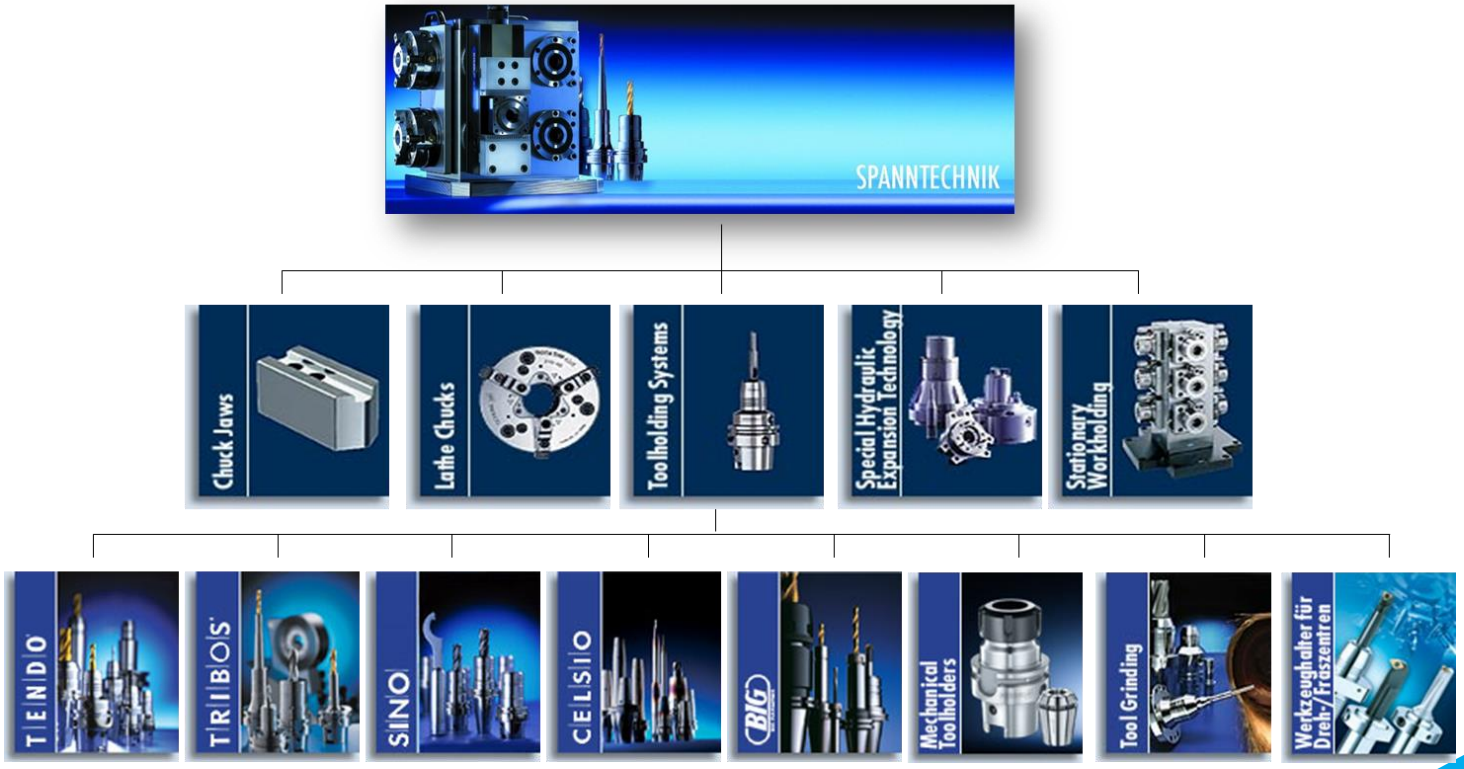
Toolholding systems

TENDO Hydraulic Expansion Toolholders

Superior Clamping and Gripping

Product overview



TENDO

TENDO hydraulic expansion toolholders

A success story in innovation

- Keeps redefining technological progress in the premier class, for more than 30 years
- Stands for efficiency in production and continuity in development
- TENDO – the epitome of the best that SCHUNK offers in toolholders, perfectly combined in a multifaceted product range that is second to none in the market
- Select the right TENDO model that you need to meet your requirements:
  - short and strong
  - in a slim or super-slim design
  - with extensions or with intermediate sleeves for flexible clamping ranges

