

MST's SHRINK-FIT HOLDER SLIMLINE is

a system to hold tools (carbide) firmly and accurately by heating and cooling the holder (steel).

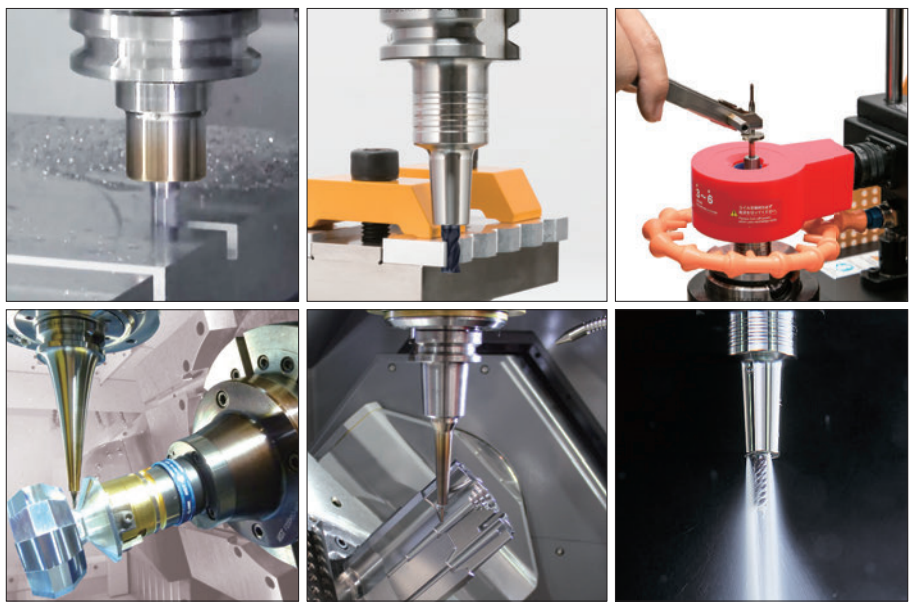
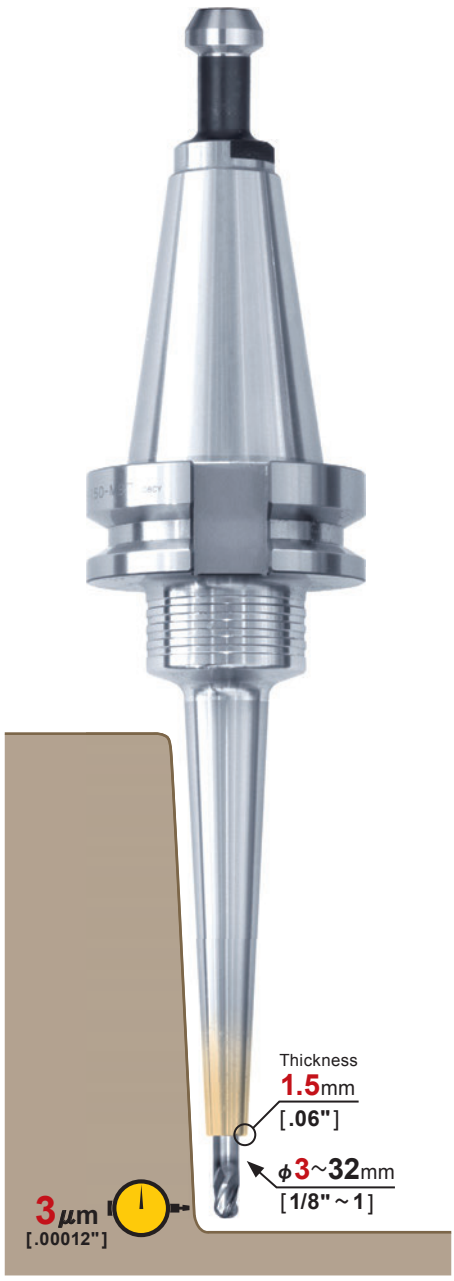
It is different from the existing mechanism of chucking, and is a revolutionary holder that uses the science of material expansion and shrinkage. SLIMLINE is made of MST's exclusive material which is developed to shrink-fit (insert/remove tool) easily at low temperatures (300°C [570°F] on average).

