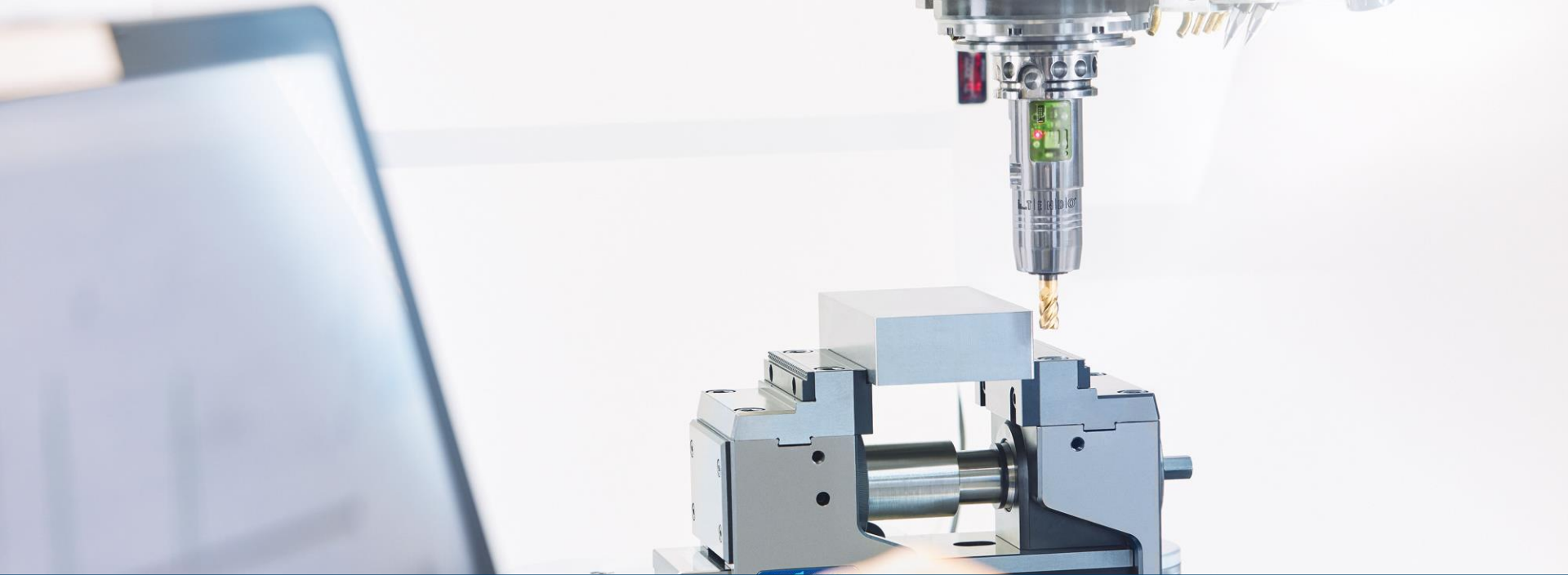

TENDO Hydraulic expansion technology

Quality and precision with over 35 years of experience

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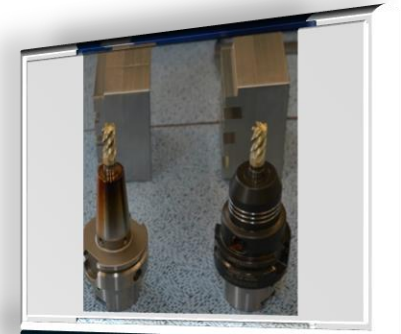

