

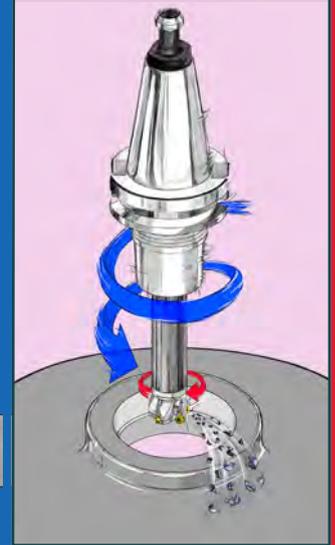
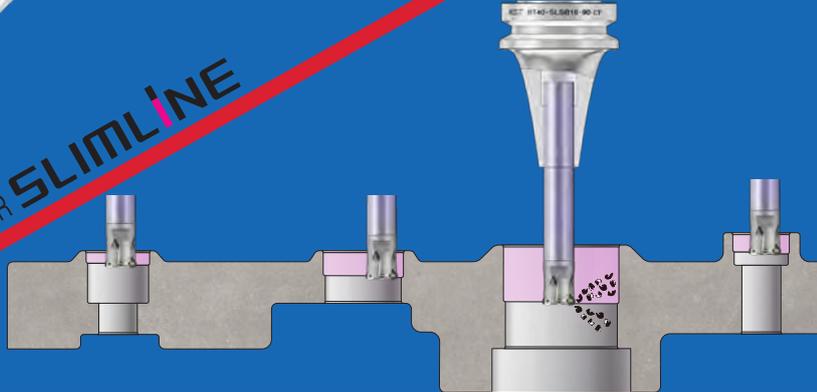
Long
Small tip
High-speed rotation

Strong and thick

FMH RIGID type

Boring with SHRINK-FIT holder MILL BORE

SHRINK-FIT HOLDER **SLIMLINE**



Workpiece clamber
SMART GRIP

- Smaller than workpiece, Simple clamping
- 3-axis · 5-axis · Multi-tasking Coordinate measuring machines
- Process integration Robotization

Highly Recommended Products

2mm collapsibility with just one collet!



DETa-1 Collet Holder

ANGLE HEAD

The most compact and light-weight in the world



Wash



Holder

Removes scratches & rust

6S

Line up and lubricate

Cutter Jig

Tightening

Disassembling

Sorting, Organizing

MST

Feel free to visit our factory anytime

MST corporation

SHRINK-FIT HOLDER SLIMLINE

Select the best holder for your application from 4,000 variations!

DIE & MOLD

Parts

5-axis

Heavy-duty cutting

Micro

Minimum thickness

1.5 mm

3 μ m



Minimum overhang

The SLIMLINE SHRINK-FIT HOLDER

can also be used for parts machining in addition to Die & Mold applications. It demonstrates its superiority for all kinds of applications, such as 5-axis machining, micro-precision machining, and heavy-duty machining, and contributes to cost reduction by improving machining accuracy and extending tool life.



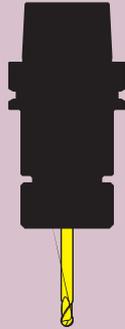
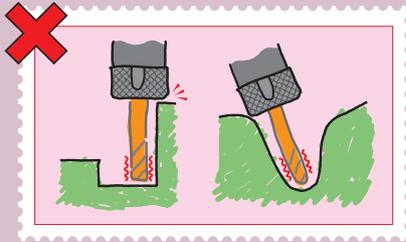
Using a dedicated shrink-fit machine allows for safe, reliable and high-precision chucking. No skill or experience is required to set the tool.



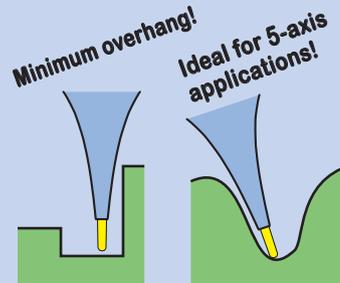
Common tool holder problems ...

SLIMLINE solves all these problems!

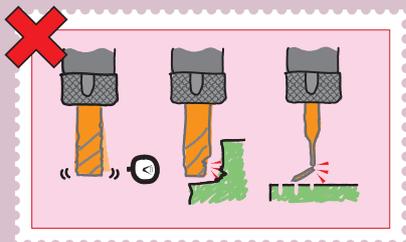
Tool holder tip interferes with the workpiece ...



Less interference!



**Large tool run-out ...
Tool breakage, chipping ...**



**High run-out accuracy!
No breakage of small tools!**



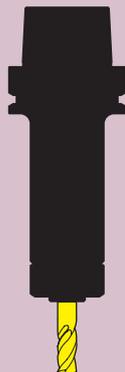
**Tool comes out ...
Low cutting parameters ...**



**Tool doesn't come out!
No chattering!**



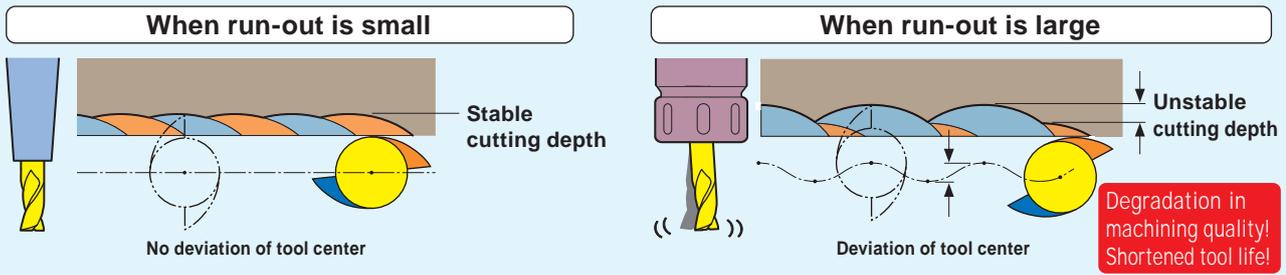
Insufficient coolant supply ...



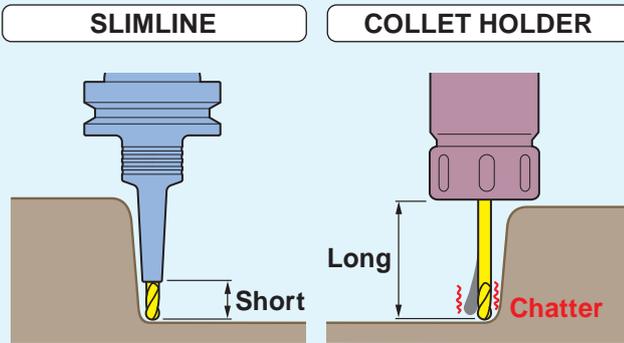
Ideal for coolant-through machining!



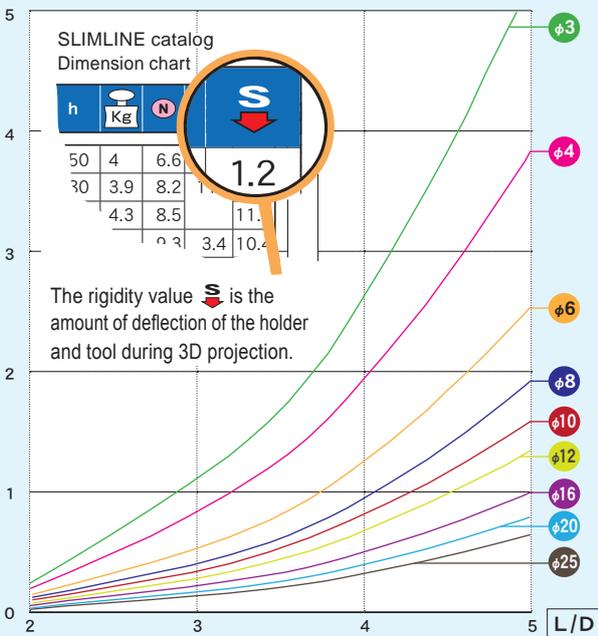
Tool run-out affects the machining quality and tool life.



The slim body minimizes interference with workpieces and jigs, and the tool projection length can be set short. As a result, the reduced tool deflection leads to less chatter and leads to improved surface finish accuracy and longer tool life.



Rigidity value S ($\mu\text{m}/\text{kgf}$)



The rigidity value S is the amount of deflection of the holder and tool during 3D projection.

Deflection amount is proportional to the cube of the projection length³.

Length L is double \rightarrow Deflection amount S is 8 times

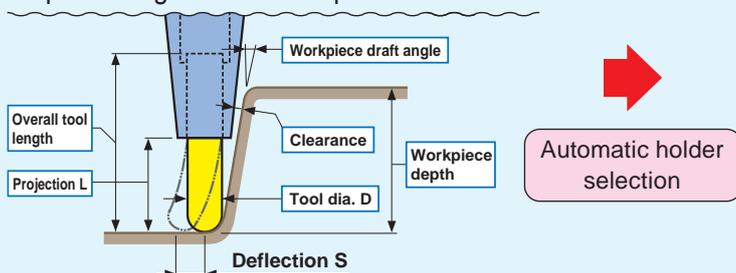
$$S = \frac{6.8 \times F \times L^3}{E \times D^4}$$

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

By converting the rigidity value S into the overhang length L/D of the carbide tool, it becomes a criterion for determining the cutting parameters.

