



© hfng - Fotolia.com

Automotive Engine-Parts Tooling



Cylinder Block Tooling

»» Cylinder Block Tooling (Aluminum)

- »» Rough and Finish Milling of Top/Bottom, Front/Back Surfaces ... P 4
- »» Counter Sink Mill for Bearing Caps P 4
- »» Journal Width Cutting Mill P 4
- »» Boring - Roughing P 5
- »» Boring - Finishing and Chamfering..... P 5
- »» Crank Hole Boring - Finishing P 5
- »» Drilling P 6

»» Cylinder Block Tooling (Cast iron)

- »» Roughing of Top/Bottom, Front/Back Surfaces..... P 7
- »» Finishing of Top/Bottom, Front/Back Surfaces..... P 7
- »» Counter Sink Mill for Bearing Caps P 8
- »» Journal Width Roughing Mill P 8
- »» Journal Width Finishing Mill P 8
- »» Boring - Roughing P 9
- »» Boring - Finishing and Chamfering..... P 9
- »» Crank Hole Boring - Finishing P 9
- »» Drilling P10

Cylinder Head Tooling

»» Cylinder Head Tooling (Aluminum)

- »» Roughing and Finishing of Mating Surfaces P11
- »» Camshaft Boring P11
- »» Valve Seat Chamfering and Finishing..... P12
- »» Drilling P12

»» Cylinder Head Tooling (Cast iron)

- »» Roughing and Medium Finishing of Mating Surfaces... P13
- »» Roughing and Finishing of Mating Surfaces P13
- »» Camshaft Boring P14
- »» Valve Seat Chamfering and Finishing..... P14
- »» Drilling P15

Crank Shaft Tooling

»» Crank Shaft Tooling

- »» Milling Both Ends / Centering..... P16
- »» Front and Rear Shaft / Journal Turning..... P16
- »» Front and Rear Shaft / Journal Turning..... P17
- »» Pin / Journal Milling P17
- »» Pin / Journal Milling P18
- »» Pin / Journal Grooving..... P18
- »» Pin / Journal Milling Fillet Grooving..... P19
- »» Front and Rear Shaft Turning / Broaching P19
- »» Pin / Journal Oil Hole Drilling P19
- »» Drilling P20
- »» Reference Surface Milling P21

Cam Shaft Tooling

»» Cam Shaft Tooling

- »» Milling Both Ends / Centering..... P22
- »» Turning of Shaft, Journal, and Pins..... P22
- »» Drilling of Main and Other Holes P23
- »» Cam Milling P23

Tooling Lineup

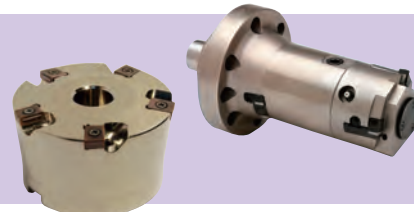
High-speed Cutter for Aluminum RF Type /
Aluminum Machining Cutter SRF Type

P24-25



Cylinder Bore Cutter

P26-27



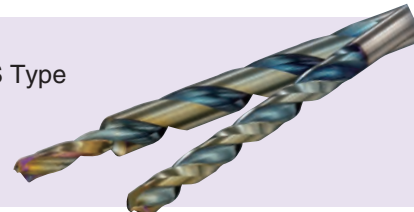
Self-guided Reamer

P28-29



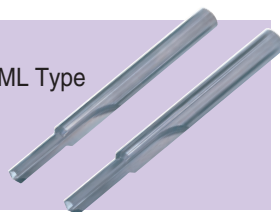
Drilling for Aluminum
Super MultiDrill NHGS Type

P30-31



Drilling for Aluminum
SUMIDIA Drills DAL Type/DDL Type/DML Type

P31



High-Feed Mill For Cast Iron
SEC-GOALMILL Series

P32 to 35



Cutter for High-Speed Cast Iron Milling
SUMIBORON RM Type

P36-37



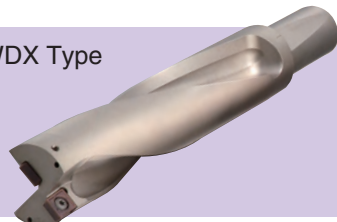
Cutter for High-Speed Finishing of Cast Iron
BN Finish Mill

P38-39



Indexable Drills SumiDrill WDX Type

P40-41



Super MultiDrill GS Type/HGS Type

P42-43



Super MultiDrill XHT Type/PHT Type

P44-45



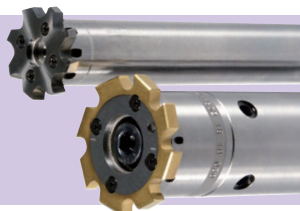
Valve Seat Boring Cutter
VSR Cutter+Reamer

P46-47



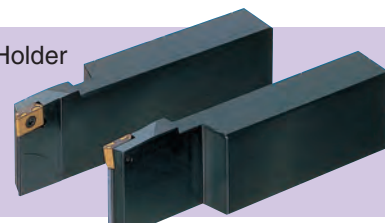
Indexable Reamer
SumiReamer SR Type

P48-49



SEC-XD Type Tool Holder

P50-51



Pin Milling Cutter

P52 to 55



Special Tool Design Examples P56 to 60

Rough and Finish Milling of Top / Bottom, Front / Back Surfaces

SEC-High-Feed Mill APV Type



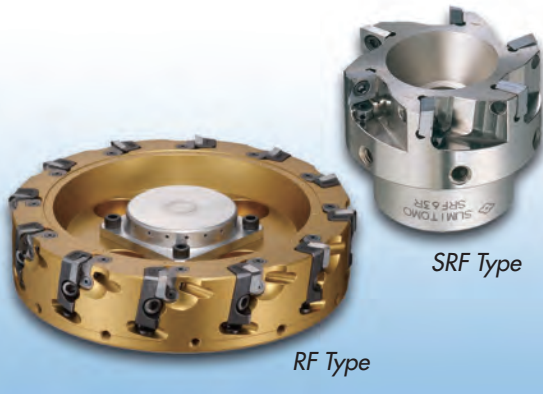
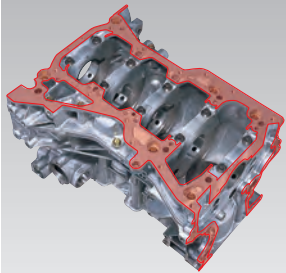
- +18° axial rake provides reliable cutting performance for milling work from rough cuts to finishing
- Edge reference cutter holds run-out within 5 to 10 μm to ensure consistent surface roughness.
- Combined with AURORA coated (DLC) inserts for greatly improved adhesion resistance.
- Economical behind-wedge clamp design is simple and uses fewer parts.

Recommended Cutting Conditions

V_c = 400 to 800m/min
 f_z = 0.1 to 0.3mm/t
 a_p = 3mm or less
 Wet

Aluminum Machining Cutter SRF Type / High-speed Cutter for Aluminum RF Type

P.24



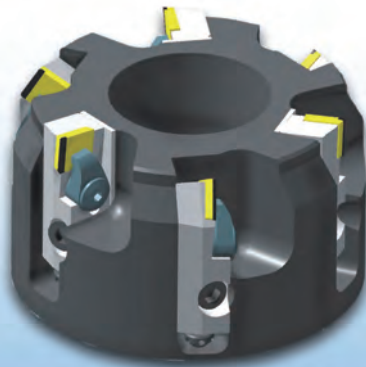
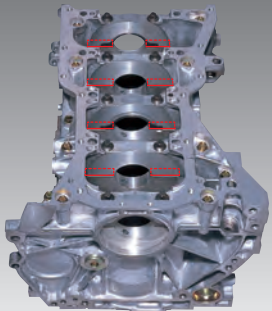
- Performs rough to finish (rough: carbide, finish: SUMIDIA), or rough and finish at the same time by exchanging inserts.
- The RF Type is made from aluminum alloy for a lightweight body that reduces spindle load during high spindle speeds, and shortens tool changing time.
- Cartridges can be assembled off-line and exhibit only 10 μm of run-out when attached.
- Anti-centrifugal force design to prevent inserts from dislodging from cutter.
- To prevent warping, wedges are not used in the cutter construction
- SUMIDIA wiper insert leaves a surface roughness of Rz 0.8 (μm) or less.
- AURORA coated (DLC) inserts and PCD inserts may also be used.