TENDO hydraulic expansion toolholder – The original

Precise! Multi-functional in 29 interfaces

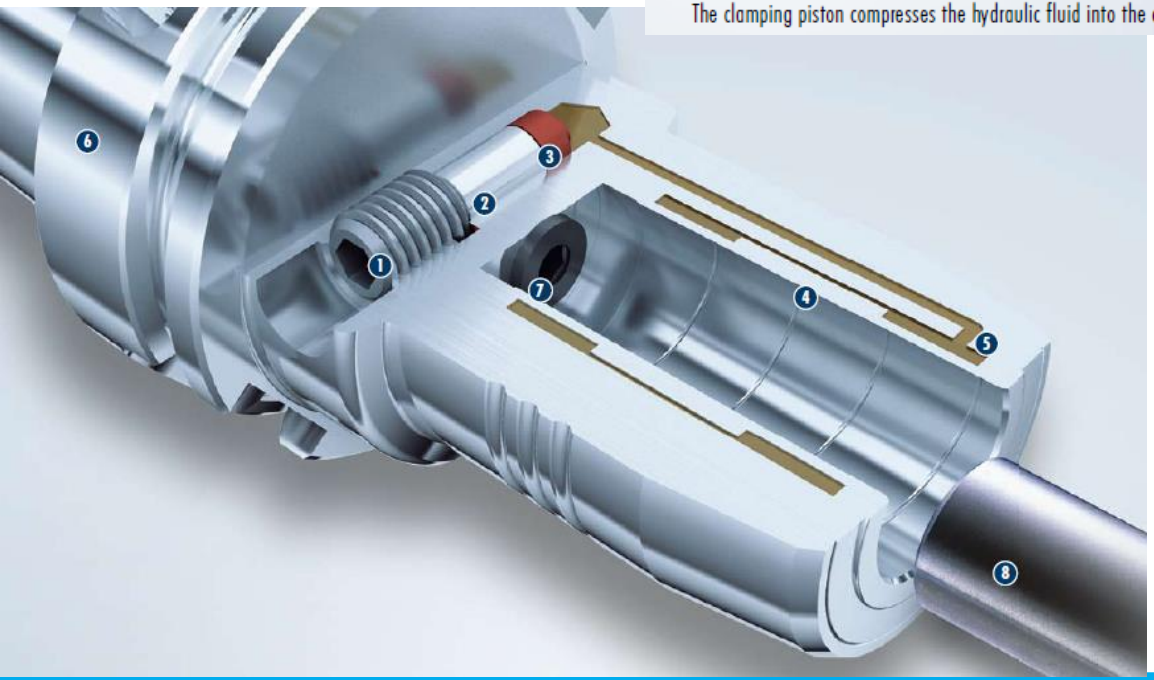
- The hydraulic expansion toolholder from SCHUNK
- Extensive range of 29 interfaces
- All-rounder in precision and compatible for use in all machine tool spindles
- The technologically advanced hydraulic expansion toolholder
- Universally applicable
- Cost-effective in its use
- Micron-accurate in its precision.

TENDO hydraulic expansion toolholder – The original

Advantages

- 100% clamping, 100% reliability, 100% universal in its application
- Milling, reaming, boring, chamfering, thread milling, tapping, or high-speed machining
- Precision is guaranteed
- Tool changes in seconds without peripheral equipment
- 29 interfaces available
- Run-out and repeat accuracy < 0.003 mm
- Excellent vibration damping
- Versatile clamping range due to intermediate sleeves
- Exact axial length preadjustment
- Fine-balanced

TENDO in detail



1 The clamping screw

The clamping screw is used to move the clamping piston. Clamp the clamping screw to dead stop using an Allen key. A torque wrench is not needed.