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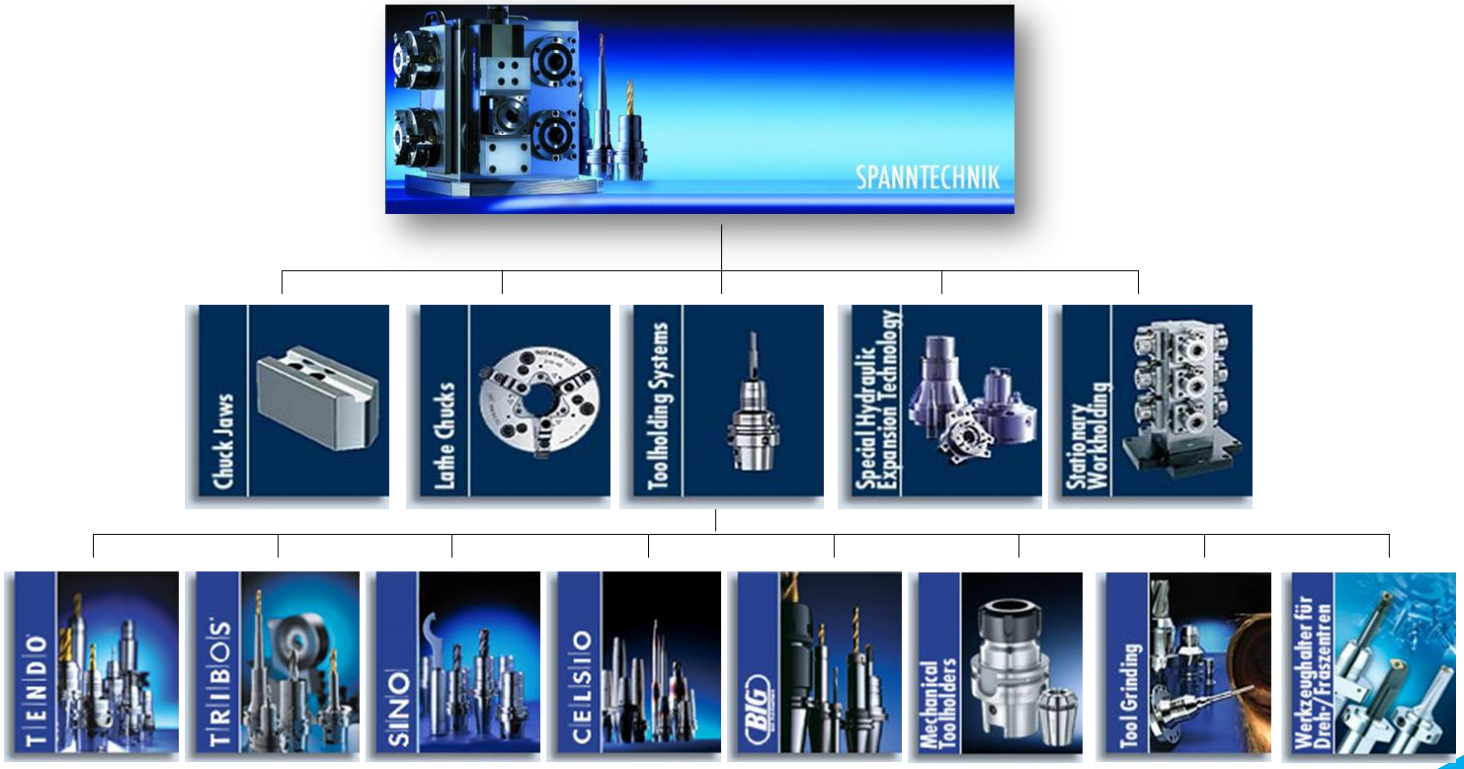
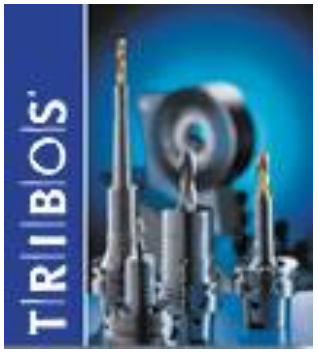