It also has a coefficient of thermal expansion that is 1.6 times higher than that of regular steel. Unlike conventional holders, SLIMLINE does not require any parts such as collets and nuts to hold tools. The simple mechanism can make the nose very thin, even to a thickness of

1.5mm[.06"], and achieve the slimmest holder on the market. It creates less work-piece interference and minimizes cutter projection in order to achieve stable and high-rigidity machining.

Our line-up contains 4,000 kinds to offer the most suitable holder design for a large variety of work-piece shapes. These are benefits that only SLIMLINE can offer.

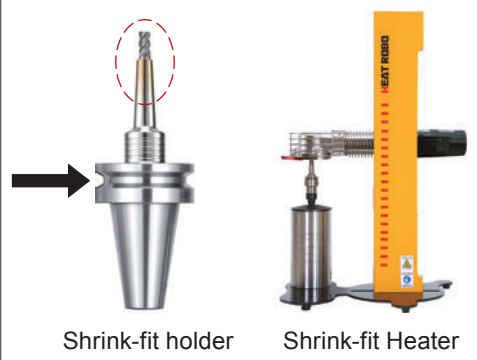
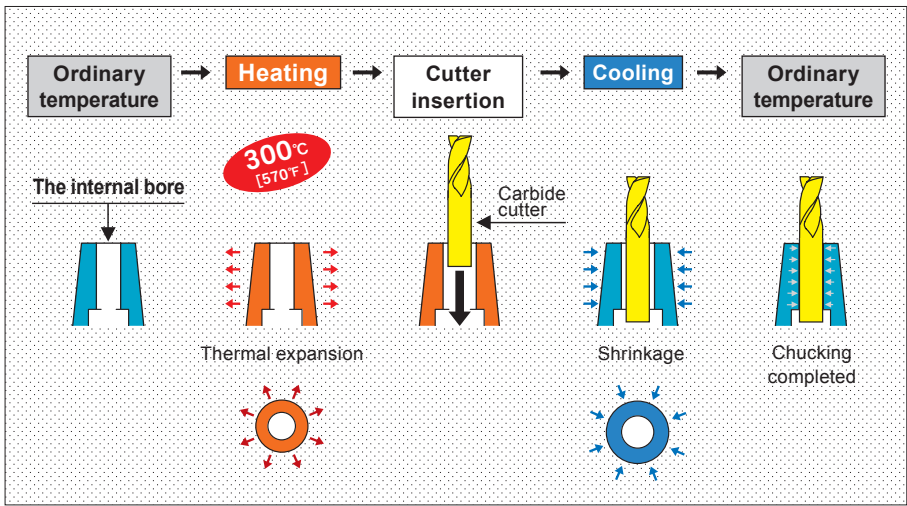
We promise that SLIMLINE will demonstrate its outstanding capabilities in 5-axis, micro-precision, heavy-duty, and many kinds of machining in order to improve accuracy, extend tool life and reduce production cost.



PAT.

Principle of shrinking technology

- A shrink-fit holder is a chucking system that utilizes the difference between the coefficients of thermal expansion of the holder material (steel) and the cutter (carbide).



Special material for shrink-fitting

Thermal expansion coefficient is **1.6** times higher.

- Special material is applied to MST's shrink-fit holders. This material has a higher coefficient of thermal expansion than that of competitor's shrink-fit holders, and you can shrink-fit at lower temperatures than that of competitors. Also, due to its superior heat resistance temperature, the holder doesn't receive any damage by overheating.

Shrink-fitting temperature and heatproof temperature

MST's SLIMLINE

Heatproof temperature

- You can heat it up to 720°C [1310°F] without any issue.

Shrink-fitting temperature

- Since the heating temperature is lower than 430°C [810°F], there is no adverse impact on holder life.