Recommended Cutting Conditions (SUMIDIA)

(Si content of 13% or less/more than 13%)
 V_c = 2,000 to 5,000/400 to 800m/min
 f_z = 0.05 to 0.2mm/t
 a_p = 3mm or less
 Wet

Counter Sink Mill for Bearing Caps

Special SUMIDIA Cutter



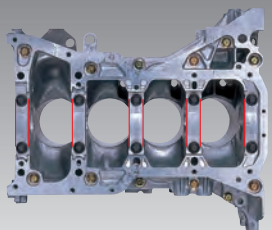
- Special cutting edge design makes it suitable for mirror finishing of aluminum alloys.
- Uniquely designed clamping system enables fine adjustment for precise run-out.
- Also features highly rigid cutter body suitable for roughing.
- SUMIDIA coating delivers superior fracture resistance for stable and long tool life.

Recommended Cutting Conditions

V_c = 400 to 3,000m/min
 f_z = 0.05 to 0.2mm/t
 a_p = 3mm or less
 Wet

Journal Width Cutting Mill

Special Side Cutter



- Uses inserts with chipbreaker for good cutting performance and low cutting resistance.
- Achieves superior cutting performance and adhesion resistance when combined with AURORA coated (DLC) inserts.
- SUMIDIA inserts may also be used.

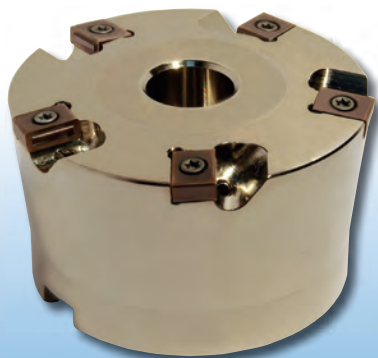
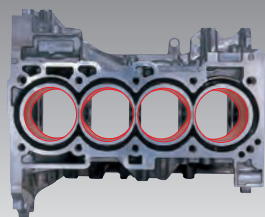
Recommended Cutting Conditions

V_c = 200 to 1,000m/min
 f_z = 0.05 to 0.2mm/t
 a_p = 3mm or less
 Wet

Boring - Roughing

Rough Boring Cutters

P.26



- Inserts with optimized chipbreaker and cutting edge layout reduces resistances and chattering.
- Economical, 8 cornered insert.

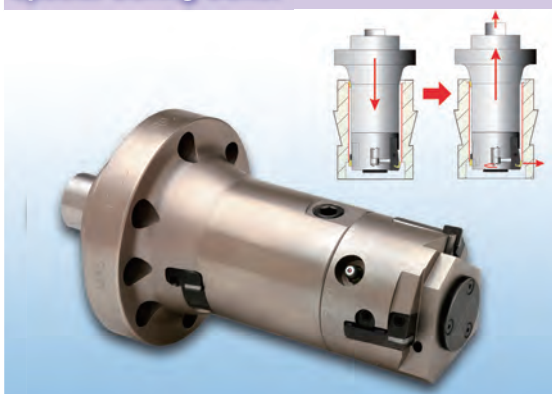
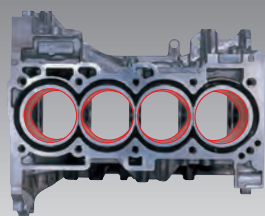
Recommended Cutting Conditions

$v_c = 80$ to 200m/min
 $f_z = 0.1$ to 0.3mm/t
 $a_p = 3\text{mm}$
 Wet

Boring - Finishing and Chamfering

Special Boring Cutter

P.58



- Finishing cutter by Sumitomo's Master Tool brand.
- Draw bar activated cartridge performs medium finish on plunge and finish on pull out.

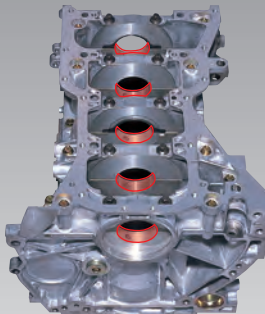
Recommended Cutting Conditions (Carbide/SUMIBORON)

$v_c = 100$ to $250/500$ to $1,200\text{m/min}$
 $f_z = 0.05$ to $0.25/0.08$ to 0.25mm/t
 $a_p = 0.5\text{mm}$ or less
 Wet

Crank Hole Boring - Finishing

Line Boring Bar

P.58



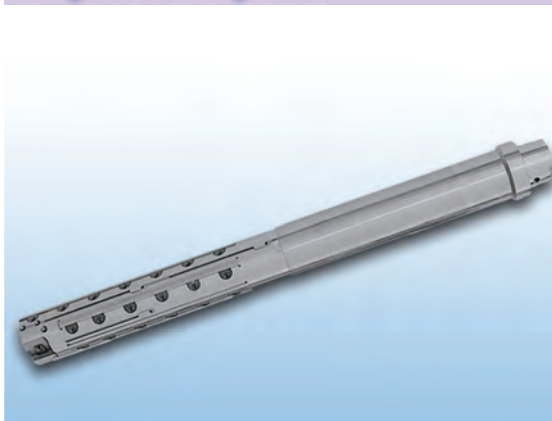
- Allows simultaneous finishing of all journal portions along the crank shaft hole.
- Same bar can be used for continuous medium finishing and finishing.
- Can be made with oil holes and HSK mounting system.
- Use either carbide or steel line boring bars depending on length and diameter.

Recommended Cutting Conditions (Carbide/SUMIDIA)

$v_c = 100$ to $200/200$ to 500m/min
 $f = 0.05$ to 0.15mm/rev
 $a_p = 0.5\text{mm}$ or less
 Wet

Self-guided Boring Bars

P.28



- Self-guided to allow boring of all journal portions along the crank shaft hole in a machining center.
- Features clamp-on carbide pad for easy maintenance.
- Suitable for high-speed, high-precision machining.

Application Examples

$\phi 54$, $N=3,000\text{m}^{-1}$, $f=0.18\text{mm/rev}$,
 $a_p=0.25\text{mm}$

Surface roughness $Rz0.6$ (μm), concentricity $1.50\mu\text{m}$

Coaxility $\phi 3\mu\text{m}$ (equivalent to 2J, 3J, and 4J based on scale of 1J to 5J)

Recommended Cutting Conditions

$v_c = 200$ to 600m/min
 $f = 0.05$ to 0.20mm/rev
 $a_p = 0.5\text{mm}$ or less
 Wet

Drilling

Super MultiDrill NHGS Type

P.30

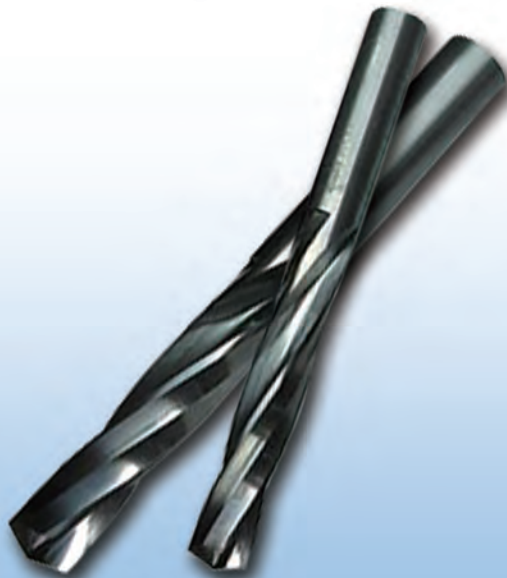


- Excellent for high efficiency drilling.
- Sharp helix angle and optimized cutting edge lowers thrust for high efficiency drilling.
- Uses AURORA coating (DLC) for improved adhesion resistance and stable tool life.
- Features double margins for drilling where precision is required.