2 Clamping piston

The clamping piston compresses the hydraulic fluid into the oil chamber.

3 The sealing element

Special sealing for leak-free clamping

4 The expansion sleeve

The expansion sleeve bulges itself evenly against the tool shank. First, this clamping process centers the tool shank and then powerfully clamps it on the full surfaces.

5 The oil chamber

When the oil chamber is filled with hydraulic fluid, it has a dampening effect on the clamped tool.

6 The base body

The machine-side interface is located on the base body

7 The length-setting screw

Can be actuated radially or axially for quick and easy tool-presetting

8 The tool

The tool is clamped centrically to the middle axis - maximum run-out and repeat accuracy < 0.003 mm.

Technical highlights

Set-up time minimizer! Precision tool change without peripheral equipment

- Micron-accurate tool change in seconds
- With a few simple actions, the tool can be changed quickly and process reliably
- Insert the tool into the hydraulic expansion toolholder, screw in the clamping screw to dead stop using an Allen key – finished!
- Clamping result: maximum run-out accuracy
- Convincingly simple handling using an Allen key
- No additional investment costs for peripheral equipment
- Manufacturing down-times and set-up times are reduced at the machine
- 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

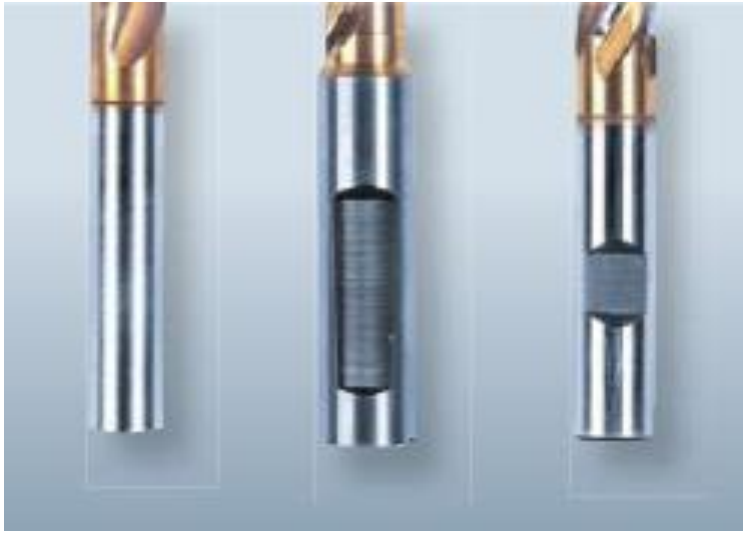
- Application of slotted or coolant-proof intermediate sleeves
- Different tool diameters ranging from 0.8 – 25 mm tensible
- Can be used flexibly within the clamping range
- The run-out accuracy of the sleeve is < 0.003 mm

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



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

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

Fine-balanced for maximum running smoothness

- As a standard requirement fine-balanced for the use on HSC machines
- The fine-balancing contributes significantly to:
  - Maximum running smoothness
  - Enhancing the performance of the machine spindle
  - Reducing vibrations

TENDO E compact

TENDO E compact

More robust! With a torque up to 900 Nm (Ø 20 mm) for volume machining, boring, reaming, and thread-milling.

- Tighter tolerances, huge cost pressure, better quality
- Highest torques, now up to 900 Nm wit h Ø 20 mm under dry clamping conditions, 520 Nm with oily tool shanks
- Constant run-out and repeat accuracy < 0.003 mm
- For universal use in milling, bor ing, reaming, and thread-milling
- Increased service tool life up to 40% leads to cost savings
- Tool changes in seconds with no peripheral equipment – clamping to a dead stop
- Excellent price/performance ratio

TENDO E compact

High radial rigidity for the best shape accuracy

- 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*)