Coefficient of thermal expansion

- Between the holder(special material) and cutter(carbide).
... 10.5×10^{-6} mm/°C

1.6 times
(Compared to competitors' holders)

Long service life

The tip of the shrink-fit holder doesn't get burned due to the low heating temperature.



Heatproof temperature
720°C
[1310°F]

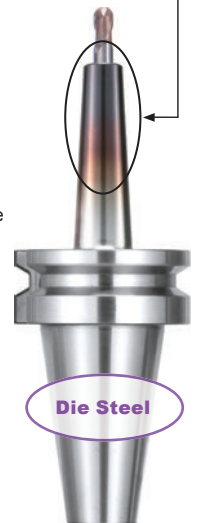
Safety ratio

Maximum heating temperature
430°C
[810°F]

Shrink-fitting temperature

Short life

The shrink-fit holder burns due to the high heating temperature.



Maximum heating temperature
690°C
[1270°F]

Over Heating

Heatproof temperature
580°C
[1080°F]

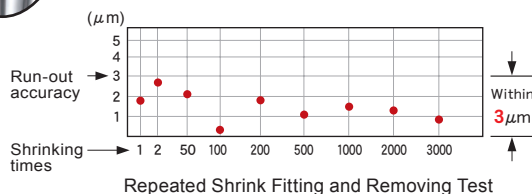
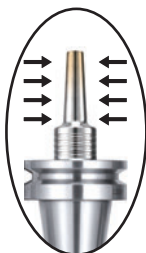
- Oxidation
- Contraction of a bore dia.
- Reducing hardness

The difference between the maximum heating temperatures of MST's shrink-fit holders and our competitors' (3mm dia. shank cutter).

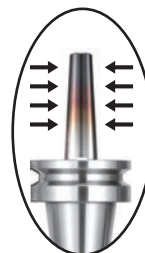
The lifetime of shrink-fit holder

MST's SLIMLINE

A shrink-fit temperature of a SLIMLINE holder is as low as 430°C [810°F] maximum. It never exceeds a heatproof temperature of 720°C [1310°F]. Repetitious shrinkage fitting does not cause the deterioration of a holder.



Competitors' shrink-fit holder



Heating several times at 700°C [1290°F]

The internal bore
Contraction of a bore dia.

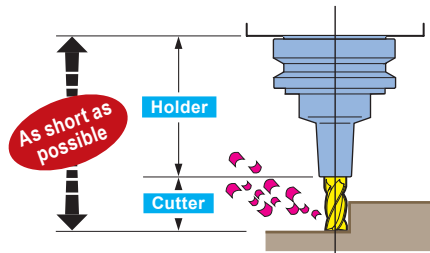
The cutter is difficult to insert. Run-out accuracy deteriorations.

Repeated over-heating causes change in properties of the materials, the holder will be reduced performance.

High rigidity

Shortest cutter projection

- 1.5mm [.06"] thin wall thickness and slim body design minimize interference with a work-piece, fixture and cutting tool projection. This improves cutting tool life and machining surface quality dramatically thanks to minimal deflection and chattering.



Deflection amount is proportional to **projection length³**.

Length becomes **2** times → Deflection amount becomes **8** times

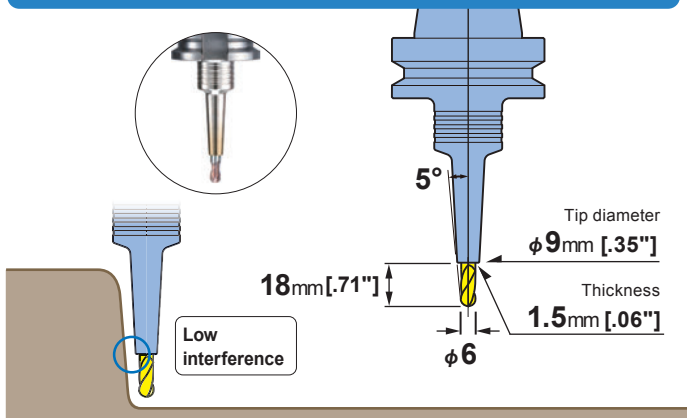
$$S = \frac{6.8 \times F \times L^3}{E \times D^4}$$