Recommended Cutting Conditions

$v_c = 80$ to 200 m/min
 $f = 0.1$ to 0.35 mm/rev
 Wet

Hyper Burnishing Drill HPD Type



- Reduced machining load affords significantly longer tool life.
- Drastically reduces thrust loads.
- Four-point support for high circularity.
- 15° helix angle delivers excellent chip evacuation and low fracture rate for stable drilling performance at high feeds.

Recommended Cutting Conditions (Carbide)

$v_c = 50$ to 150 m/min
 $f = 0.05$ to 0.2 mm/rev
 Wet

SUMIDIA Drills DAL Type / DDL Type / DML Type

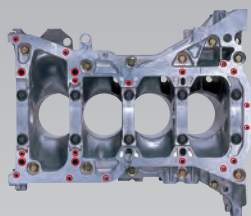
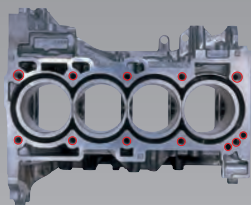
P.31



- Cutting edge uses SUMIDIA for stable drilling performance and longer tool life.
- High precision **DAL Type** is suitable for drilling holes of IT class 7 to 8, while the general **DDL Type** is suitable for drilling holes of IT class 11 to 12.
- **DML type** is the DDL type with a chamfering edge allowing it to drill and chamfer simultaneously.

Recommended Cutting Conditions

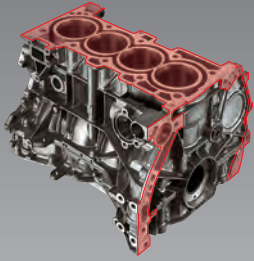
$v_c = 80$ to 250 m/min
 $f_z = 0.05$ to 0.2 mm/rev
 Wet



Roughing of Top / Bottom, Front / Back Surfaces

High-Feed Cutter for Cast Iron Goal Mill GRV Type

P.32



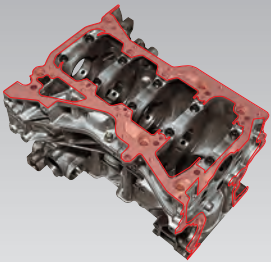
- Approach Angle 45°
- Fine tuning mechanism uses elastic deformation to make run-out adjustment easy. Holds run-out of cutting edge within 2 μm.
- No skill required to preset.
- Uses inserts with chipbreakers for low cutting resistance.

Recommended Cutting Conditions

v_c = 80 to 250m/min
 f_z = 0.1 to 0.3mm/t
 a_p = up to 5mm
 Dry

SUMIBORON High-Efficiency Mill RM Type

P.36



- Uses high strength SUMIBORON inserts for use in high speed, high efficiency machining applications.
- Economical, 8 cornered solid insert is regrindable.
- Features a shim-based fine tuning mechanism designed for front wedge clamping to allow regrinding.

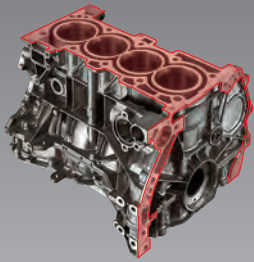
Recommended Cutting Conditions (SUMIBORON)

v_c = 800 to 1,500m/min
 f_z = 0.05 to 0.2mm/t
 a_p = 0.3 to 3mm
 Dry

Finishing of Top / Bottom, Front / Back Surfaces

High-Feed Cutter for Cast Iron Goal Mill GFV Type

P.32



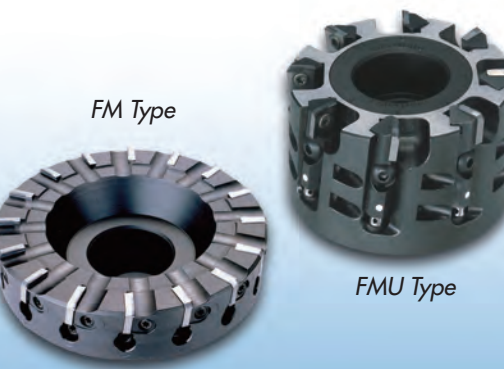
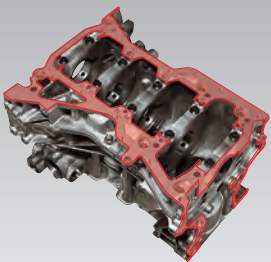
- Approach Angle 90°
- Fine tuning mechanism uses elastic deformation to make run-out adjustment easy. Holds run-out of cut edge within 2 μm.
- Screw-locked inserts offer accuracy of edge referenced inserts.
- No skill required to preset.
- Uses inserts with chipbreakers for low cutting resistance.
- Economical, 8 cornered insert.

Recommended Cutting Conditions

v_c = 80 to 250m/min
 f_z = 0.1 to 0.4mm/t
 a_p = up to 1mm
 Dry

SUMIBORON BN Finish Mill FM Type / BN Finish Mill EASY FMU Type

P.38



FM Type

FMU Type

- Uses SUMIBORON inserts and features a part flyout safety mechanism for use in high speed machining.
- Unique edge design holds surface roughness to Rz 3.2 (μm).
- Cutting edge run-out stays within 10 μm just by attaching the cartridge. Cartridges can be assembled off-line for easy adjustment (FMU type).

Recommended Cutting Conditions

v_c = 800 to 2,000m/min
 f_z = 0.1 to 0.3mm/t
 a_p = 0.5mm or less
 Dry

Counter Sink Mill for Bearing Caps

SEC-WaveMill WEX Type

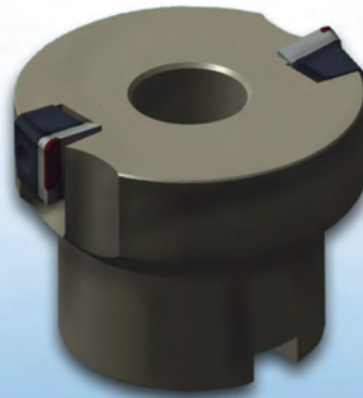


- Strong cutting edge design coupled with a high rigidity body delivers stable and high efficiency milling with low cutting force.
- Enhanced precision insert and body leaves smooth finished surfaces with high precision.
- Wide variety of inserts available for a wide range of applications.
- All types have coolant holes.

Recommended Cutting Conditions

v_c = 100 to 250m/min
 f_z = 0.1 to 0.2mm/t
 a_p = 8mm or less
 Dry

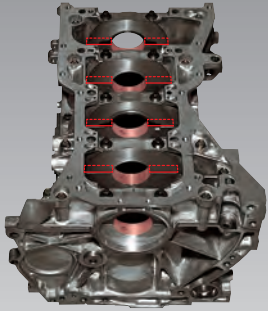
Special SUMIBORON Cutter



- Uses SUMIBORON indexable inserts for high-speed, high-precision machining.
- Provides long-lasting surface finishing quality for stable machining performance.

Recommended Cutting Conditions

v_c = 800 to 2,000m/min
 f_z = 0.1 to 0.3mm/t
 a_p = 0.5mm or less
 Dry



Journal Width Roughing Mill

SEC Side Cutter

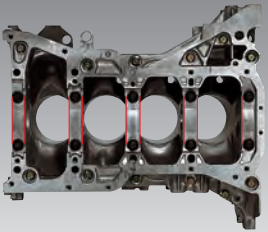


- Used to cut both sides of the journal at the bottom of the block. May also be used on special-purpose machines as a cutter for simultaneous cutting by combining with an arbour supported on both ends.
- Uses inserts with chipbreaker for good cutting performance and low cutting resistance.