Product overview



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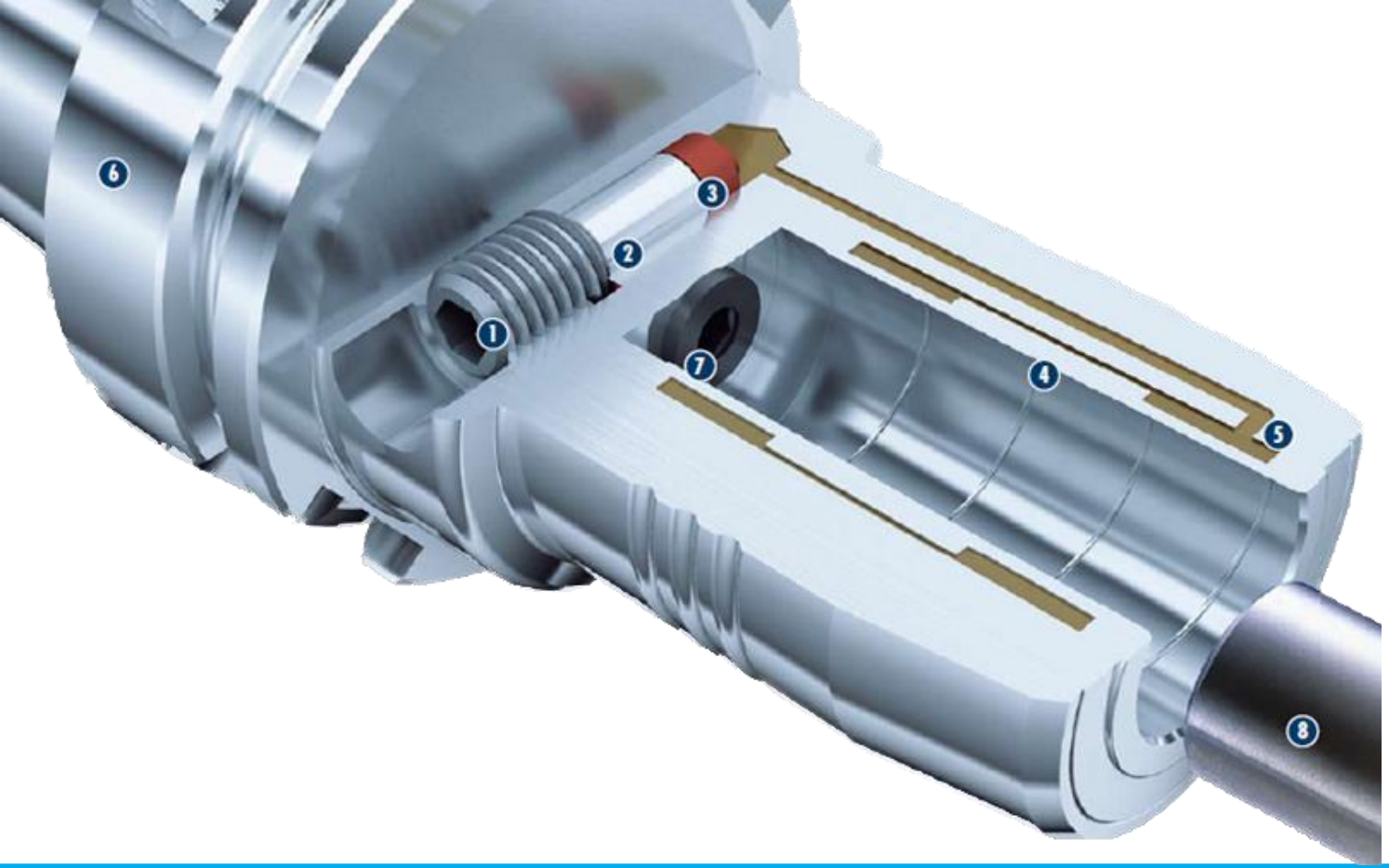
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TENDO Principle of function

Technical highlights

The set-up time killer! Precise tool change without peripheral equipment

- µ-accurate tool change in seconds
- Simple handles for changing the tool quickly and reliably
- Insert the tool into the hydraulic expansion technology, screw in the clamping screw with an allen key to the back stop turn in – ready
- The clamping results: highest run-out accuracy
- Convincingly simple handling with the allen key
- No additional capital expenditure for peripheral equipment
- Downtimes and set-up times at the machine are reduced
- Maintenance costs or failure of external clamping devices are no longer applicable

Features

Run-out and repeat accuracy

- Optimal continous run-out and repeat accuracy of < 0.003 mm
- Even cutting actions
- Minimizes wear to the cutting edges of the tool
- Increases tool service life considerably
- Reduces the costs incurred for regrinding or buying new tools

Features

Excellent vibration damping for perfect surfaces

- The hydraulic sytem is synonymous with excellent vibration damping
- Micro-blowouts on the cutting edge of the tool are prevented
- Achieves optimum workpiece surfaces
- The spindle performance will be enhanced
- The tool service life is considerably increased and costs reduced

Features

High flexibility through the use of intermediate sleeves

- Application of slotted or coolant-proof intermediate sleeves
- Different tool diameters ranging from 0.8 – 25 mm tensible
- Can be used flexibly within the clamping range
- The run-out accuracy of the sleeve is < 0.003 mm