S : Deflection amount D : Shaft diameter
L : Tool projection F : Load
E : Young's modulus

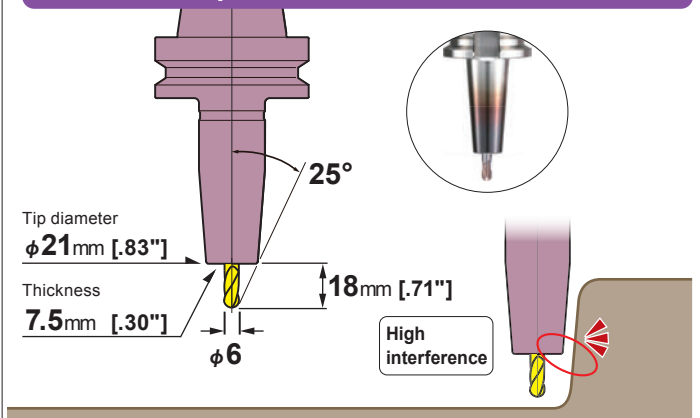
Displaying the highest performance at deep machining

- The holder tip thickness with 1.5mm [.06"] minimizes interference against the workpiece and jig fixtures.

MST's SLIMLINE

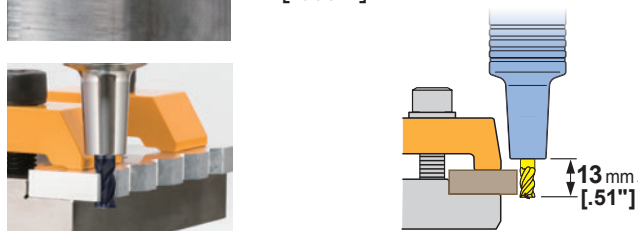


Competitors' shrink-fit holder



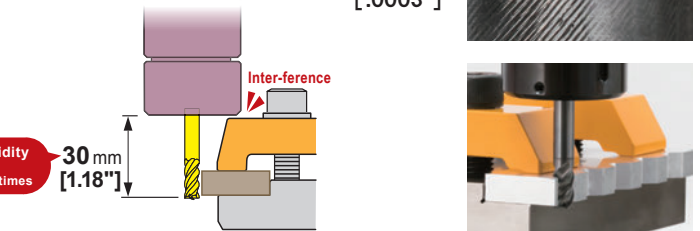
Surface roughness
 $R_z = 2\mu\text{m}$ [.0001"]

SLIMLINE



Surface roughness
 $R_z = 7.2\mu\text{m}$ [.0003"]

Collet chuck



High clamping force

Ideal for heavy-duty machining.

Clamping force **3** times

1100 N·m

320 N·m 350 N·m 330 N·m

SLIMLINE Hydraulic holder Collet chuck Competitors' shrink-fit holder

High Clamping force

$\phi 20\text{mm}$ [.78"]

High run-out accuracy

Stable high run-out accuracy can be achieved at all times.

- There are no tightening parts (such as nuts and collets) to hold cutters. The simple design maintains high-accuracy chucking.

2 PIECE type

Master holder
SLIMLINE collet

12 type → **5 μm** [.0002"]
6 type → **3 μm** [.00012"]
8 type → **3 μm** [.00012"]

**MONO 3°
MONO CURVE**

3 μm [.00012"]

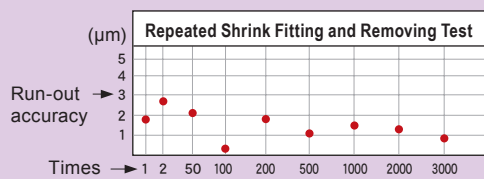
UNO

1 μm [.00004"]

BLACK UNO

0.5 μm [.00002"]