* Some special-purpose machines have modified designs for machining the center thrust portion.

Recommended Cutting Conditions

v_c = 80 to 200m/min
 f_z = 0.1 to 0.3mm/t
 a_p = 4mm or less
 Dry



Journal Width Finishing Mill

Center Thrust Finishing Cutter

☞ P.56

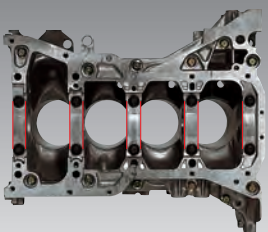


- Features a positive cutting edge design for its low cutting resistance typical for this type of long overhang cutting.
- High precision design minimizes run-out for finishing use.

* Special-purpose machines may be modified to use removable cartridges with a retractable mechanism.

Recommended Cutting Conditions

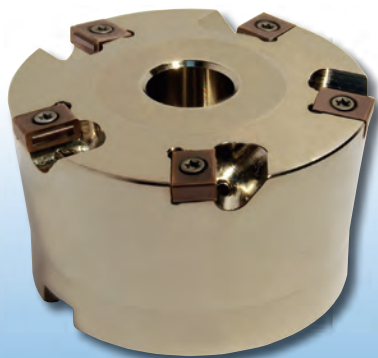
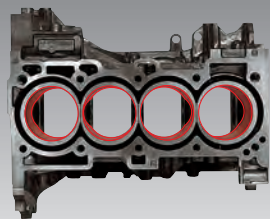
v_c = 80 to 200m/min
 f_z = 0.08 to 0.2mm/t
 a_p = 0.5mm or less
 Dry



Boring - Roughing

Rough Boring Cutters

P.26



- Inserts with optimized chipbreaker and cutting edge layout reduces resistances and chattering.
- Economical, 8 cornered insert.

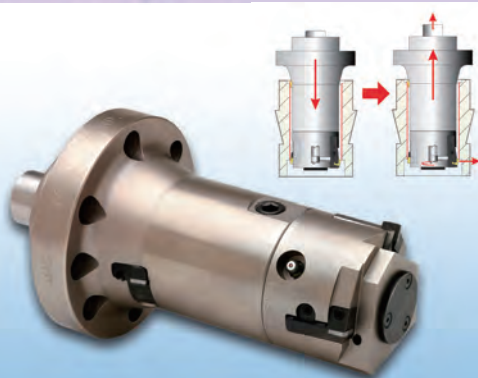
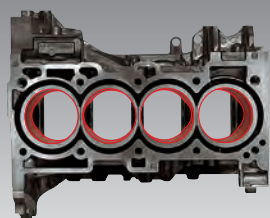
Recommended Cutting Conditions

$v_c = 80$ to 200 m/min
 $f_z = 0.1$ to 0.3 mm/t
 $a_p = 3$ mm
 Wet

Boring - Finishing and Chamfering

Special Boring Cutter

P.58



- Finishing cutter by Sumitomo's Master Tool brand.
- Draw bar activated cartridge performs medium finish on plunge and finish on pull out.

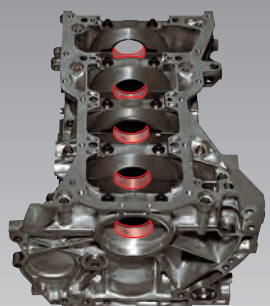
Recommended Cutting Conditions (Carbide/SUMIBORON)

$v_c = 100$ to $250/500$ to $1,200$ m/min
 $f_z = 0.05$ to $0.25/0.08$ to 0.25 mm/t
 $a_p = 0.5$ mm or less
 Wet

Crank Hole Boring - Finishing

Line Boring Bar

P.58



- Allows simultaneous finishing of all journal portions along the crank shaft hole.
- Same bar can be used for continuous medium finishing and finishing.
- Can be made with oil holes and HSK mounting system.
- Use either carbide or steel line boring bars depending on length and diameter.

Recommended Cutting Conditions (Carbide/SUMIBORON)

$v_c = 100$ to $200/200$ to 500 m/min
 $f = 0.05$ to 0.15 mm/rev
 $a_p = 0.5$ mm or less
 Wet

Self-guided Boring Bars

P.28

- Self-guided to allow boring of all journal portions along the crank shaft hole in a machining center.
- Features clamp-on carbide pad for easy maintenance.
- Suitable for high-speed, high-precision machining.

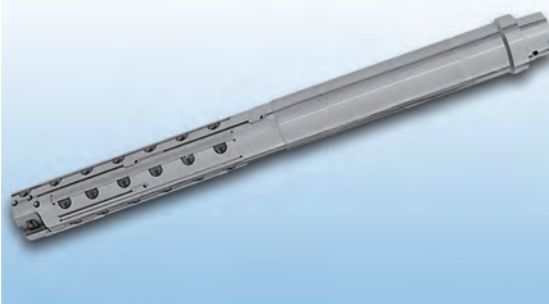
Application Example

$\phi 50$ mm, $N=1,850$ min⁻¹, $f=0.1$ mm/rev,
 $a_e=0.25$ mm

Surface roughness Rz 2.9 to 4.4 (μ m) Circularity 1.5 μ m
 Coaxility $\phi 6$ μ m (equivalent to 2J, 3J, and 4J based on scale of 1J to 5J)

Recommended Cutting Conditions (SUMIBORON)

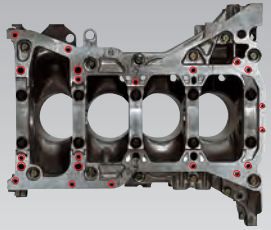
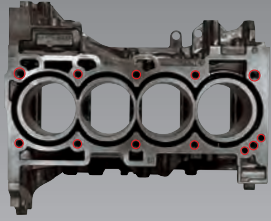
$v_c = 200$ to 600 m/min
 $f = 0.05$ to 0.20 mm/rev
 $a_p = 0.5$ mm or less
 Wet



Drilling

Super MultiDrill (GS Type / HGS Type / XHT Type)

P.42/P.44



- New DEX coating specially formulated for drills provides twice as long tool life compared to the conventional coating.
- Excellent for high efficiency drilling.
- Optimized cutting edge lowers thrust for high efficiency drilling.
- Solid carbide delivers high rigidity and enables smooth chip evacuation.

Recommended Cutting Conditions (GS Type)

$V_c = 40$ to 100 m/min
 $f = 0.15$ to 0.35 mm/rev
 Wet

Recommended Cutting Conditions (HGS Type)

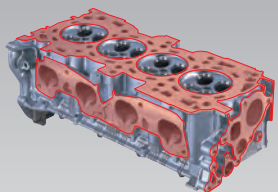
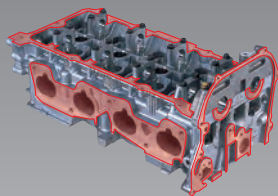
$V_c = 50$ to 120 m/min
 $f = 0.15$ to 0.35 mm/rev
 Wet

Recommended Cutting Conditions (XHT Type)

$V_c = 40$ to 80 m/min
 $f = 0.12$ to 0.35 mm/rev
 Wet

Roughing and Finishing of Mating Surfaces

SEC-High-Feed Mill APV Type



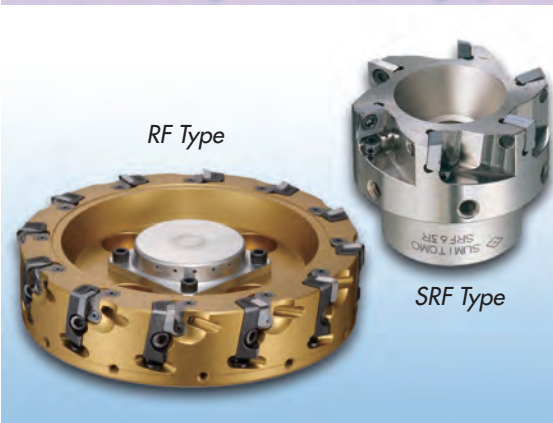
- +18°axial rake provides reliable cutting performance for milling work from rough cuts to finishing
- Edge reference cutter holds run-out within 5 to 10 μm to ensure consistent surface roughness.
- Combined with AURORA coated (DLC) inserts for greatly improved adhesion resistance.
- Economical behind-wedge clamp design is simple and uses fewer parts.