Features

Dirt resistance for long lasting functional reliability

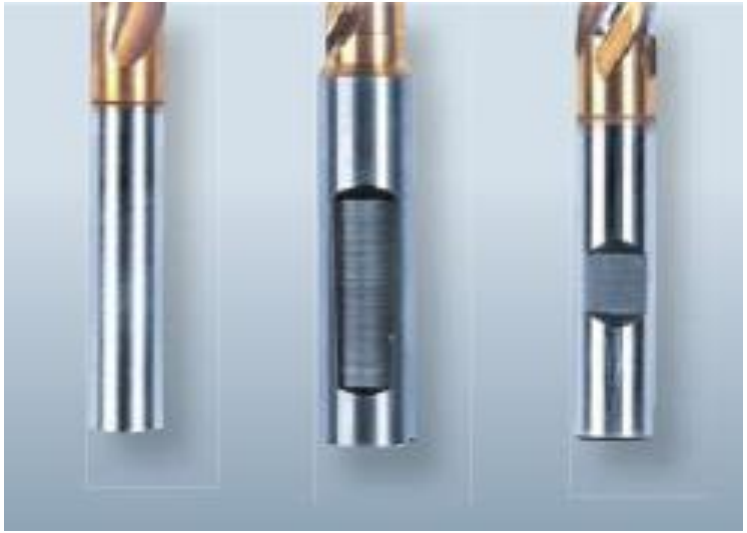
- Completely closed TENDO system
- Prevents the penetration of dirt, chips, coolants, and grease
- Clamping range is not damaged
- Functionality and perfect tool clamping system remain fully preserved
- Freedom from maintenance and a long service life for the TENDO clamping system are guaranteed

Features

Dirt grooves for reliable torque transmission

- Enormous clmaping pressure
- Displacement of oil, grease, or grease residue into the dirt groove
- The clamping face remains dry
- Reliable torque transmission is guaranteed

Features



All commercially available shank types can be clamped for process reliable clamping

- Tools with both smooth cylindrical shanks in accordance with DIN 6535, Type HA up to Ø 32 mm and also those with recesses in accordance with:

  DIN 1835 Types B, E
  DIN 6535 Types HA, HB, HE
  can be clamped directly and without the use of an intermediate sleeve

TENDO E compact

The TENDO-E compact

TENDO General:

- Run-out accuracy 0.003 mm
- Excellent vibration damping
  - → protects tools
  - → Better quality of workpieces
- Tool change by hand in seconds
- Identical torques at any clamping

TENDO-E compact

- 900 Nm at ø20 / 2000Nm at Ø32

TENDO-E compact Ø 32 mm: max. continuous torque over 2000 Nm!!!

TENDO E compact

<u>High radial rigidity for the best shape accuracy</u>

- Optimal radial rigidity through a sturdy base body prevents lateral deflection during the cutting process
- Your benefit: high part accuracy geometry at the workpiece combined eith the highest removal rates (e. g. 400 cm³/min for 42CrMo4*)

<u>High torque up to 900 Nm (Ø 20) for maximum volume machining</u>

- Compact design
- Strong holding forces
- Thus high torque transmission
- Your benefit: a significantly higher metal cutting volume

* depending on machine tool and tool

TENDO E compact

Shorter processing times. Faster amortization.

TENDO E compact

BT 30* Ø 12 and Ø 20

*Coolant supply as per DIN 69871 AD

The 7 bull's eye with TENDO E compact:

1:0 The torque monster - Up to 60 % greater torques
than commercially available hydraulic expansion toolholders.
(For Ø 16 up to 700 Nm with dry, up to 350 Nm with oily tool shank).

2:0 The precision guarantor - More than 70 % better run-out than ER collet chucks

3:0 The endurance runner - Up to 40% more volume metal removal possible,
before the tool has to be reground.

TENDO E compact

BT 30* Ø 12 and Ø 20

*Coolant supply as per DIN 69871 AD

The 7 bull's eye with TENDO E compact:

4:0 The more intelligent - Up to 40% longer service life due to oil shock absorber effect.

5:0 Ingeniously simple - ingeniously efficient! Up to 80 % faster tool change.

6:0 The price miracle - Up to 65 % procurement cost savings!

7:0 The perfectionist - Almost 100 % reproducible tool change <0.003mm.