High torque up to 900 Nm (Ø 20) for maximum volume machining

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

*abhängig von Werkzeugmaschine und Werkzeug

TENDOzero

TENDOzero

Micron precise! To 0.000 mm in next to no time

- Professional for tight tolerances for boring, reaming, drill-finishing, or wherever perfect run-out accuracy is a must
- Even minimal concentricity errors with tools, spindle mounts, and the spindles can be individually compensated
- Constant run-out accuracy can be adjusted to 0.000 mm for optimum shape and positional tolerances
- Perfect vibration damping for up to 50% long er tool lives
- Easy handling for precise setting 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

- It is even possible to set a run-out accuracy of 0.000 mm with intermediate sleeves

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

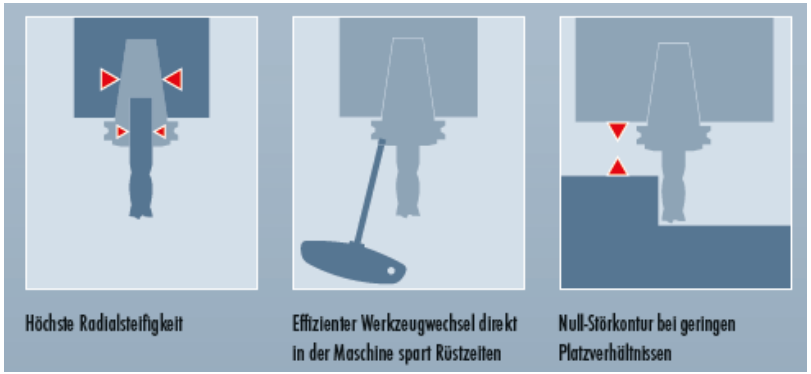
Extremely short, extremely powerful, extremely cost-effective

- No interfering contour – optimal freedom of movement where working space is limited
- Excellent vibration damping guarantees optimum workpiece surfaces and long tool life
- Perfectly suited for large volume cutting
- Easy and quick handling, micron precise tool change
- Can be ideally combined with TENDO SVL and TRIBOS SVL extensions

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 LSS

TENDO LSS

No competition! Super-slim and offering high precision – with a run-out accuracy < 0.006 mm (when L1 = 200 mm and with an unclamping length of 2.5xD)

- Optimized interfering contours, which results in excellent workpiece accessibility
- Sets standards, therefore saves costs in the fabrication of expensive special tools
- Negotiates the obstacles posed even by the trichiest of tasks, when machining at the narrowest of angles and where workpieces are difficult to access
- High stability and high radial rigidity
- super-slim toolholder is ideally suited to boring, reaming, and for finish milling machining operations
- Maximum run-out and repeat accuracy
- Excellent vibration damping

TENDO LSS

- Ideally suited for the the precision machining of hard-to-reach areas
- For example, when milling difficult, deep contours in die construction

TENDO SDF-KSR

1. Drive worm (set screw)
2. Clamping actuation
3. Drive worm (adjustment screw)

TENDO SDF-KSR

More precise! Radial length adjustment for micron precise positioning

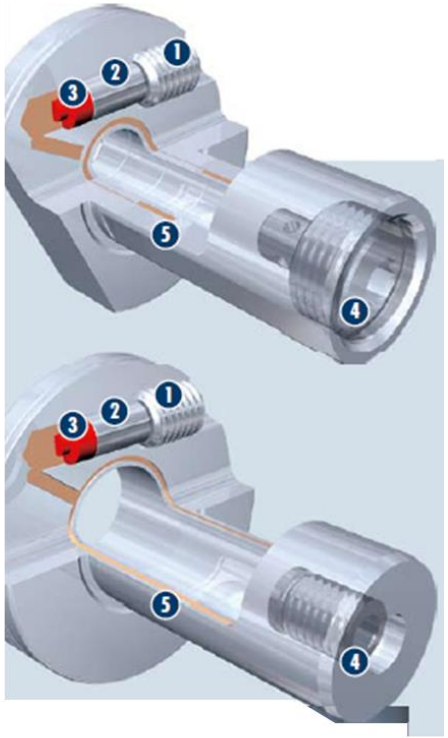
- When the sensitive adjusting mechanism is oriented, this set-up time minimizer gives you micron precise positioning for the tool length
- Length-setting screw equipped with a front and back stop, self-locking, 10 mm adjustment travel for all clamping diameters
- Position of the tool can’t be changed 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