Simply enter the information for the tool and workpiece, and the system will automatically select the optimal holder and tool overhang length for the machining process.

- Input cutting tool and workpiece information



No.	Holder	Deflection S	L/D	Projection
1	BT40-SLSA6-150cv	3.2	5.5	16.1
2	BT40-SLSA6-120cv	4.8	6.3	27.8
3	BT40-SLSA6-180cv	5.2	6.5	16.2
4	BT40-SLSA6-125-M42	5.6

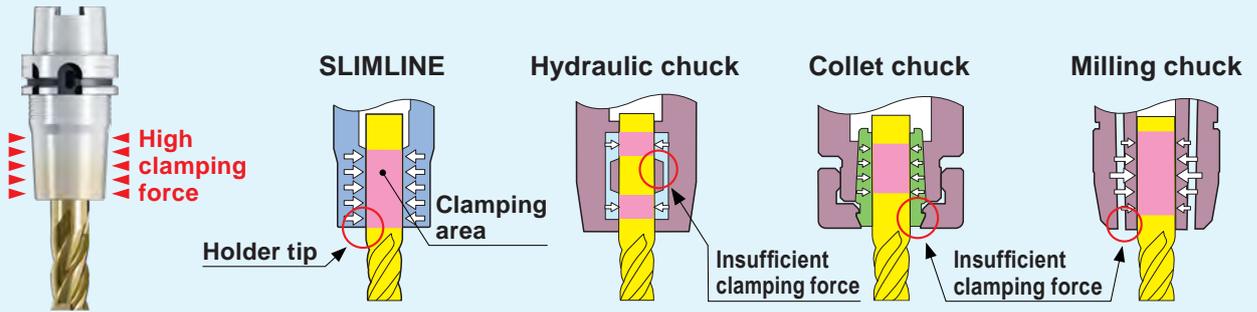
Holdings are listed in order of strength.

Output to DXF

High clamping force

Cutter won't come out during heavy-duty machining!

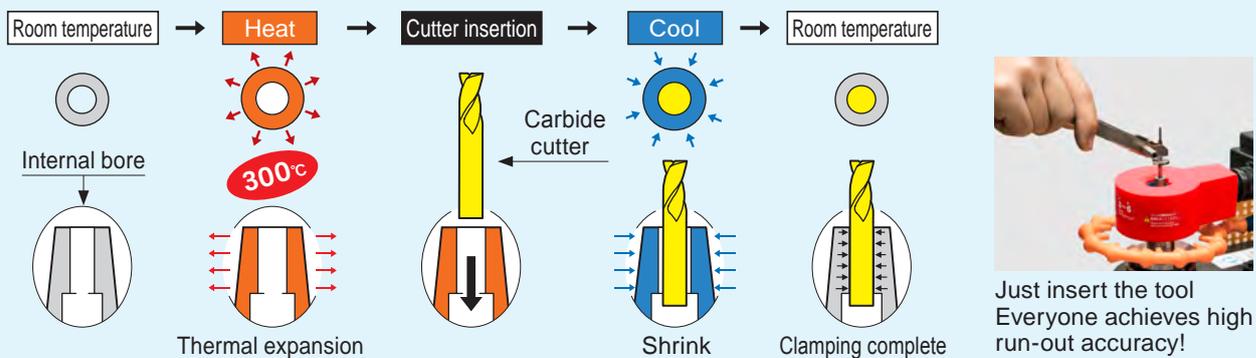
SLIMLINE clamps the tool up to the tip of the holder.



The principle of shrink-fit holders

High precision every time no matter who does the setting!

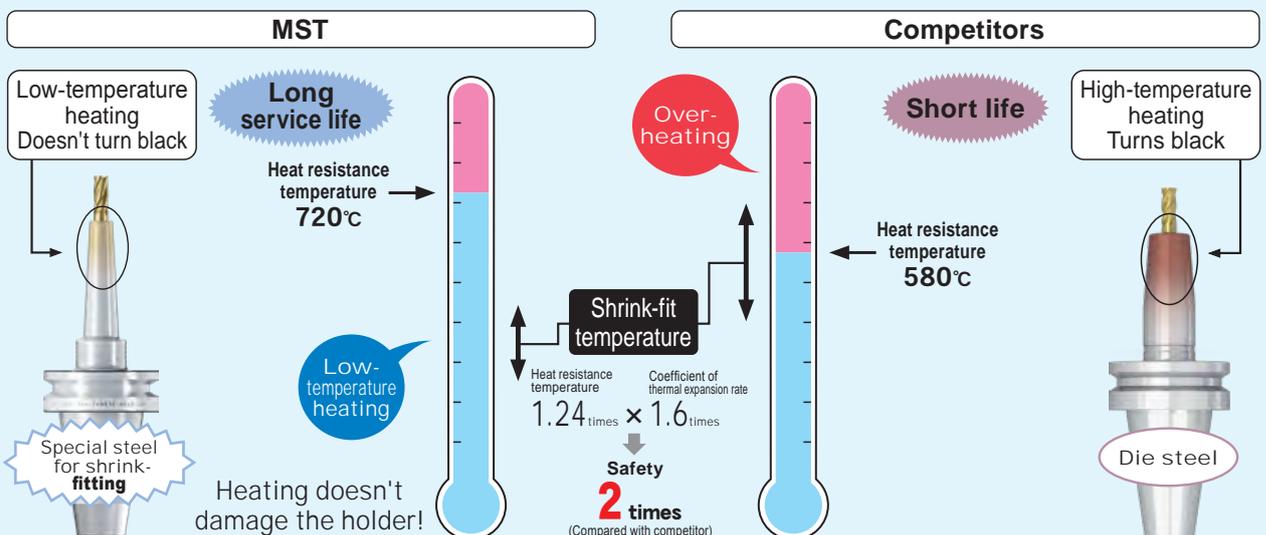
Clamps the carbide cutter firmly and precisely by heating and cooling the holder. This revolutionary holder makes use of the thermal expansion and contraction properties of the holder material, and is completely different from conventional chucking mechanisms.



Special steel for shrink-fitting

This optimal steel makes it possible to maintain the original accuracy even after 3,000 shrink-fittings!

SLIMLINE holders are made of **special steel** developed by MST that is used exclusively for shrink-fitting. Our special steel has a **thermal expansion rate 1.6 times** greater than that of ordinary steel, and a **heat resistance temperature of 720°C**, making it the ideal material for shrink-fit holders. Cutters can be inserted or removed at a **low temperature** averaging **300°C**.



MONO 3°

Ideal for deep and straight wall milling applications



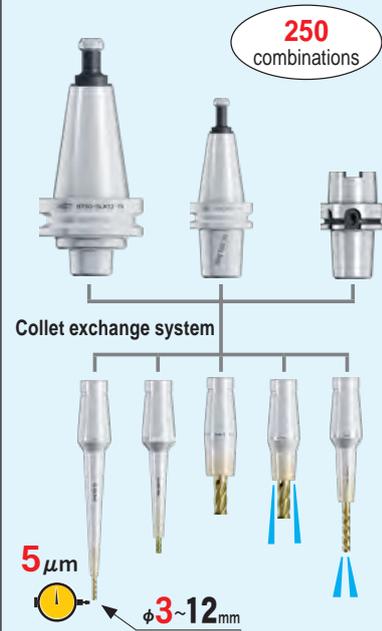
MONO CURVE

Ideal for 5-axis applications



2 PIECE type

Highly versatile



UNO BLACK UNO

Superior accuracy



HYPER VERSION

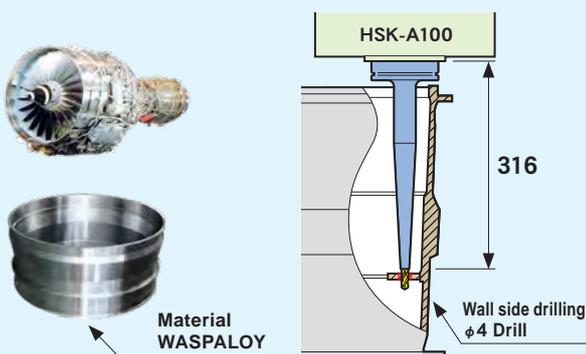
Heavy-duty machining for Endmill



Customized design

• Freely designable according to the workpiece shape.