Recommended Cutting Conditions

v_c = 400 to 800m/min
 f_z = 0.1 to 0.3mm/t
 a_p = 3mm or less
 Wet

Aluminum Machining Cutter SRF Type / High-speed Cutter for Aluminum RF Type

P.24



- Performs rough to finish (rough: carbide, finish: SUMIDIA), or rough and finish at the same time by exchanging inserts.
- The RF Type is made from aluminum alloy for a lightweight body that reduces spindle load during high spindle speeds, and shortens tool changing time.
- Cartridges can be assembled off-line and exhibit only 10 μm of run-out when attached.
- Anti-centrifugal force design to prevent inserts from dislodging from cutter.
- To prevent warping, wedges are not used in the cutter construction
- SUMIDIA wiper insert leaves a surface roughness of Rz 0.8 (μm) or less.
- AURORA coated inserts and PCD inserts may also be used.

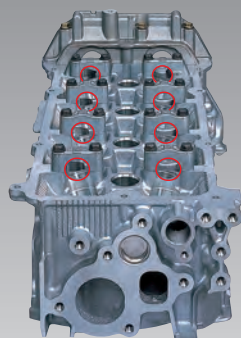
Recommended Cutting Conditions (SUMIDIA)

(Si content of 13% or less/more than 13%)
 v_c = 2,000 to 5,000/400 to 800m/min
 f_z = 0.05 to 0.2mm/t
 a_p = 3mm or less
 Wet

Camshaft Boring

Carbide Line Boring Bar

P.58



- Can be used on a special-purpose machines to machine all journals simultaneously in the cam shaft hole.
- Also capable of continuous medium finishing and finishing using the same bar.
- Can be made with oil holes and HSK mounting system.

Recommended Cutting Conditions (Carbide/SUMIDIA)

v_c = 100 to 300m/min
 f = 0.05 to 0.15mm/rev
 a_b = 0.5mm or less
 Wet

Self-guided Boring Bars

P.28



- Self-guided to allow boring of all journal portions along the camshaft hole in a machining center.
- Features clamp-on carbide pad for easy maintenance.
- Suitable for high-speed, high-precision machining.

Recommended Cutting Conditions (Carbide/SUMIDIA)

v_c = 100 to 300m/min
 f = 0.05 to 0.20mm/rev
 a_b = 0.5mm or less
 Wet

Valve Seat Chamfering and Finishing

Indexable VSR Cutter + Reamer / Regrindable VSR Cutter + Reamer

P.46



- Simultaneously machines valve seat surfaces on the exhaust and intake sides of the cylinder head while reaming the valve stem guide holes.
- Collet system makes reamer easy to set.
- Can be made to support both indexing and regrinding.

Recommended Cutting Conditions

$v_c = 50$ to 150 m/min
 $f = 0.03$ to 0.2 mm/rev
 Wet

Drilling

Super MultiDrill NHGS Type

P.30



- Excellent for high efficiency drilling.
- Sharp helix angle and optimized cutting edge lowers thrust for high efficiency drilling.
- Uses AURORA coating (DLC) for improved adhesion resistance and stable tool life.
- Features double margins for drilling where precision is required.

Recommended Cutting Conditions

$v_c = 80$ to 200 m/min
 $f = 0.1$ to 0.35 mm/rev
 Wet

Hyper Burnishing Drill HPD Type



- Reduced machining load affords significantly longer tool life.
- Drastically reduces thrust loads.
- Four-point support for high circularity.
- 15° helix angle delivers excellent chip evacuation and low fracture rate for stable drilling performance at high feeds.

Recommended Cutting Conditions (Carbide)

$v_c = 50$ to 150 m/min
 $f = 0.05$ to 0.2 mm/rev
 Wet

SUMIDIA Drills DAL Type / DDL Type / DML Type

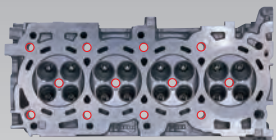
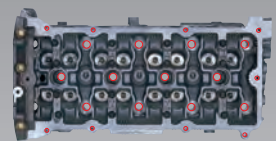
P.31



- Cutting edge uses SUMIDIA for stable drilling performance and longer tool life.
- High precision **DAL Type** is suitable for drilling holes of IT class 7 to 8, while the general **DDL Type** is suitable for drilling holes of IT class 11 to 12.
- **DML type** is the DDL type with a chamfering edge allowing it to drill and chamfer simultaneously.

Recommended Cutting Conditions

$v_c = 80$ to 250 m/min
 $f_z = 0.05$ to 0.2 mm/rev
 Wet



Roughing and Medium Finishing of Mating Surfaces

High-Feed Cutter for Cast Iron Goal Mill GRV Type

P.32



- Approach Angle 45°
- Fine tuning mechanism uses elastic deformation to make run-out adjustment easy. Holds run-out of cutting edge within 2 μm.
- No skill required to preset.
- Uses inserts with chipbreakers for low cutting resistance.

Recommended Cutting Conditions

v_c = 80 to 250m/min
 f_z = 0.1 to 0.3mm/t
 a_p = up to 5mm
 Dry

SUMIBORON High-Efficiency Mill RM Type

P.36



- Uses high strength SUMIBORON inserts for use in high speed, high efficiency machining applications.
- Economical, 8 cornered solid insert is regrindable.
- Features a shim-based fine tuning mechanism designed for front wedge clamping to allow regrinding.

Recommended Cutting Conditions (SUMIBORON)

v_c = 800 to 1,500m/min
 f_z = 0.05 to 0.2mm/t
 a_p = 0.3 to 3mm
 Dry

Roughing and Finishing of Mating Surfaces

High-Feed Cutter for Cast Iron Goal Mill GFV Type

P.32



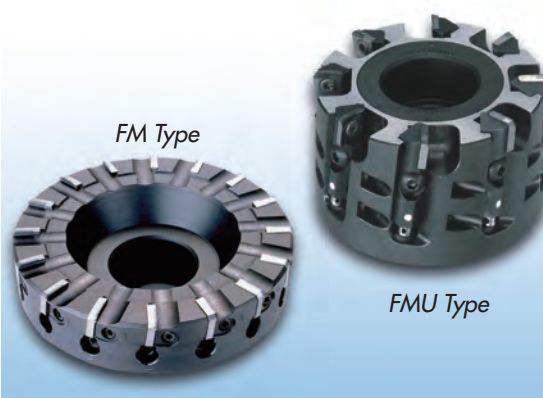
- Approach Angle 90°
- Fine tuning mechanism uses elastic deformation to make run-out adjustment easy. Holds run-out of cut edge within 2 μm.
- Screw-locked inserts offer accuracy of edge referenced inserts.
- No skill required to preset.
- Uses inserts with chipbreakers for low cutting resistance.
- Economical, 8 cornered insert.