TENDOzero

TENDOzero

µ-accurate! To 0.000 mm in the twinkling of an eye

- Professional for tight tolerances in drilling, reaming and spindling, where perfect concentricity is required.
- Minimal concentricity errors of the tool, the holder and the machine spindle can be compensated individually
- Permanent concentricity adjustable to 0.000 mm for optimum form and position tolerances
- Perfect vibration damping for up to 50 % longer tool life
- Easy handling for the exact adjustment of high-quality precision tools

TENDOzero

A TORX PLUS® key is used on the four set-screws to correct the angular position of the clamped precision tool, and the run-out accuracy is set to 0.000 mm

TENDO ES

TENDO ES

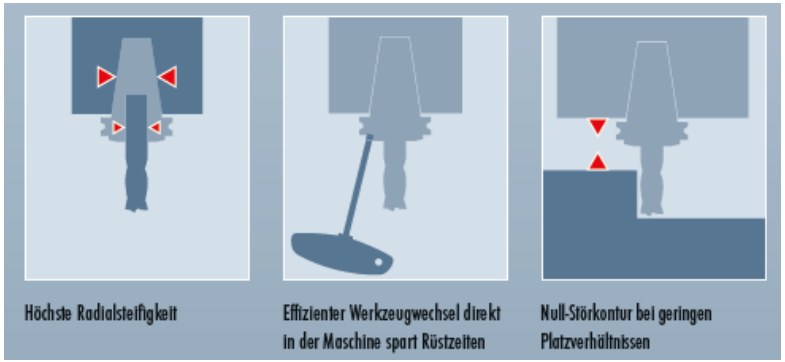
Space-saving! Precision in tight machine rooms

- With zero interfering contour
- Is used when every centimeter in the machine room counts
- Extremely short hydraulic expansion toolholder
- Perfectly suited for machining large workpieces – even when space in the machine room is tight – and for deep-hole drilling
- Tools are mounted directly in the mounting taper
- The mounting taper is supported in the spindle
- Result: Maximum radial rigidity at high torques and plenty of additional space in the machine room

TENDO ES

Ideal for deep-hole drilling:

- Extremely short design
- Frees up plenty of machine room space
- Guarantees that there is sufficient freedom of movement for the axes before tool immersion
- Collisions are eliminated



TENDO SDF-KSR

TENDO SDF-KSR

More precise! Radial length adjustment for micron precise positioning

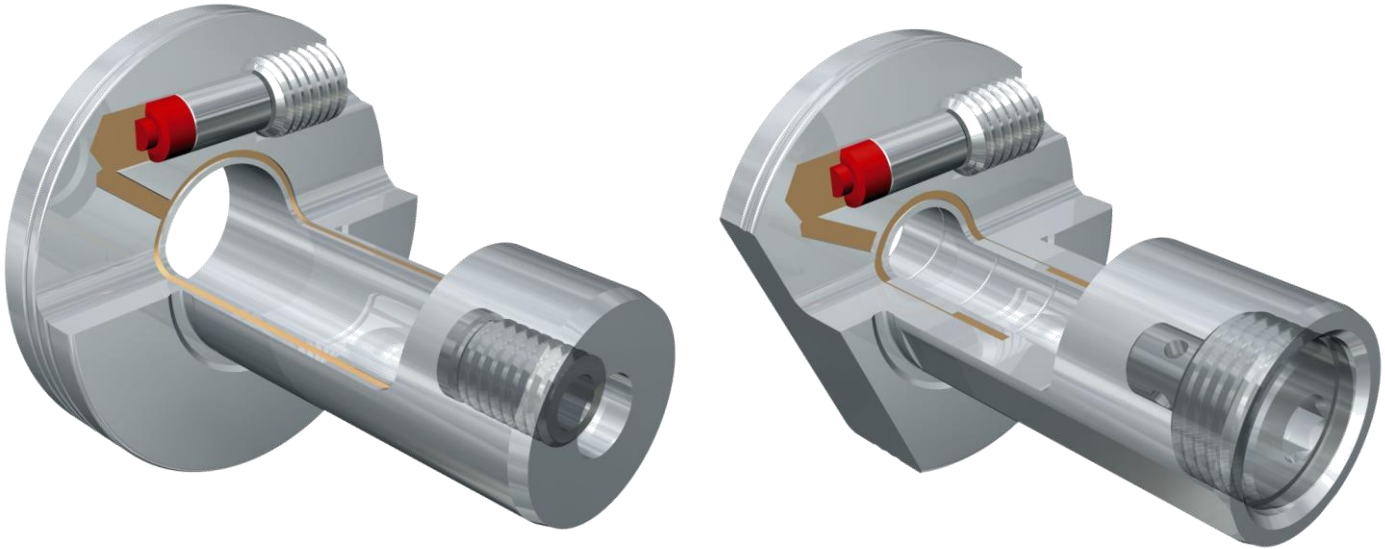
- When the sensitive adjusting mechanism is oriented, this set-up time minimizer gives you micron precise positioning for the tool length
- Length-setting screw equipped with a front and back stop, self-locking, 10 mm adjustment travel for all clamping diameters
- Position of the tool can’t be changed by its own weight or through axial pressure
- The balancing grade is not affected
- Radial length adjustment can be actuated easily and process reliably using a set screw and an Allen key
- Micron precise length adjustment of the machining tools using the compact adjusting mechanism