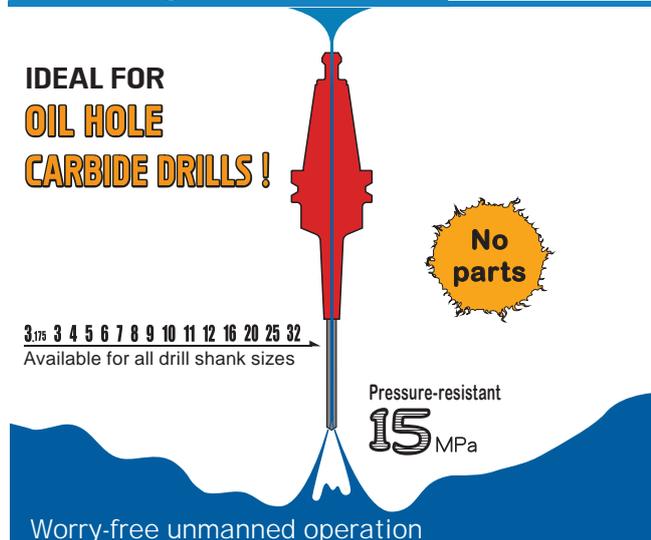
■ Jet engine Combustion chamber



Through coolant

IDEAL FOR OIL HOLE CARBIDE DRILLS!

3.175 3 4 5 6 7 8 9 10 11 12 16 20 25 32
Available for all drill shank sizes

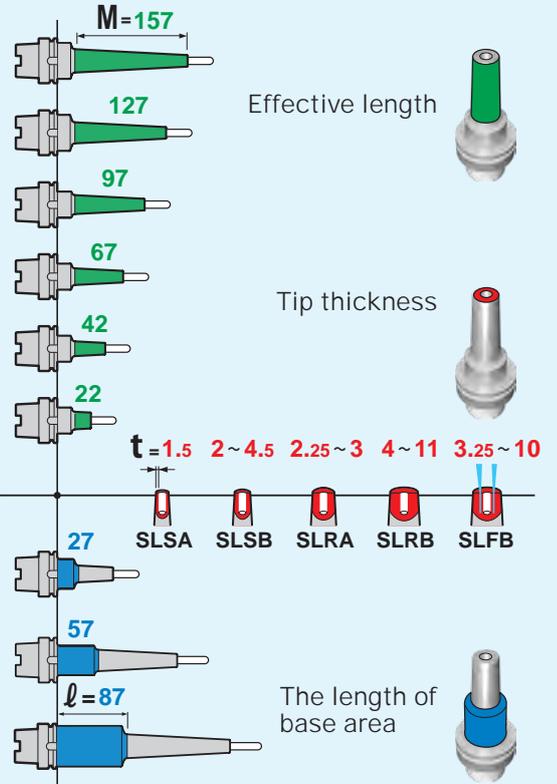
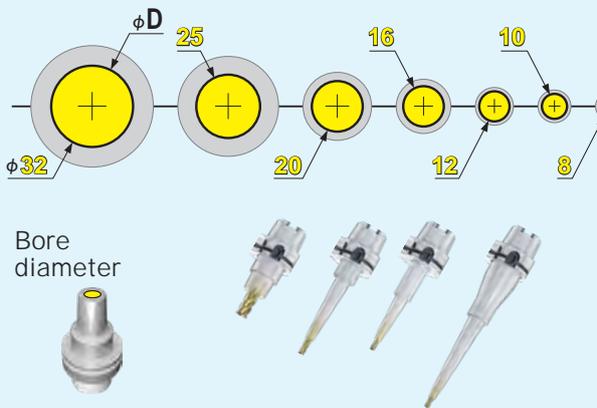
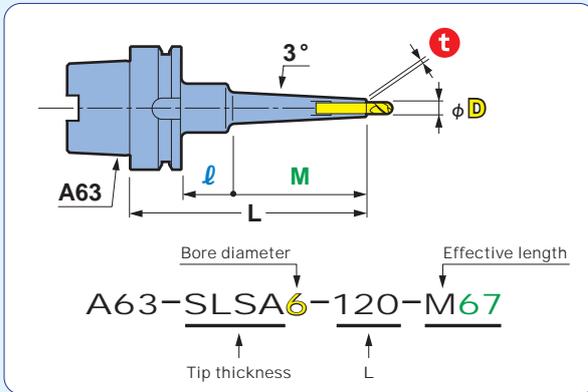


SLIMLINE has a broad range of variations.

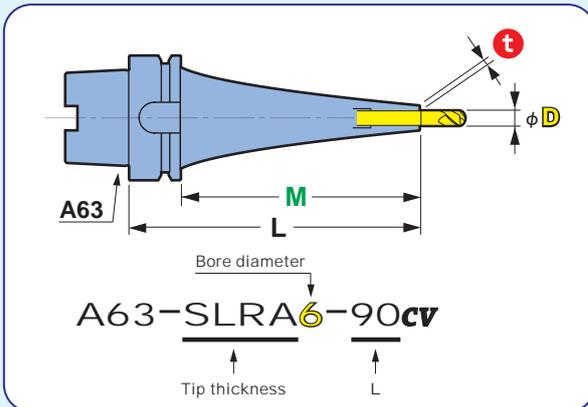
You can choose the most suitable holder for the various shapes you need to machine.

A63

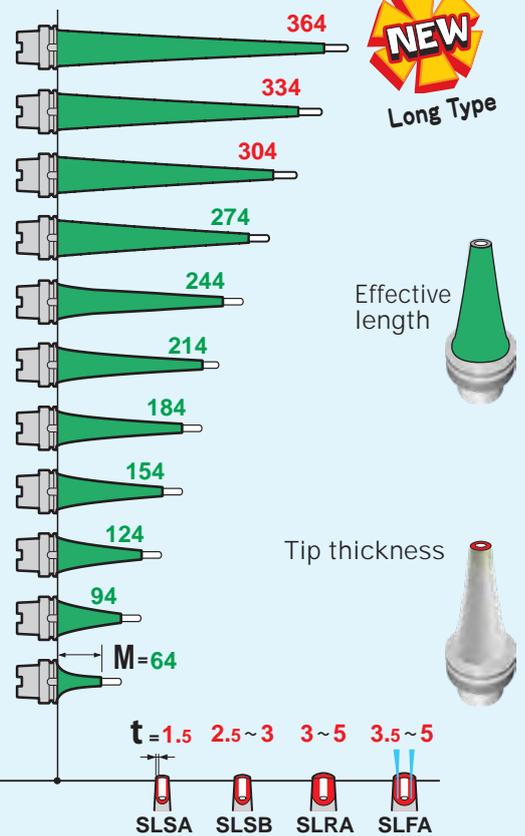
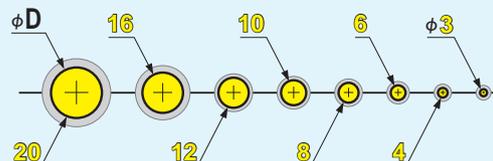
MONO 3°



MONO CURVE



Bore diameter



NEW ○ **MONO CURVE**
Long

Max. 465

Single-piece structure

3 μ m

- Single-piece shrink-fit holder
Run-out accuracy 3 μ m
- Curved design
Less affect of centrifugal force

○ **Conventional**

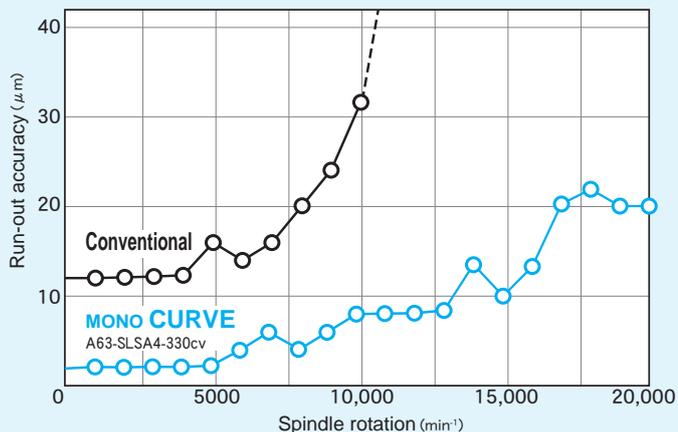
Milling chuck

Straight arbor

Many parts

Now possible to mill with small-diameter tools!
Switch from EDM to direct machining for
corner processing of large metal molds!

Run-out accuracy comparison With a gauge length of 330mm



Shrink-fit heater

We can provide different shrink-fitting devices to match your application needs!