Recommended Cutting Conditions

v_c = 80 to 250m/min
 f_z = 0.1 to 0.4mm/t
 a_p = up to 1mm
 Dry

SUMIBORON BN Finish Mill FM Type / BN Finish Mill EASY FMU Type

P.38



- Uses SUMIBORON inserts and features a part flyout safety mechanism for use in high speed machining.
- Unique edge design holds surface roughness to Rz 3.2 (μm).
- Cutting edge run-out stays within 10 μm just by attaching the cartridge. Cartridges can be assembled off-line for easy adjustment (FMU type).

Recommended Cutting Conditions

v_c = 800 to 2,000m/min
 f_z = 0.1 to 0.3mm/t
 a_p = 0.5mm or less
 Dry

Camshaft Boring

Carbide Line Boring Bar

P.58

- Can be used on a special-purpose machines to machine all journals simultaneously in the cam shaft hole.
- Capable of continuous medium finishing and finishing using the same bar.
- Can be made with oil holes and HSK mounting system.



Recommended Cutting Conditions (Carbide/SUMIBORON)

$v_c = 100$ to 300m/min
 $f = 0.05$ to 0.15mm/rev
 $a_e = 0.5\text{mm}$ or less
 Wet

Self-guided Boring Bars

P.28

- Self-guided to allow boring of all journal portions along the crank shaft hole in a machining center.
- Features clamp-on carbide pad for easy maintenance.
- Suitable for high-speed, high-precision machining.



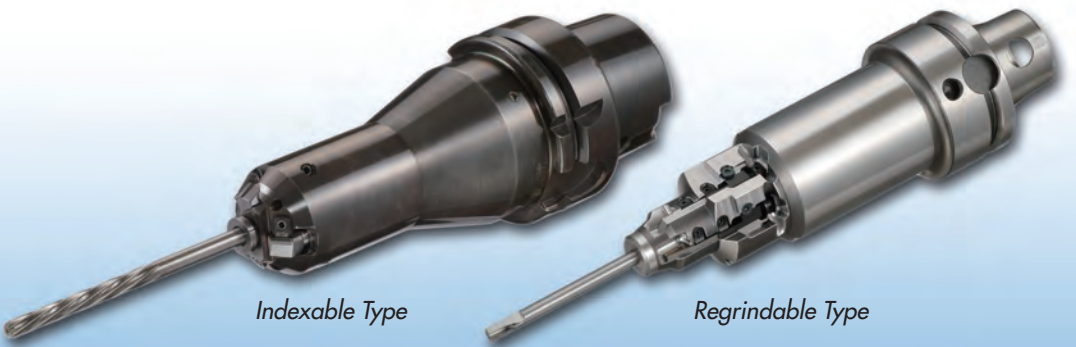
Recommended Cutting Conditions (Carbide/SUMIBORON)

$v_c = 100$ to 300m/min
 $f = 0.05$ to 0.20mm/rev
 $a_e = 0.5\text{mm}$ or less
 Wet

Valve Seat Chamfering and Finishing

Indexable VSR Cutter + Reamer / Regrindable VSR Cutter + Reamer

P.46



Indexable Type

Regrindable Type

- Simultaneously machines valve seat surfaces on the exhaust and intake sides of the cylinder head while reaming the valve stem guide holes.
- Collet system makes reamer easy to set.
- Can be made to support both indexing and regrinding.

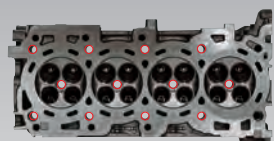
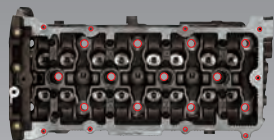
Recommended Cutting Conditions

$v_c = 50$ to 150m/min
 $f = 0.03$ to 0.2mm/rev
 Wet

Drilling

Super MultiDrill (GS Type / HGS Type / XHT Type)

P.42/P.44



- New DEX coating specially formulated for drills provides twice as long tool life compared to the conventional coating.
- Excellent for high efficiency drilling.
- Optimized cutting edge lowers thrust for high efficiency drilling.
- Solid carbide delivers high rigidity and enables smooth chip evacuation.

Recommended Cutting Conditions (GS Type)

$V_c = 40$ to 100 m/min
 $f = 0.15$ to 0.35 mm/rev
 Wet

Recommended Cutting Conditions (HGS Type)

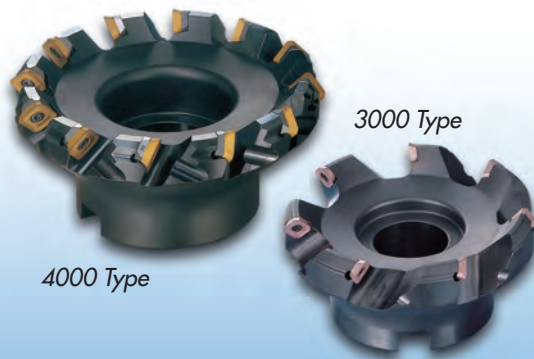
$V_c = 50$ to 120 m/min
 $f = 0.15$ to 0.35 mm/rev
 Wet

Recommended Cutting Conditions (XHT Type)

$V_c = 40$ to 80 m/min
 $f = 0.12$ to 0.35 mm/rev
 Wet

Milling Both Ends / Centering

SEC-Wavemill WGC4000 Type / WGC3000 Type



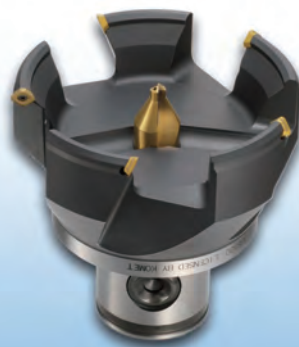
- Screw-on general purpose cutter with 45° approach angle.
- Choose inserts for various materials and a wide variety of breakers to meet machining conditions.
- Precise body and insert construction constructions gives M-class inserts high cutting edge run-out accuracy.
- **WGC4000 Type** features a carbide shim design to prevent body breakage.

Recommended Cutting Conditions

$V_c = 100$ to 250m/min
 $f_z = 0.1$ to 0.3mm/t
 $a_p = 3$ mm or less
 Dry

Centering and Facing Cutter

P.60



- Composite layout design features inserts for center drill, facing, external diameter, and chamfering for consolidating machining processes.
- Can be made for QC mounting to reduce tool changing time.

Recommended Cutting Conditions

$V_c = 100$ to 150m/min
 $f = 0.1$ to 0.2mm/rev

Front and Rear Shaft / Journal Turning

SEC-D Type Tool Holder



- Extra-strong 2-way clamp provides reliability and stable tool life.
- High indexing accuracy improves machining accuracy.
- Inserts replaceable in a single operation.

Recommended Cutting Conditions

$V_c = 100$ to 250m/min
 $f = 0.1$ to 0.3mm/rev
 $a_p = 5$ mm or less

SumiTurn T-REX Tool Holder



- Unique 6-cornered insert design with 55° apex angle affords significant cost reductions by about 30% per cutting edge.