TENDO SDF-KSR

Possible applications, e. g. on multi-spindle machines

Radially operated adjustment mechanism for pre-setting the tool length with micron accuracy in seconds

TENDOturn



TENDOturn

Low-vibration! Improvement of surface finish by up to 300%

- Applications on lathes/milling centers
- Versatile clamping range by virtue of intermediate sleeves
- Run-out and repeat accuracy of < 0.003 mm (DSE double clamping insert)
- Easy handling
- Unique vibration damping
- This helps to realize excellent workpiece surfaces
- Axial length-setting screw
- All shank types can be clamped, including Weldon and Whistle Notch
- Improvement of vibration damping
- Visible improvement in the surface quality by up to 300%

TENDOturn

TENDOturn lathe clamping insert DKE

- Increase the productivity by using the lathe clamping insert DKE
- Does not require any specific interface
- Can be held in any customary VDI bore rod holders in order to absorb vibrations

TENDOturn double clamping insert DSE

- Modular insert for driven tools, for perfect performance on existing equipment
- Maximum run-out quality and great vibration damping ensure optimum results
- Uniform internal/external clamping force centers the insert providing maximum holding forces correct and precise clamping of your tool

TENDO WZS for tool grinding

TENDO WZS for tool grinding

Process reliable! Through maximum run-out accuracy < 0.003 mm

- Uncompromisingly meets the high demands in tool sharpening
- High run-out and repeat accuracy
- Material is removed evenly during the grinding procedure
- Increases the process reliability for grinding and sharpening operations
- Enables you to clamp shank tools up to 32 mm in diameter as well as special tools with large shank lengths of up to 95 mm depth
- Intermediate sleeves enhance the clamping options
- Especially slim interfering contour for improved interference between grinding wheel
- Optimal shape accuracy, surface quality, and run-out accuracy of the cutting edges of the tool ensures better chip flow and a more even cutting action
- Versatile clamping range due to intermediate sleeves

TENDO WZS for tool grinding

With ist 25° chuck chamfer, TENDO WZS has an optimally adapted interfering contour for the tool grinding process in comparison to other hydraulic toolholders

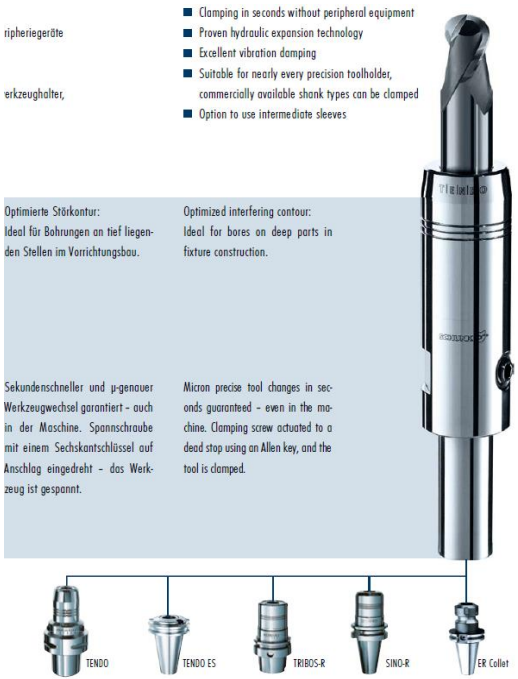
TENDO SVL

TENDO SVL

Superior! Long, slim design, and optimized interfering contours

- Predestined and designed for the precise machining of hard-to-reach areas
- Is setting the standards in regard to set-up time and costs
- The extension can be quickly clamped in every type of precision tool-holder
- Huge advantage: a single TENDO extension can be fitted with a variety of standard tools, dispensing with the need for expensive special tools
- Clamping in seconds without peripheral equipment
- Proven hydraulic expansion technology
- Excellent vibration damping
- Suitable for nearly every precision toolholder, commercially available shank types can be clamped
- Option to use intermediate sleeves

TENDO SVL



TENDO SVL extensions fit in almost all toolholding systems

TENDO SVL

- Optimized interfering contour
- Ideal for bores on deep parts in fixture cosntruction

- Micron precise tool changes in seconds guaranteed – even in the machine
- Clamping screw actuated to a dead stop using an Allen key, and the tool is clamped