Shrink-fit Heater **HEAT ROBO**

HOT-AIR HEATER

Heating
95~120 sec.
(Tool dia. 6mm)

Affordable

Reduces your
initial cost



Baby 3000P

Equipped with a brushless motor
Lasts 10 times longer!
(compared to conventional models)

Baby 1200S



INDUCTION HEATER

Heating
18 sec.
(Tool dia. 6mm)

Speedy heating

Improved
operating efficiency

DENJI
電磁 **5000S**
DENJI
電磁 **2500**
DENJI
電磁 **1200S**



Cost comparison

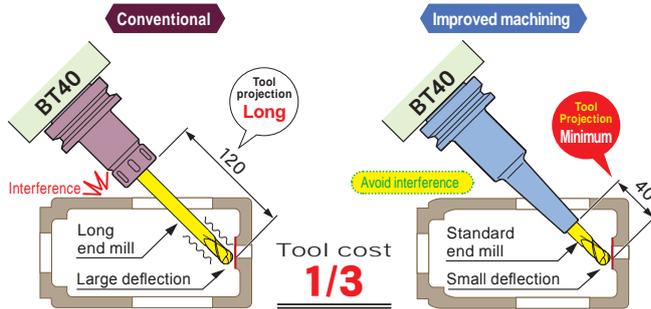
Heating operation Cost per tool (Tool dia. 6mm)	HOT-AIR HEATER Baby 3000P	INDUCTION HEATER DENJI 1200S	
Heating time	95 sec.	18 sec.	↓ 81%
Power consumption	75 Wh	6 Wh	↓ 92%
Cooling time(compressed air)	1 min.	1 min.	—
Air consumption	245 ℓ	245 ℓ	—
Operating time	3 min.	1.5 min.	↓ 50%

SLIMLINE case studies

1 Deep milling

FC250

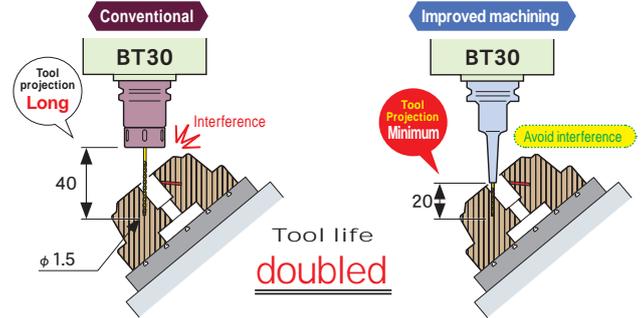
- Point**
- Switching from a long ball nose end mill to a standard ball nose end mill.
 - Holder rigidity has improved and achieved chattering-free machining.



2 $\phi 1.5$ diagonal oil hole drilling

FC300

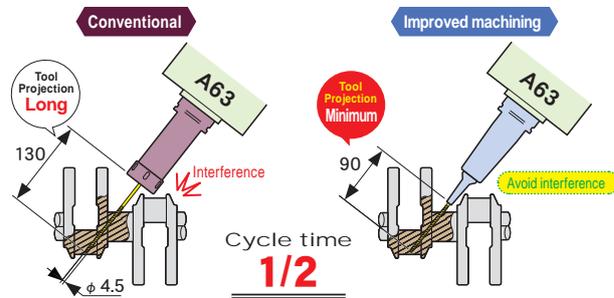
- Point**
- Switching from collet holders.
 - Doubled the tool life by minimizing drill projection length.



3 $\phi 4.5$ diagonal oil hole drilling

SCM440

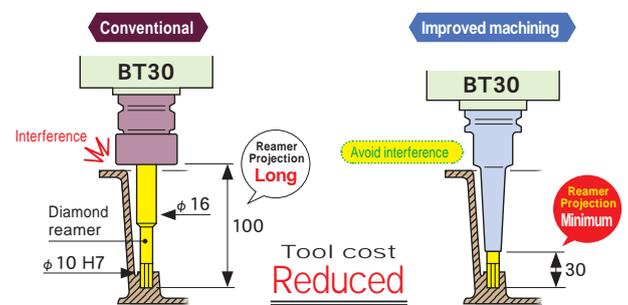
- Point**
- Switching from a combination of collet holders and special long drills to SLIMLINE and standard drills.



4 $\phi 10$ H7 Reamer (Dowel pin hole)

ADC12

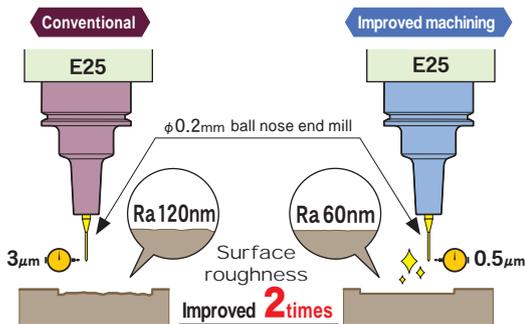
- Point**
- Switching from a combination of collet holders and long reamers to SLIMLINE and short reamers.



5 Mirror finishing

ELMAX (60HRC)

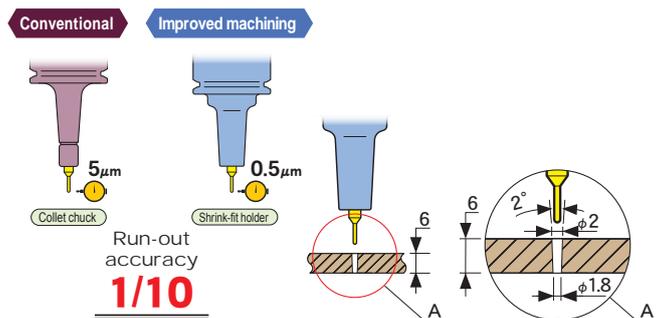
- Point**
- Axial depth of cut $1\mu\text{m}$ with SLIMLINE BLACK UNO.



6 Tapered hole process

Stainless

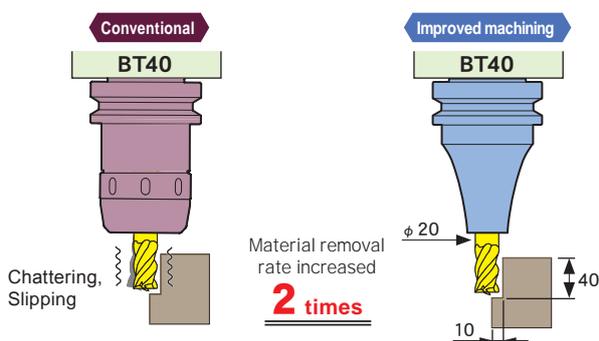
- Point**
- Switching from other company's collet holders to SLIMLINE.



7 Heavy-duty machining of difficult materials

Ti-6Al-4V

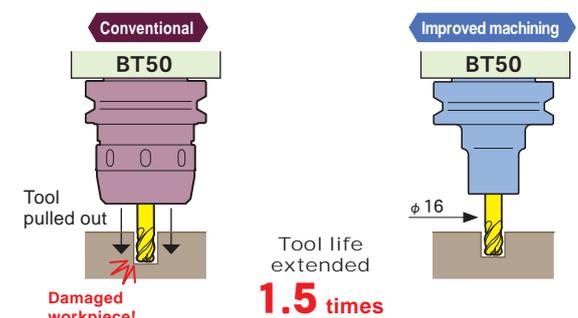
- Point**
- Switching from milling chuck to SLIMLINE Z. Doubled machining efficiency due to the anti-slip and anti-rotation mechanism.



8 Heavy grooving

FC300

- Point**
- Switching from milling chuck to Hyper version. Tool life 50% longer.

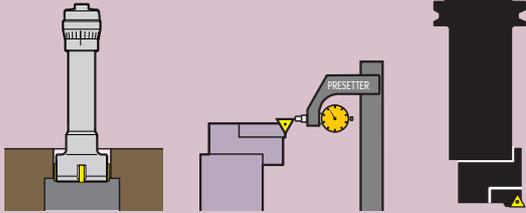


Common boring head problems...

MILL BORE solves all these problems!

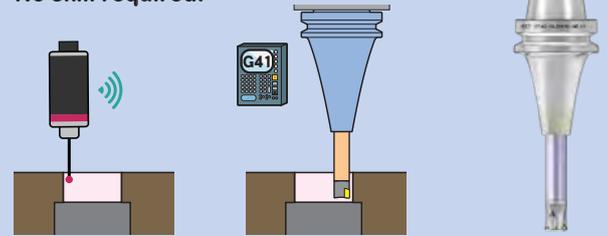
✗ Troublesome diameter adjustment ...

Requires skill and know-how
Takes a long time



Diameter adjustment not required!

Automatic measurement and compensation!
No skill required!



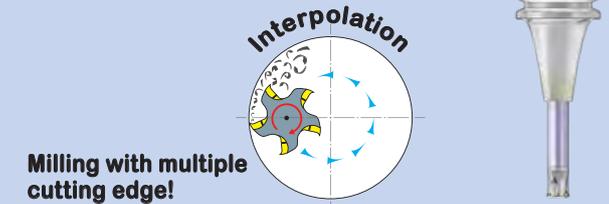
✗ Coiled chips...

Damage to the workpiece
Shortens insert life
Requires supervised operation



Cuts the chips into small pieces!

Eliminates temporary machine
down time caused by trouble
Enables unmanned and automated operation



✗ Limited choice of inserts...

Only small inserts can be used!
Difficult to cut hard materials



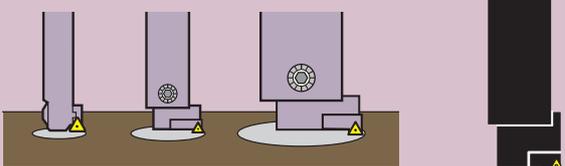
Wide selection of tools!

Sold by various tool manufacturers!
A broad line-up!



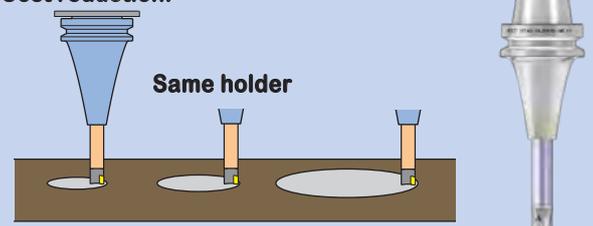
✗ Many holders required...