No deterioration in accuracy after shrinking more than 3000 times



Easy operation

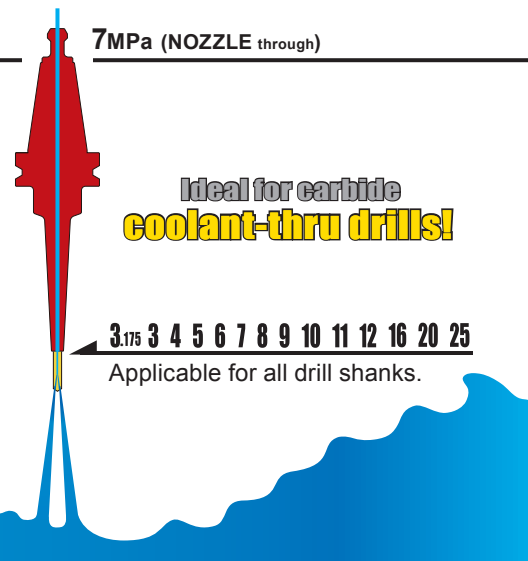
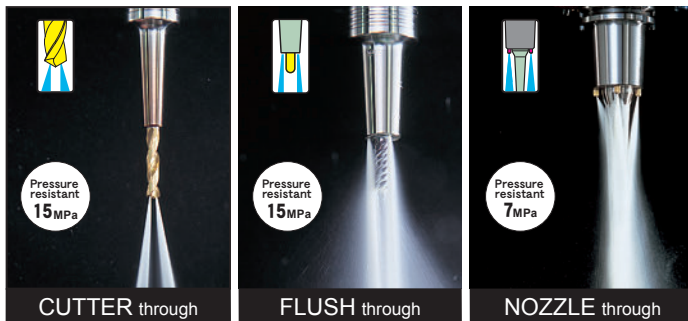


For COOLANT through

Withstanding pressure 15MPa

7MPa (NOZZLE through)

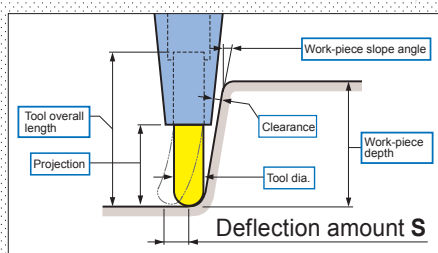
- The shrink-fit holder has a very simple configuration without a collet or a tightening nut. It is easily and completely compatible with through spindle coolant.



Rigidity calculation software

Holder automatic selection

- Automatically select optimum holders in the order of smaller deflection value S by inputting tool and work-piece information.



Enter your tool holder, cutting tool, and work-piece information.

➔ P.236

No.	Holder	Deflection amount
1	BT40-SLSA6-150cv	3.2
2	BT40-SLSA6-120cv	4.8
3	BT40-SLSA6-180cv	5.2
4	BT40-SLSA6-125-M42	5.6
...

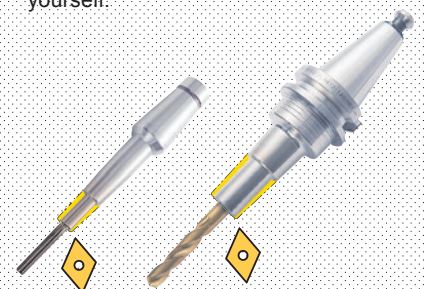
This system lists tool holders in descending order of rigidity.

Output DXF files.

USER Customization

Modifying outer-dimension

- When you have interference using a standard holder, you can customize it yourself.



- MST can customize upon your request.
 - There is a dimensional limitation for customizing.
- ➔ P.233

A broad line-up

4000 types

MST's shrink-fit holder, SLIMLINE has an amazing line-up for all kinds of applications! For example, you can choose the optimum design holder for your needs from 300 types of the HSK-A63 shank.