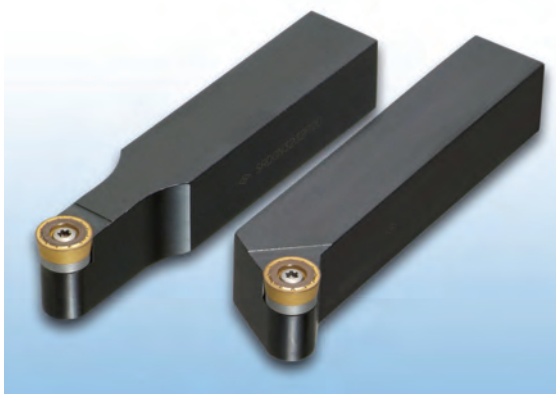
*Note: Depth of cut is less than 2.5 mm

Recommended Cutting Conditions

$V_c = 100$ to 250m/min
 $f = 0.1$ to 0.3mm/rev
 $a_p = 2.5$ mm or less

Front and Rear Shaft / Journal Turning

SEC - Tool Holders with Round Insert



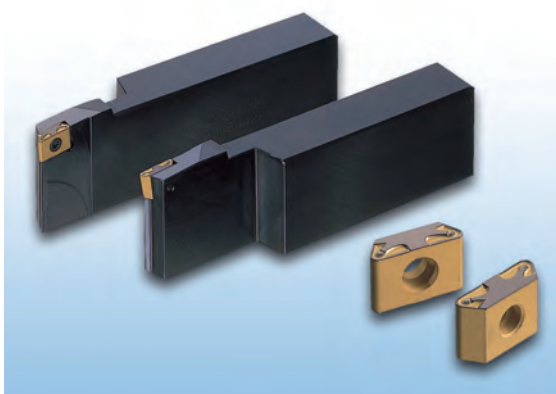
- Designed to use screw-locking round inserts, ideal for interrupted cutting counter-weights.

Recommended Cutting Conditions

$V_c = 100$ to 250m/min
 $f = 0.1$ to 0.3mm/rev
 $a_p = 3\text{mm}$ or less

SEC-XD Type Tool Holder / Insert

P.50



- Uses insert lengthwise for stable machining and longer tool life.
- Can use 4 corners of insert when used in both left and right hand tool holders.

Recommended Cutting Conditions

$V_c = 100$ to 250m/min
 $f = 0.15$ to 0.4mm/rev
 $a_p = 5\text{mm}$ or less

Pin / Journal Milling

Tapered Spline Internal Pin Milling Cutter Double Negative Edge Type / Negative-Positive Edge Type

P.52



W-Negative Type

Negative - Positive Type

Characteristics of the Tapered Spline System

- Unique tapered spline system drastically reduces cutter replacement time by 1/3.
 - High rigidity extends tool life.
 - Highly durable clamp ensures long body life.
 - Designed to cope with thermal growth for good milling precision.
- * Can also be made with cross-key system.
- Both double negative and negative-positive edge types can be made for inserts with chipbreaker. Reduces cutting force and improves chip control.

Recommended Cutting Conditions

$V_c = 140$ to 170m/min
 $f_p = 0.3$ to 0.5mm/t (W-Nega)
 $f_p = 0.1$ to 0.2mm/t (Nega-Posi)
 $fr = 0.5\text{mm/t}$
 $a_p = 3\text{mm}$ or less Dry

Characteristics of Negative - Positive Edge Type

- Unique negative-positive shaped inserts reduce cutting force.
- Benefits:
- Improved tool life
 - Reduced cutting noise
 - Improved efficiency
 - Improved precision
- Prevents mis-clamping of inserts.
- * Use of double-negative edges is recommended for work materials harder than HB300.

Pin / Journal Milling

External Pin Milling Cutter

P.52



- Ultra-fine pitch for high productivity and high speed cutting.
- Cost effective design reduces tool changes.

Recommended Cutting Conditions

$v_c = 200$ to 350 m/min
 $f_z = 0.35$ mm/t
 $a_p = 3$ mm or less
 Dry

External Pin Milling Cutter - Tapered Spline System

P.52



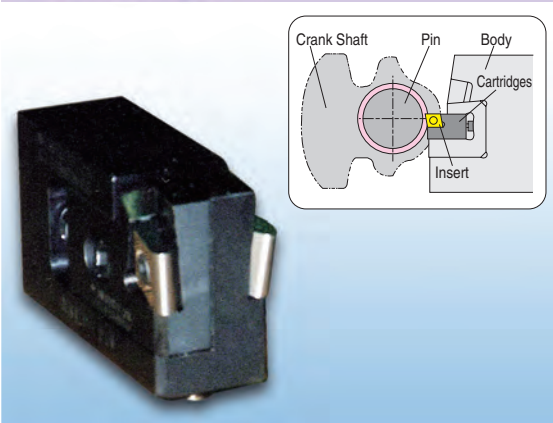
- Applicable to a radius of 750mm or less, with tapered spline clamping system.
- Light weight cutter body for easy replacement.
- * See page 17 for features of external milling cutters.

Recommended Cutting Conditions

$v_c = 140$ to 350 m/min
 $f_z = 0.1$ to 0.35 mm/t
 $a_p = 3$ mm or less
 Dry

Pin / Journal Grooving

Fillet Grooving Tool

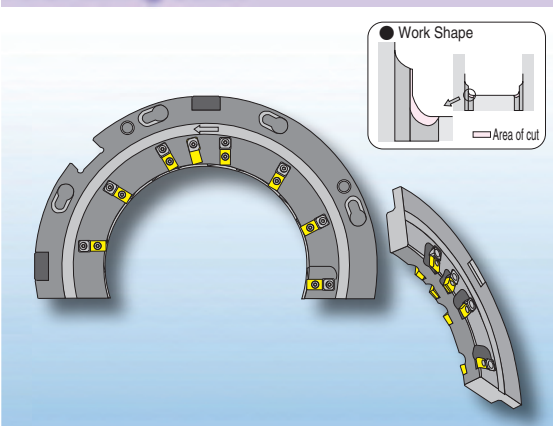


- Ideal for width milling on pins and journals, and grooving fillet roll guides.
- Features adjustment mechanism for milling width and diameter.
- Lengthwise use of insert lends to stable cutting performance.

Recommended Cutting Conditions

$v_c = 100$ to 250 m/min
 $f = 0.1$ to 0.3 mm/rev
 $a_p = 2.5$ mm or less

Fillet Milling Cutter



- Used for fillet grooving on pins and journals.
- Affords higher efficiency and tool life compared to turning.
- * Different from undercut mills is absence of inner cutting edges.

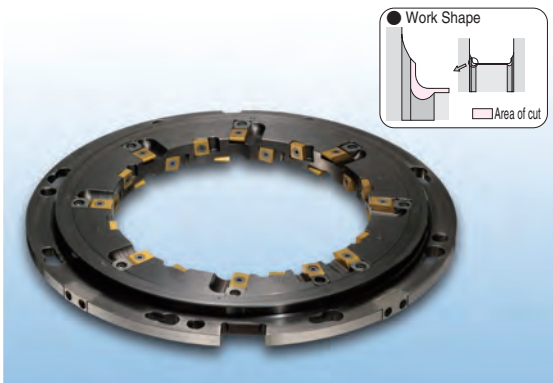
Recommended Cutting Conditions

$v_c = 160$ to 220 m/min
 $f_z = 0.2$ to 0.5 mm/t
 $a_p = 0.5$ mm or less
 Dry

Pin / Journal Milling Fillet Grooving



Undercut Milling Cutter

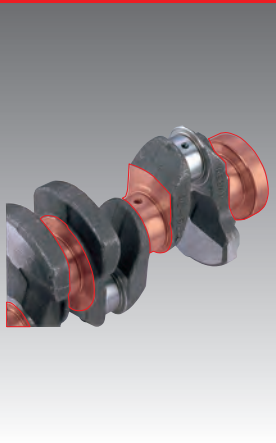


- Includes inner cutting edges for fillet grooving on pins and journals, allowing cylindrical portions to be machined simultaneously.
- Affords higher efficiency and tool life compared to turning.

Recommended Cutting Conditions

$v_c = 160$ to 220 m/min
 $f_z = 0.2$ to 0.5 mm/t
 $a_p = 0.5$ mm or less
 Dry

Front and Rear Shaft Turning / Broaching



Turn Broach

P.55



- Tool eliminates turning process to reduce number of machines and cutting time for journals.
- Incorporates extra-strong clamping and high precision cartridges with optimally arranged and selected inserts to ensure high productivity.