Occupies tool magazine pods
Too much hassle to manage
High cost



Complete with just one holder!

Reduces the number of holders needed!
Cost reduction!



MILL BORE SYSTEM

Base Holder SHRINK-FIT HOLDER SLIMLINE

A broad range of **4000** variations

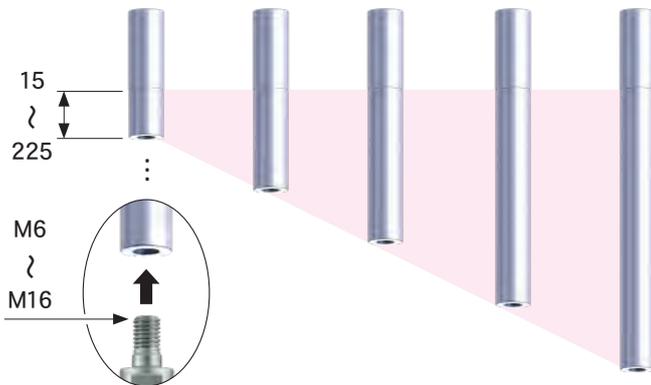


Applicable spindle size

BT ... 30/40/50
 HSK ... A50/63/100

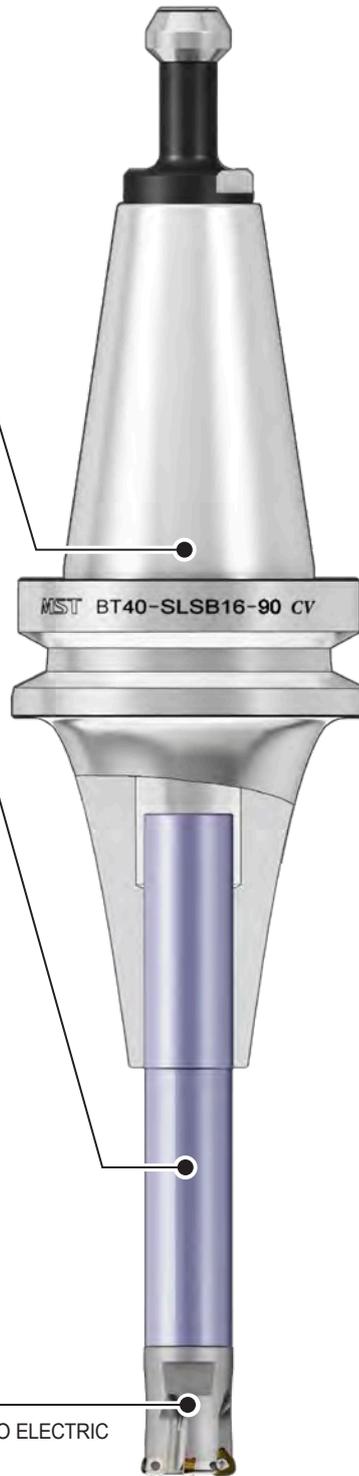
Extension arbor Carbide arbor

Less chattering **Flexural rigidity 3** times
 (Compared with steel arbor)



Milling cutter Indexable tool

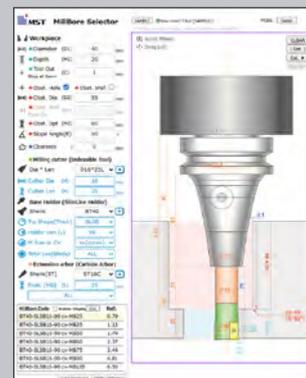
- MOLDINO • DIJET • Mitsubishi Materials • OSG • TUNGALOY • SUMITOMO ELECTRIC
- KYOCERA • ISCAR • Seco Tools • TaeguTec ...



MILL BORE selection software

To achieve high-efficiency boring, it is necessary to select the optimal combination of a base holder (Shrink-fit holder SLIMLINE) and an extension arbor (carbide arbor) that matches the shape of the workpiece. MILL BORE selection software is available through MST. Please find your best combination.

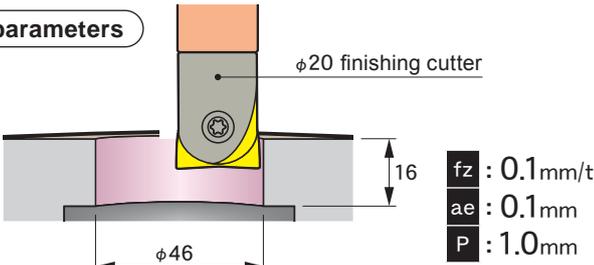
※ Please refer to the MILL BORE catalog for usage instructions.



MILL BORE Test Data

Even if the machine, the number of years in operation, and the workpiece material differ, it is possible to complete your machining within the general tolerance of boring processing using the MILL BORE.

Cutting parameters



φ20 finishing cutter

φ46

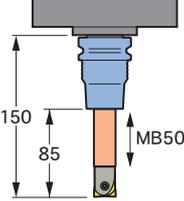
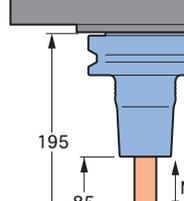
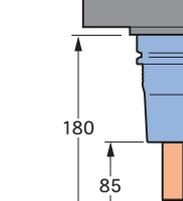
16

fz : 0.1mm/t
ae : 0.1mm
P : 1.0mm

General tolerance of boring application

Roundness (μm)	Below 10~20
Cylindricity (μm)	Below 10~20
Surface roughness Rz (μm)	Below 6.3

Case study by machine (Workpiece material : FC250)

Machine	Spindle	BT30	BT50	HSK-A63
	Years in operation	2	15	6
	Holder	BT30-SLRA20-65-M22-MB50	BT50-SLRB20-110-M42-MB50	A63-SLRB20-95-M42-MB50
	Target dimension φ46.000			
	Vc (m/min)	350		
	Finished dimension (mm)	φ46.001	φ45.999	φ46.000
	Roundness (μm)	4.5	6.1	3.9
	Cylindricity (μm)	5.1	7.0	4.5
	Surface roughness Rz (μm)	1.2	2.8	1.3

Case study by material (BT50 spindle, operated for 10 years)

Workpiece material	FC250	S50C	A5052
Vc (m/min)	350	300	600
Machining time(sec.)	76	88	44
Finished dimension (mm)	φ45.996	φ46.001	φ45.998
Roundness (μm)	5.5	4.0	3.7
Cylindricity (μm)	6.2	4.5	5.7
Surface roughness Rz (μm)	2.4	2.2	0.3
Machined surface			

ANGLE HEAD HALF

Optimal design for drilling and tapping

Affordable
2,300USD~

Speedy
Shorter
delivery time

Lightweight
1.8kg~

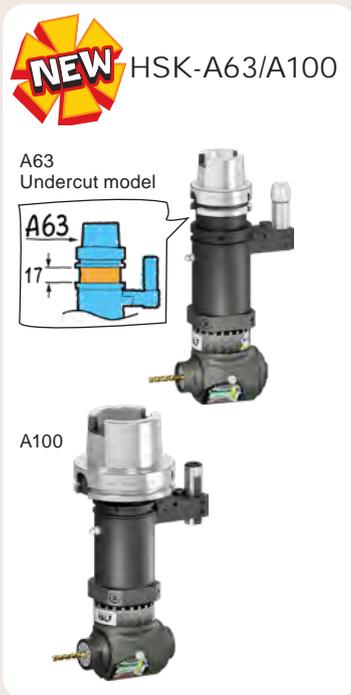
Compact
φ36~

Repair it
yourself

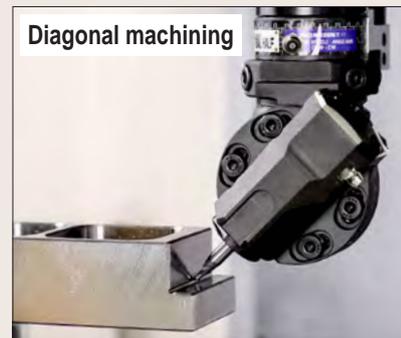
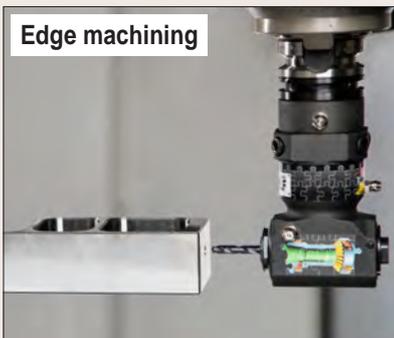
**NEW
CONCEPT**

Approximately 80% of the work done using angle heads is drilling and tapping.
The Angle Head HALF has been optimally designed to be as rigid and precise as possible (1/2 the rigidity), and it is also

**Affordable (Price :1/2),
Quick delivery (Lead time: 1/2),
Lightweight (Weight :1/2).**



Angle Head HALF enables multi-direction machining, such as internal and side machining of the workpiece, without changing the set-up.