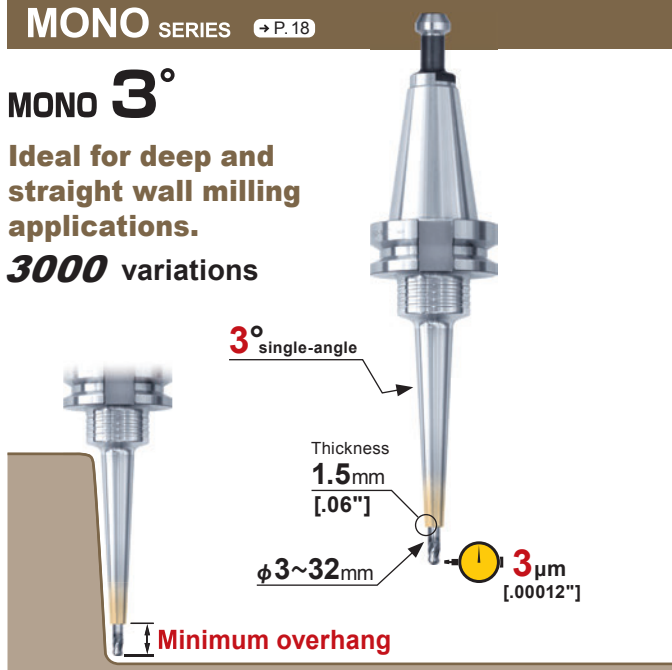


MONO SERIES → P.18

Solid type

MONO 3°

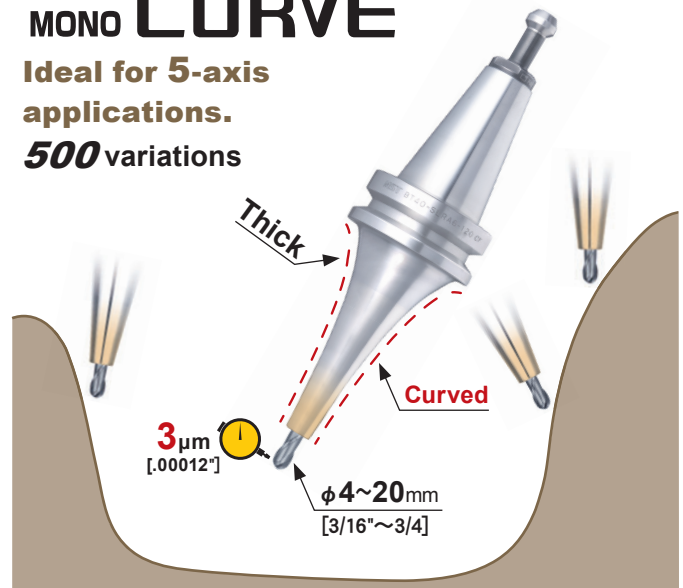
Ideal for deep and straight wall milling applications.
3000 variations



MONO CURVE

Ideal for 5-axis applications.
500 variations

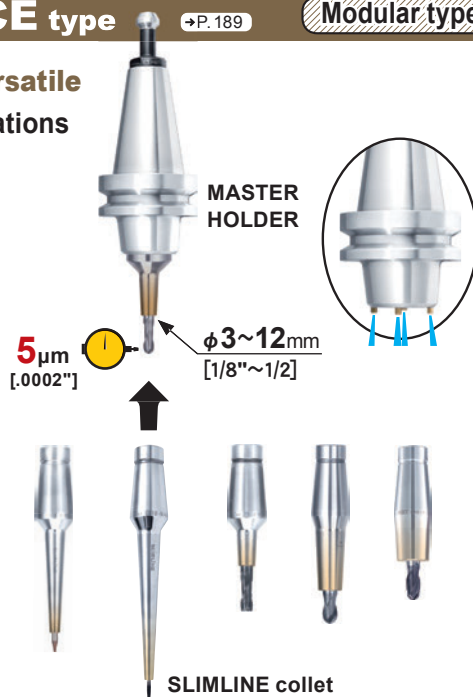
PAT.



2 PIECE type → P.189

Modular type

Highly versatile
250 variations



UNO → P.197

Solid type

Superior accuracy

PAT.