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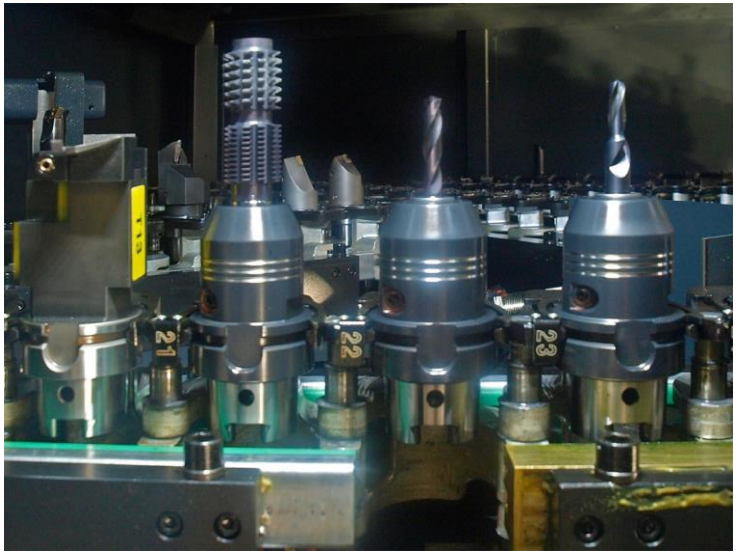
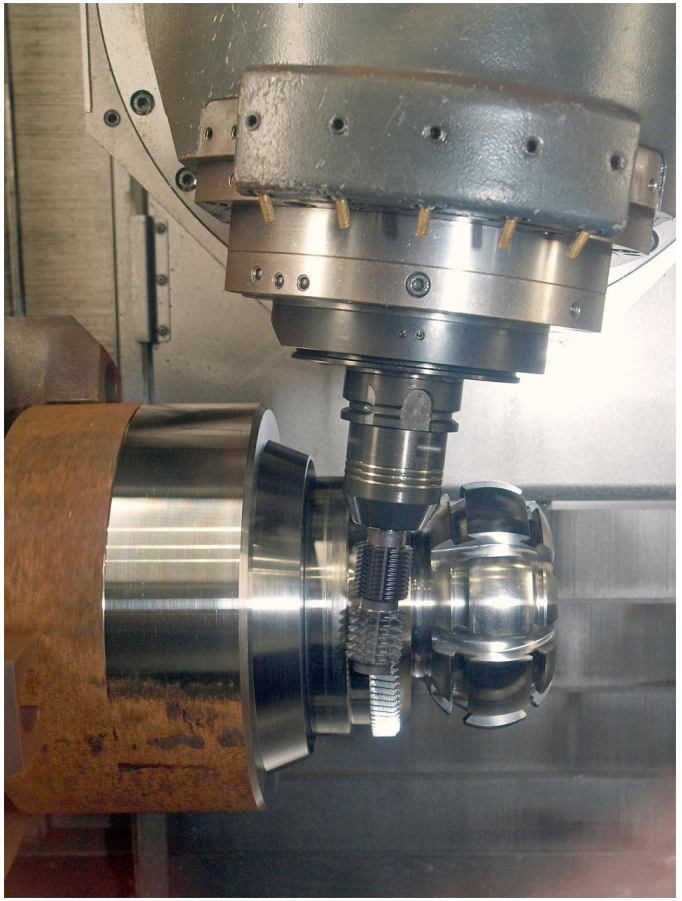
SCHUNK & DMG