Common Angle head problems ...

ANGLE HEAD HALF solves all these problems!

✗ Expensive...
5,000~7,000 USD



Affordable !

2,300 USD ~



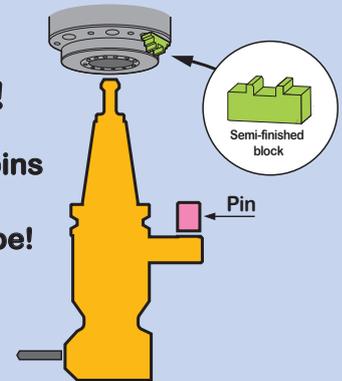
✗ Lead time
Doesn't arrive in time

Out of stock ...
The positioning block
needs to be attached
to the machine...



**Shorter
delivery time !**

We have various pins
to accommodate
blocks of any shape!



✗ Heavy ! Large !

Cannot use with ATC...
Cannot use with compact
machining centers



Light weight ! Compact !

Can be used on BT30
machining centers!



✗ Repair is not easy !

High repair cost...
Requires specialized
repair...
Takes time and effort...



You can repair it yourself !

Instruction video
available!
Commercial parts
can be used!
Fine matching or
adjustment not
required!



90° type

BT30/40/50
HSK-A50/A63/
A100

HFD/HFA
φ1~20mm

HFT
M2~16

mini type

Extra-compact head

BT30/40/50
HSK-A50/A63/
A100

HFCS
φ 3, 4, 6mm
M4, 5, 6

15.5 φ36mm

31.5

UNIVERSAL type

Any angle can be set

BT30/40/50
HSK-A50/A63/
A100

HUD/HUA
φ1~20mm

HFT
M2~12

120° 120°

Compact design

Type	CODE	Q	A	B
90° type	HFD 7	72	68	38
	HFD12	98	93	58
	HFT 4	75	73	38
	HFT 6	97	92	58
	HFA10	90	87	38
	HFA20	119	111	64
	HFT12	97	96	58
		116	115	
mini type	HFCS6	36	31.5	31

ATC possible on BT30 machine

BT30
1.8kg

Easy installation

Standardized positioning pins make it possible to use the Angle Head HALF with existing positioning blocks and with any machine.

Positioning block

Groove type Taper hole type

Height-adjustable structure

Straight pin Taper pin

Positioning pin

Easy disassembly and assembly

- The number of parts is 22, which is half that of conventional angle heads.
- Fine matching or adjustment not required
- We use commercially available parts for consumable parts such as bearings, which are inexpensive and easy to obtain.
- Maintenance and repairs can be easily carried out by the customer using the instruction manual and video.

By reducing repair costs and downtime,
running cost is reduced to less than 1/10!

Easy to reassemble

Shaft

Drilling Tapping

Exchange

Angle shaft (for drilling) Angle shaft (for tapping)

Shank

Exchange

ANGLE HEAD HALF case studies

1 Pilot hole and tapping at the edge of long workpieces

- Point**
- No need to transfer to other machines or outsource.
 - Process reduction.



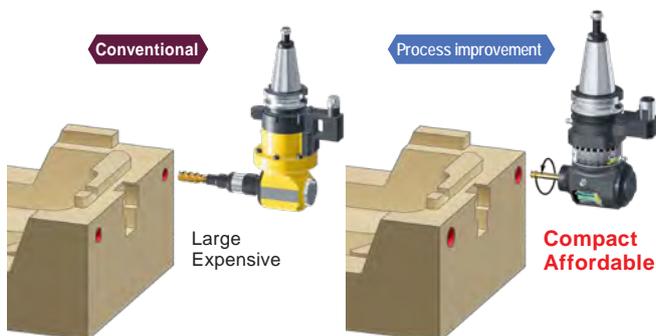
3 Chamfering

- Point**
- Also use the ANGLE HEAD HALF for chamfering after grooving or drilling done with the ANGLE HEAD HALF.



5 Helical tapping

- Point**
- Greater than M16 tap available with ANGLE HEAD HALF.



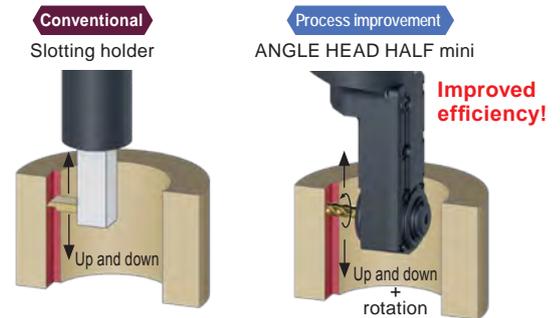
7 Cutting off

- Point**
- Switching from cutting off with an end mill.
 - Drastic reduction of operation time.



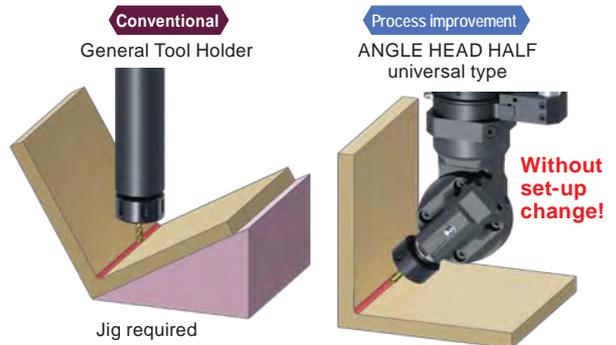
2 Internal grooving

- Point**
- Processing with a slotting holder → Integrated into machining center processing.
 - Milling reduces cycle time.



4 Relief machining

- Point**
- Universal-type, L-shaped relief machining without changing the setup.



6 $\phi 3.2$ rivet hole

- Point**
- Switching from a Manual Process to a Mechanized Process.
 - Reduced cycle time, improved positioning accuracy and reduced operating costs.



8 Horizontal hole

- Point**
- ANGLE HEAD HALF is affordably priced, reducing initial costs even when purchasing one for each of the four directions.



- Other brand's angle head
3,250USD × 4units = 13,000USD
- MST's angle head HALF
1,300USD × 4units = 5,200USD

ANGLE HEAD

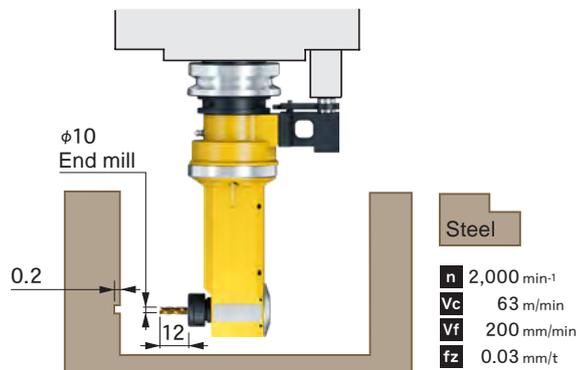
Manufactured for
30,000 units
40 years

MODULAR type

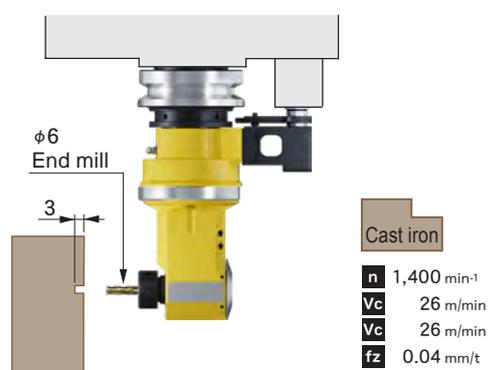
Shank and head can be freely combined



Case study ① (Internal grooving)



② (External grooving)

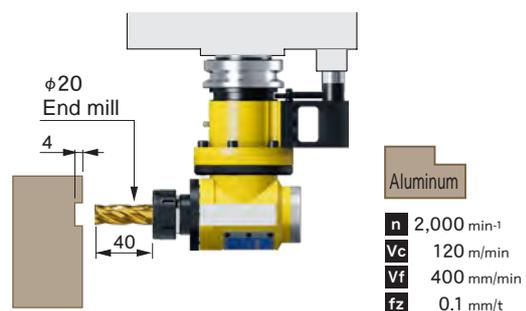


SOLID type

A popular and highly-versatile type



Case study (External grooving)

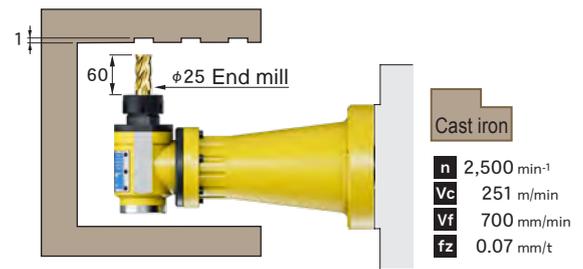


FLANGE type

Directly mounting on spindle enables heavy-duty milling



Case study (Internal machining)