BLACK UNO

UNO

0.5µm
[.00002\"]

1µm
[.00004\"]

HYPER VERSION → P.199

Solid type

Heavy-duty endmill holder with high clamping force

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Short type

Heavy type

SLIMLINE Z



Reduced spindle load and lowered cutting vibration

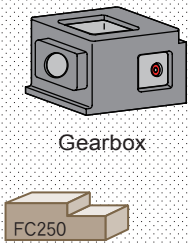
3 times clamping force prevents the cutter from pulling out or slipping.

Z shank prevents the cutter from pulling out or slipping.

Production improvement examples

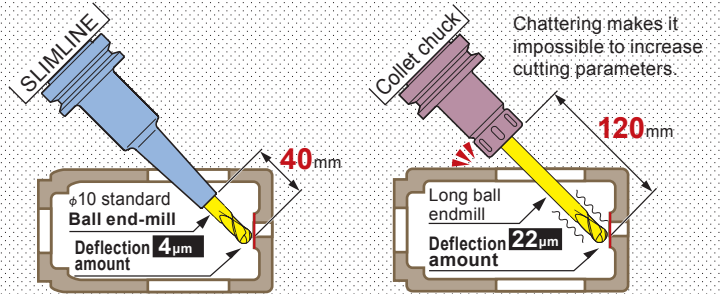
Examples 1 Interference avoidance

- Replacing the long ball endmill with the standard ball endmill.
Rigidity of the holder was improved and allowed chattering-free machining.



Tool cost
reduction
¥31,600 → ¥11,500

Improved
cutting feed
256 → 860 mm/min

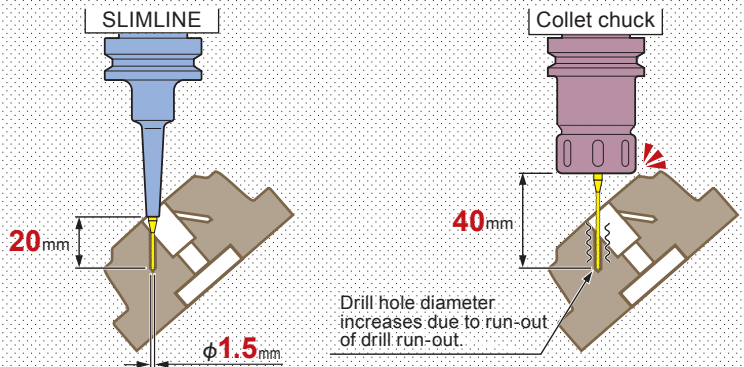


Examples 2 Improved run-out accuracy

- Improve run-out accuracy thanks to minimizing a drill projection. And, preventing expansion of drill hole diameter.

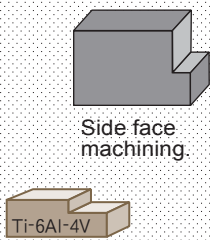


Tool life
2 times longer

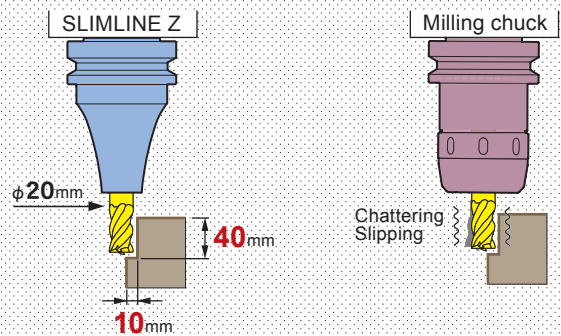


Examples 3 Heavy-duty machining of tough materials

- The anti-slippage and anti-pulling out capabilities of the SLIMLINE Z improve machining efficiency dramatically when performing side face heavy-duty machining.