The TENDO-EC

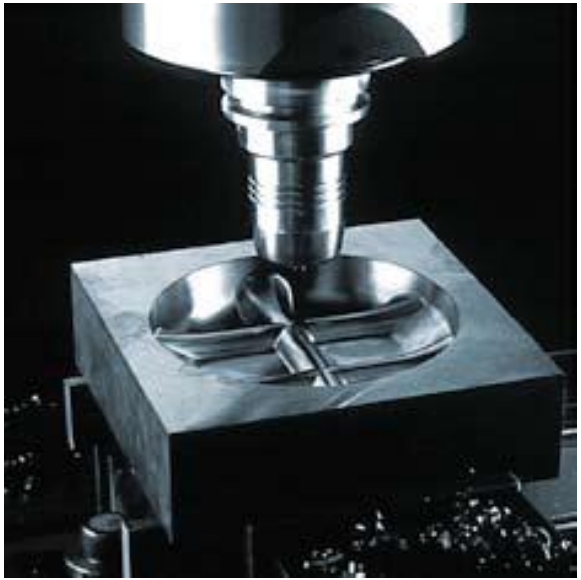
Applications

Milling operation in tool making

Milling of die inserts

Applications

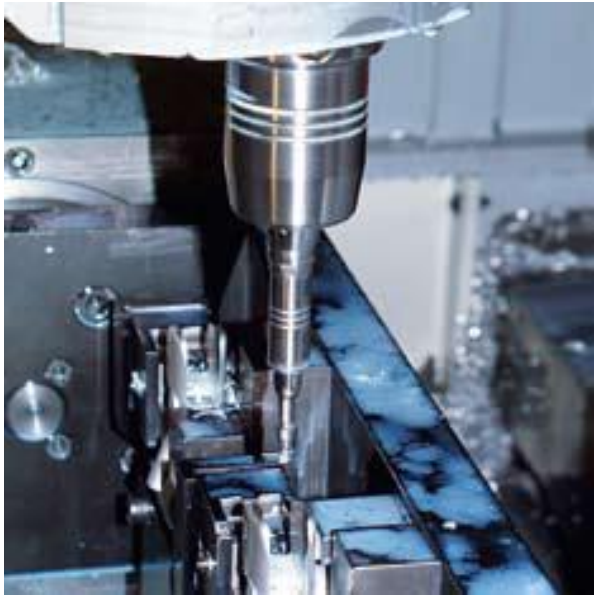
High-speed milling of a copper electr ode



HSC hard milling of a for ging die

Applications

- Prefinishing of base jaws
- TENDO with radial length adjustment on double spindle



- Machining a piston bore with PKD reamer
- Combination TENDO + TRIBOS SVL extension

Applications

High-performance drilling in machine building

Profile cutting in mould making

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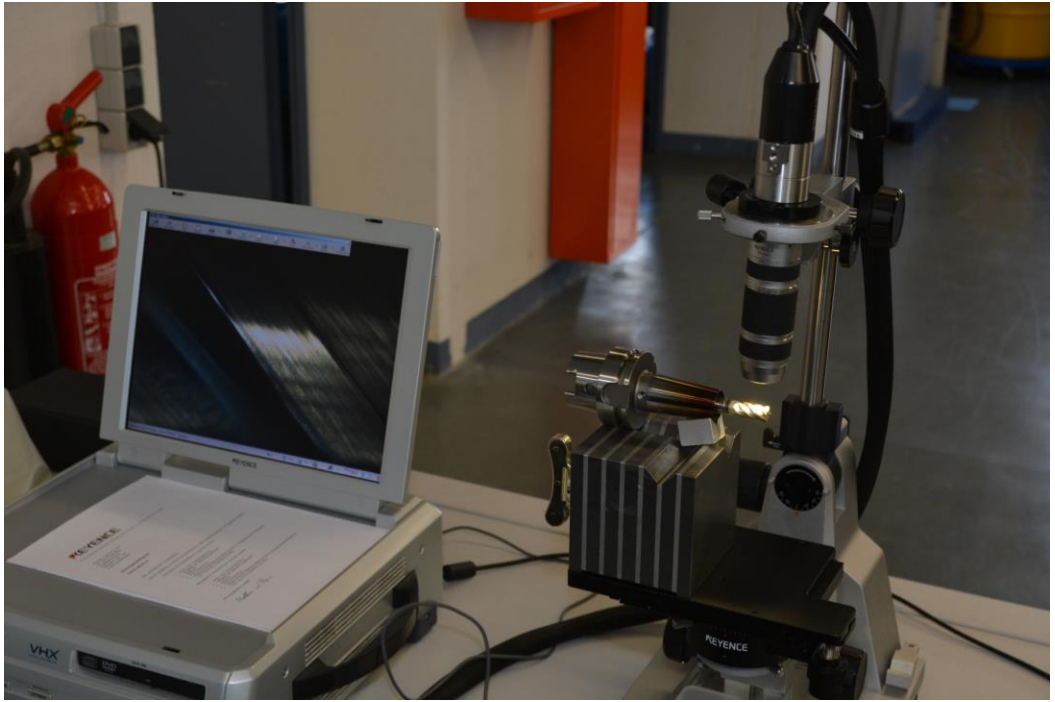
Milling test
TENDO vs. CELSIO

Click me!

Milling test TENDO vs. CELSIO



Milling test TENDO vs. CELSIO

Superior Clamping and Gripping

schunk.com