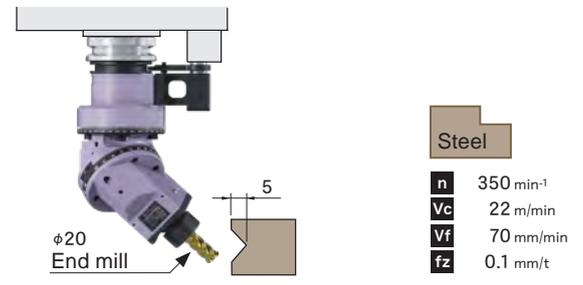


UNIVERSAL type

Cutting angle can be adjusted arbitrarily



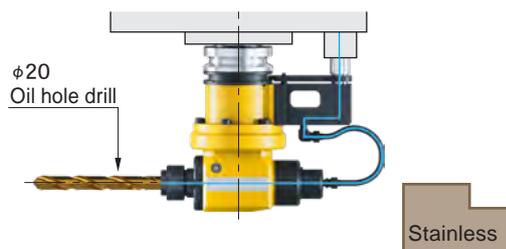
Case study (Diagonal machining)



Custom-made models

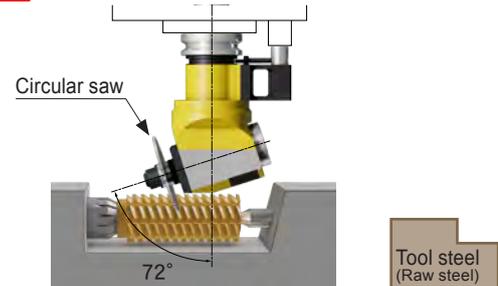
1 Deep drilling with oil hole drill

Point • Achieved superior machining accuracy and surface quality of deep hole drilling using an oil hole drill.



2 72-degree machining

Point • Oil-mist lubrication design provides long-time continuous operation.



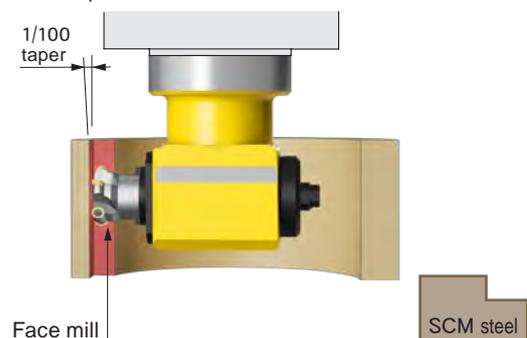
3 Internal grooving

Point • Elongated the effective length to 1,000mm by combining standard Flange mount type angle head and extension.



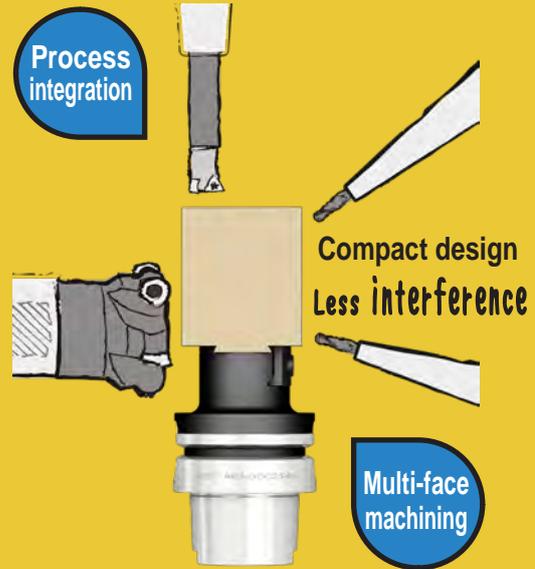
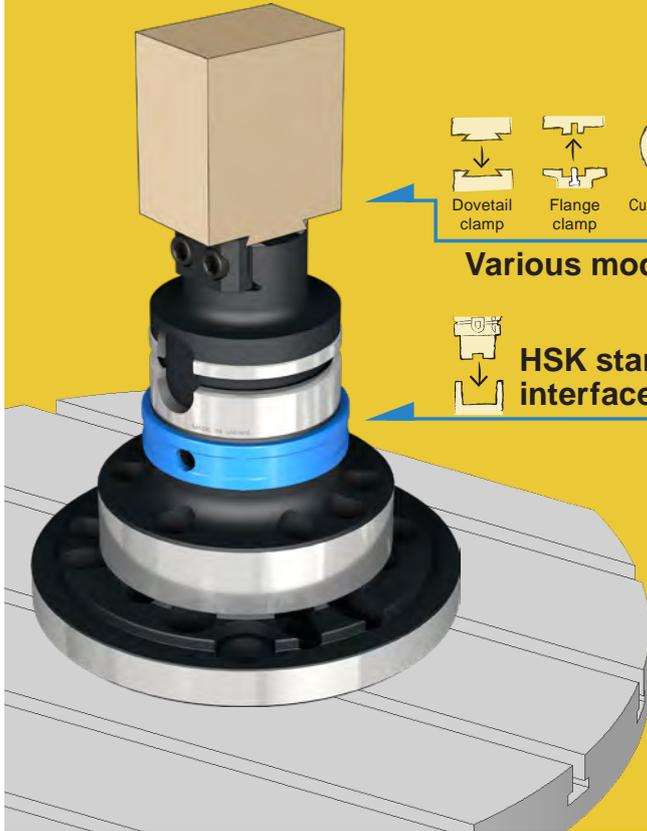
4 1/100 taper key groove machining

Point • Mechanizing conventional slotting and manual finishing processes.

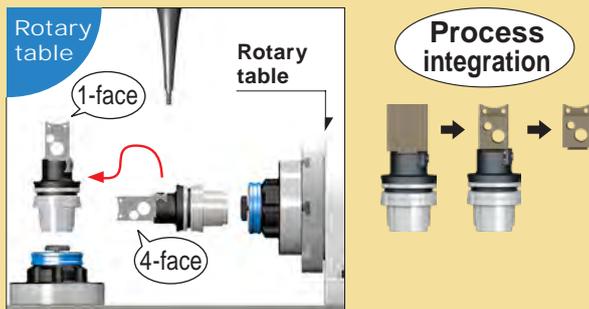


Workpiece clamping system SMART GRIP

This fixture creates a new machining process!



Multi-face milling with single 3-axis machine



Compatible with automated and robotic handling

The same robotic arm can be used even if the workpiece is changed.

Compatible with a wide variety of workpieces using a single system.



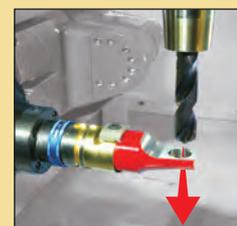
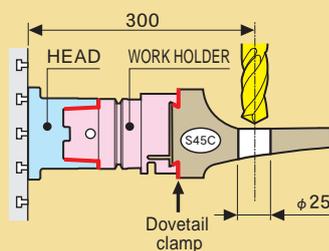
Quick workpiece exchange

Clamping (5 sec.), unclamping (5 sec.)