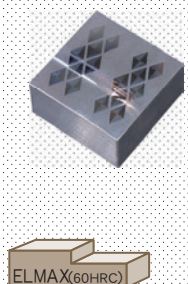


Cutting amount
2 times larger
256 → 504 cm^3/min

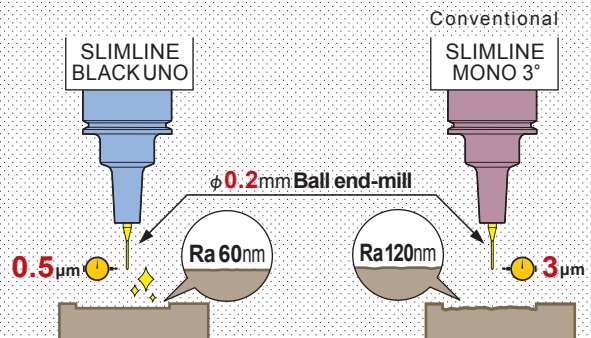


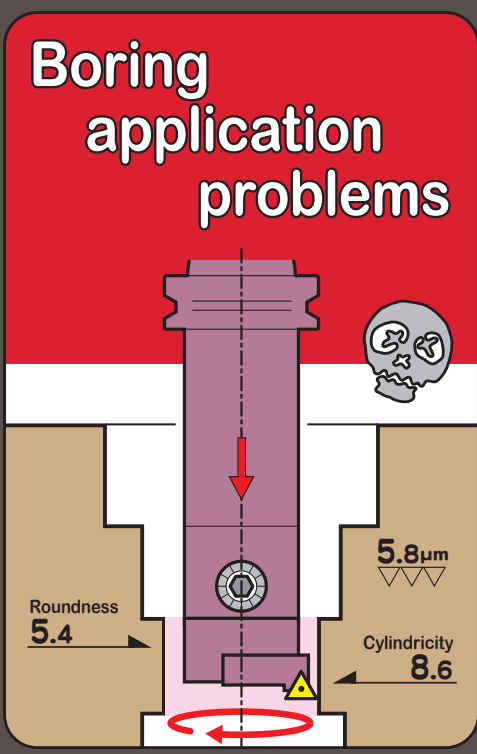
Examples 4 Mirror finishing

- The SLIMLINE BLACK UNO makes $1\mu\text{m}$ axial cutting micro-machining possible.



Surface roughness
improved **2 times**
Ra 120 → 60nm

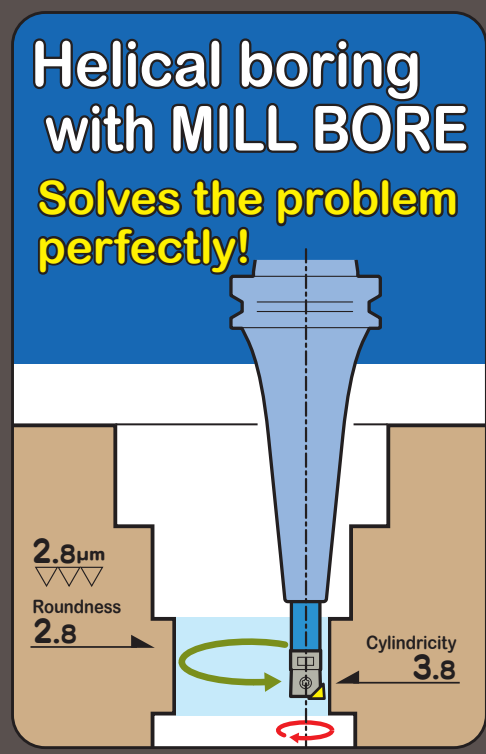




Solution

SLIMLINE
+
carbide arbor
+
Indexable End Mill

Machining width
0.03mm



NEW PRODUCT

SHRINK-FIT HOLDER
SLIMLINE

MILL BORE

If you would like more detailed information, please contact MST and ask for a catalog.



Diameter adjustment is required on tool pre-setter

Cutter compensation with helical milling

Limited insert variations

Wide variety of cutter types, inserts (material/application)

Need to purchase separate holders for each diameter

1 holder can be used for various diameters

Long, connected cuttings Damages machining surface Leads to machine trouble

Milling creates only small chips Automation / Manpower saving