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

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

TENDOturn



1 Actuation screw
2 Piston
3 Seal
4 Length adjustment screw
5 Expansion chamber

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

Applications

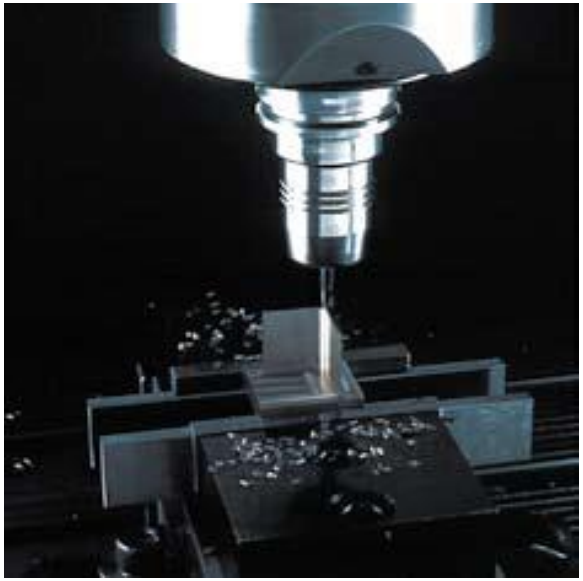
Precision drilling in tool making

Applications

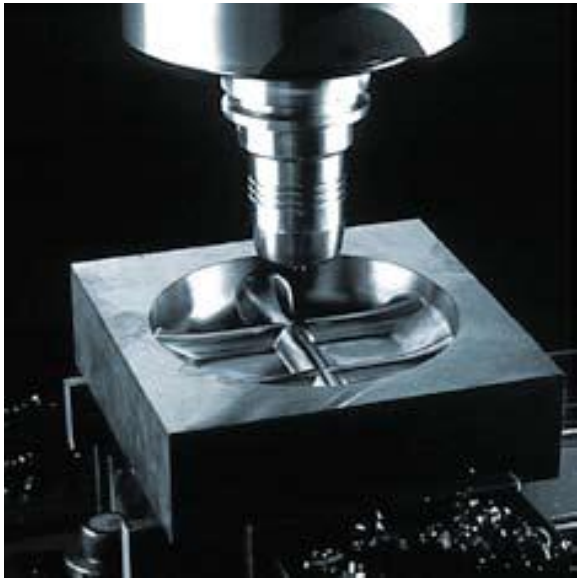
Milling operation in tool making

Milling of die inserts

Applications



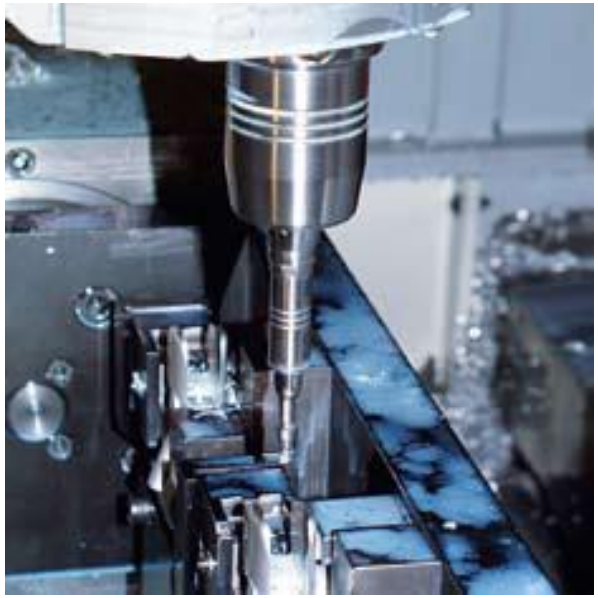
High-speed milling of a copper electr ode



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

Superior Clamping and Gripping

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