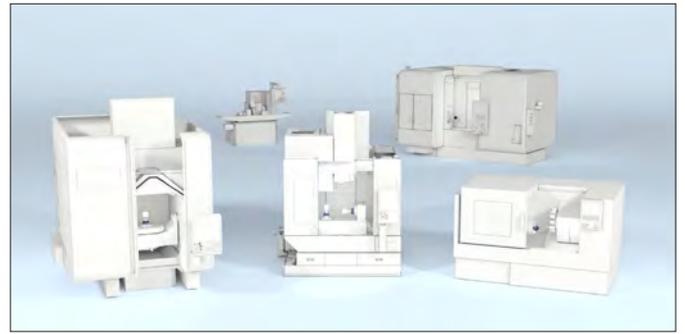
Rigidity

HSK (2-face contact interface) and dovetail clamping

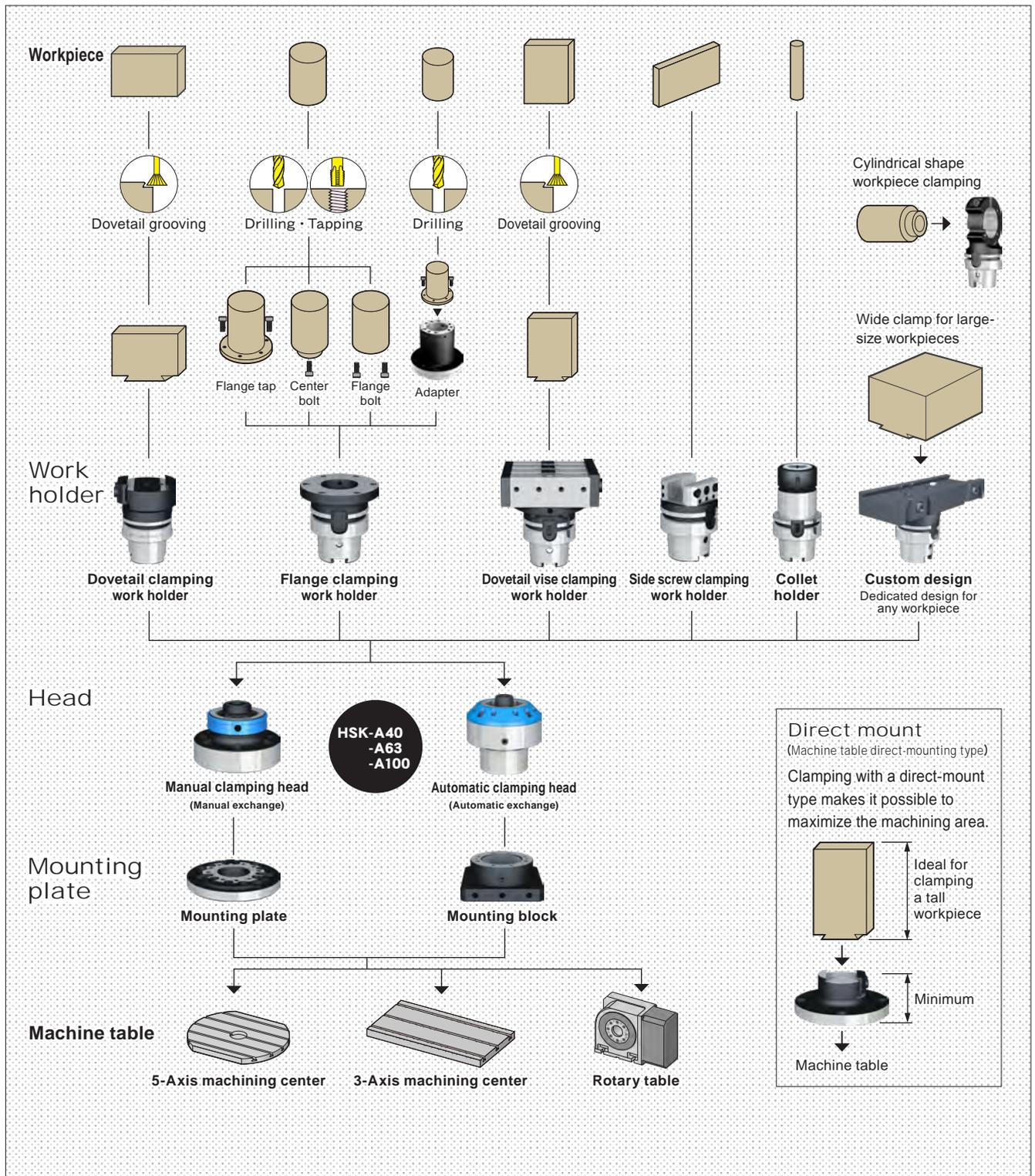


Can be used on any machine

The SMART GRIP, which enables high-precision workpiece exchange with the touch of a button, can be used with all kinds of machines, including 5-axis and 3-axis machining centers, multi-tasking, turning, grinding and coordinate measuring machines.

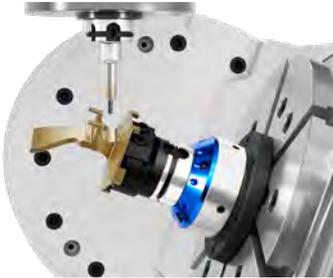


SMART GRIP system



1 5-axis machining

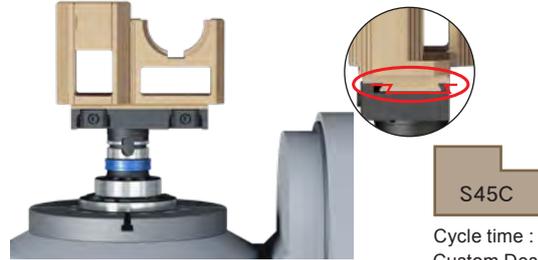
- Point**
- The dovetail clamping method clamps the bottom of the workpiece compactly and firmly. It is ideal for multi-face machining and heavy-duty milling using single chucking.



A5052
Cycle time : 13 min.

2 5-axis machining of a large-size workpiece

- Point**
- Uses a wide dovetail holder to clamp a large-size workpiece firmly.
 - A specially designed adapter is used to retrofit the dovetail section to the workpiece, eliminating the need for dovetail processing and material waste.



S45C
Cycle time : 83 min.
Custom Design

3 5-axis machining of irregularly shaped workpieces

- Point**
- By attaching a plate jig to the flange clamp holder, it can be used for workpieces of different shapes. This reduced the set-up time dramatically.



FC250
Cycle time : 13 min.

4 5-axis machining

- Point**
- The dovetail clamping method clamps the workpiece at the bottom.
 - Compact and strong clamping.
 - Improved accessibility of tools, allowing for complete processing of even the smallest details.



FCD450
Cycle time : 100 min.
Custom Design

5 5-axis machining of cylindrical workpieces

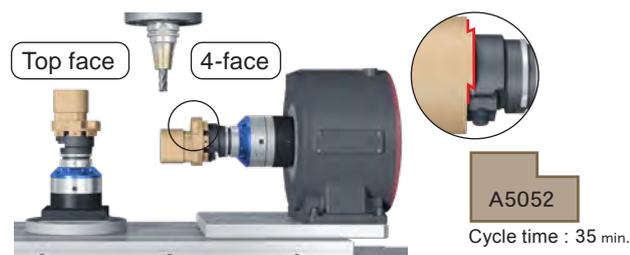
- Point**
- Customized the holder to clamp a cylindrical shape workpiece.



FCD450
Cycle time : 50 min.
Custom Design

6 4-face machining with 3-axis machine and rotary table

- Point**
- The dovetail clamping method clamps the workpiece at the bottom. Compact and strong clamping. Ideal for multi-sided machining and heavy cutting with one chucking.



A5052
Cycle time : 35 min.

7 4-face machining with 3-axis machine and rotary table

- Point**
- The flange clamp method is used to clamp large cylindrical shapes.
 - No interference by clamping the bottom of the workpiece.



SCM415
Cycle time : 128 min.

8 5-axis machining

- Point**
- Created a dovetail on lost-wax casted material.
 - The dovetail clamping method clamps the bottom of the workpiece compactly and firmly.



SUS304
Cycle time : 83 min.

Cutter arbor with solid carbide core FMH RIGID type

Reduces the chattering and achieves longer insert life
Rigid body enables high cutting depth and high-feed cutting

RIGID

Max. 400

Built-in large-dia. carbide alloy

Firm clamping of the thick portion of the carbide shank by shrink-fitting

Steady processing for deep standing wall machining

Effective length 310mm

3 times the machining efficiency!

Compatible with any brand of cutter (FMH standard)

Coolant-through



φ40~100

Holder	Conventional BT50-FMH22-60-300	FMH RIGID type BT50-FMH22-60-315H
ap(mm)	0.1	0.3
Cutting amount	14cc/min	42cc/min

- Application Shoulder milling
- Material S50C (Raw material)
- Cutting speed 180m/min (S 1,146 min⁻¹)
- Feed 4,584 mm/min (0.8 mm/t)

DETa-1 Collet Holder

2mm collapsibility with just one collet!

DTA

Easy operation
Nut-tightening type

DTB

Compatible with high-speed cutting
High cost performance

DTE

Coolant-through compatible



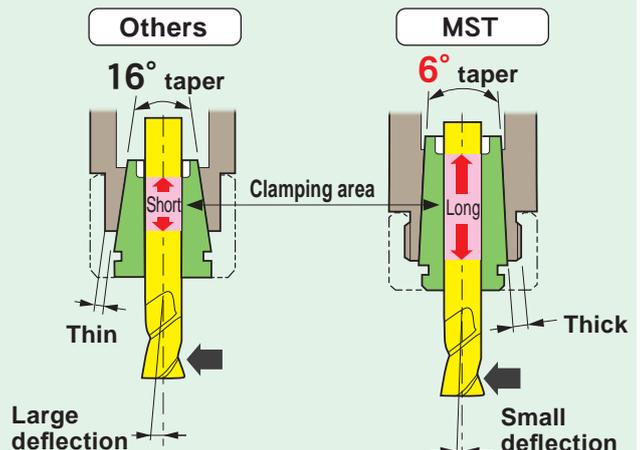
12 segments
High-precision chucking

COLLET HOLDER

The most versatile tool holder!



- Ideal taper angle for steady Endmill machining



Maintenance Products

Tool set-up station **6S DESK**

Ensures safe and comfortable tool set-up!
Improves the work environment in the factory!



Tool washing machine **CLEAN BOX**

Clean the tool holders and the cutters to maintain high accuracy for a long period of time!



For tool holders and cutting tools
CLEAN BOX



For tool holders
CLEAN BOX baby

STAR DUST

Clean the machine spindle taper to achieve high-precision machining



Spindle run-out measuring tool

TEST BAR **CHECKMATE**

Achieve high-precision machining by managing the run-out accuracy of the machine spindle!



Comes with practical tools

MAINTENANCE VIDEO

Educational video
Watch video and get ready to carry out maintenance immediately!



For educational purposes

Visit MST and have a factory tour!

The factory tour allows you to see everything inside our factory and office.



We will plan a **specific tour upon your request.**



Various automated systems, such as process integration and AGV



Live cutting demonstration using a machining center

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