Recommended Cutting Conditions

$v_c = 100$ to 250 m/min
 $f = 0.1$ to 0.35 mm/rev
 Dry

Pin / Journal Oil Hole Drilling



Super MultiDrill XHT Type / PHT Type

(Guide Holes)

P.44



- Drills oil holes in pins and journals with high efficiency, providing major benefits toward reducing number of drilling machines.
 - Drills in conjunction with the MQL system provide major reductions in coolant and coolant-related energy consumption.
- * Guide holes are necessary due to long overhang. Use of a pilot drill is recommended for drilling guide holes to ensure integrity of drilling diameter, drill tip angle, and concentricity.

Recommended Cutting Conditions

$v_c = 80$ to 130 m/min
 $f = 0.1$ to 0.25 mm/rev
 $L/D = 25$ or less
 MQL

Drilling

Super MultiDrill GS Type / HGS Type

P.42



- New DEX coating specially formulated for drills provides twice as long tool life compared to the conventional coating.
- Excellent for high efficiency drilling.
- Optimized cutting edge lowers thrust for high efficiency drilling.
- Solid carbide delivers high rigidity and enables smooth chip evacuation.

Recommended Cutting Conditions
 $v_c = 40$ to 100 m/min
 $f = 0.15$ to 0.35 mm/rev
 Wet

SEC-MultiDrill SMD Type



- Replaceable head type drill offers twice the tool life of brazed drills.
- No regrinding required, reduces number of drills to stock for easier tool management.

Recommended Cutting Conditions
 $v_c = 80$ to 130 m/min
 $f = 0.1$ to 0.4 mm/rev
 $a_p = 8$ mm or less
 Wet

SumiDrill WDX Type

P.40



- Balanced design for stable high quality drilling.
- 3 types of chipbreakers solves chip management problems.
- Uses same insert in inner and outer pockets, enabling economical 4 corners usage.

Recommended Cutting Conditions
 $v_c = 120$ to 200 m/min
 $f = 0.09$ to 0.31 mm/rev
 Wet



Reference Surface Milling

SEC-Wavemill WGC4000 Type / WGC3000 Type



4000 Type

3000 Type

- Screw-on general purpose cutter with 45° approach angle.
- Choose inserts for various materials and a wide variety of breakers to meet machining conditions.
- Precise body and insert construction constructions gives M-class inserts high cutting edge run-out accuracy.
- **WGC4000 Type** features a carbide shim design to prevent body breakage.

Recommended Cutting Conditions

v_c = 100 to 250m/min
 f_z = 0.1 to 0.3mm/t
 a_p = 3mm or less
Dry

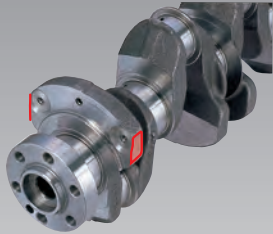
SEC-WaveMill WEX Type



- Strong cutting edge design coupled with a high rigidity body delivers stable and high efficiency milling with low cutting force.
- Enhanced precision insert and body leaves smooth finished surfaces with high precision.
- Wide variety of inserts available for a wide range of applications.
- All types have coolant holes.

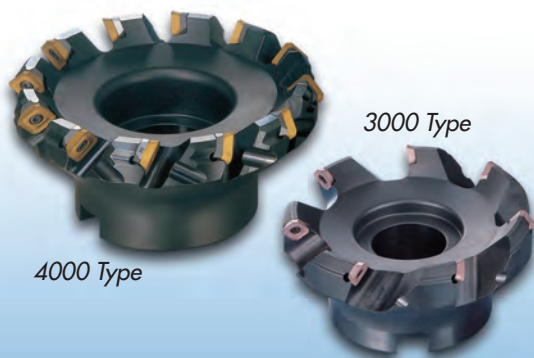
Recommended Cutting Conditions

v_c = 130 to 200m/min
 f_z = 0.12 to 0.35mm/t
 a_p = 14mm or less
Dry



Milling Both Ends / Centering

SEC-Wavemill WGC4000 Type / WGC3000 Type



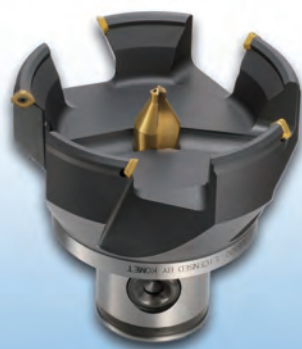
- Screw-on general purpose cutter with 45° approach angle.
- Choose inserts for various materials and a wide variety of breakers to meet machining conditions.
- Precise body and insert construction constructions gives M-class inserts high cutting edge run-out accuracy.
- **WGC4000 Type** features a carbide shim design to prevent body breakage.

Recommended Cutting Conditions

$V_c = 100$ to 250m/min
 $f_z = 0.1$ to 0.3mm/t
 $a_p = 3$ mm or less
 Dry

Centering and Facing Cutter

P.60



- Composite layout design features inserts for center drill, facing, external diameter, and chamfering for consolidating machining processes.
- Can be made for QC mounting to reduce tool changing time.

Recommended Cutting Conditions

$V_c = 100$ to 150m/min
 $f = 0.1$ to 0.2mm/rev

Turning of Shaft, Journal, and Pins

SEC-SV Type Copying Tool Holders



- 35° positive insert delivers good cutting performance and indexes easily.

Recommended Cutting Conditions

$V_c = 100$ to 250m/min
 $f = 0.1$ to 0.3mm/rev
 $a_p = 5$ mm or less

SEC-D Type Tool Holders



- Extra-strong 2-way clamp provides reliability and stable tool life.
- High indexing accuracy improves machining accuracy.
- Inserts replaceable in a single operation.

Recommended Cutting Conditions

$V_c = 100$ to 250m/min
 $f = 0.1$ to 0.3mm/rev
 $a_p = 5$ mm or less

Drilling of Main and Other Holes

Super MultiDrill GS Type / HGS Type

P.42

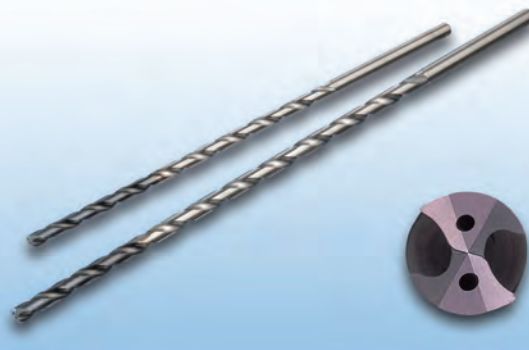


- New DEX coating specially formulated for drills provides twice as long tool life compared to the conventional coating.
- Excellent for high efficiency drilling
- Optimized cutting edge lowers thrust for high efficiency drilling.
- Solid carbide delivers high rigidity and enables smooth chip evacuation.

Recommended Cutting Conditions
 $v_c = 40$ to 100 m/min
 $f = 0.15$ to 0.35 mm/rev
 Wet

Super MultiDrill XHT Type

P.44



- New DEX coating specially formulated for drills provides twice as long tool life compared to the conventional coating.
- Excellent for high efficiency drilling
- Optimized cutting edge lowers thrust for high efficiency drilling.
- Solid carbide delivers high rigidity and enables smooth chip evacuation.

Recommended Cutting Conditions
 $v_c = 40$ to 80 m/min
 $f = 0.12$ to 0.40 mm/rev
 Wet

Cam Milling

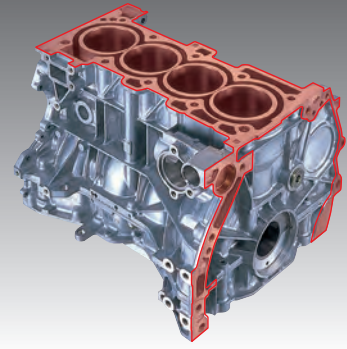
Cam Shaft Milling Cutter



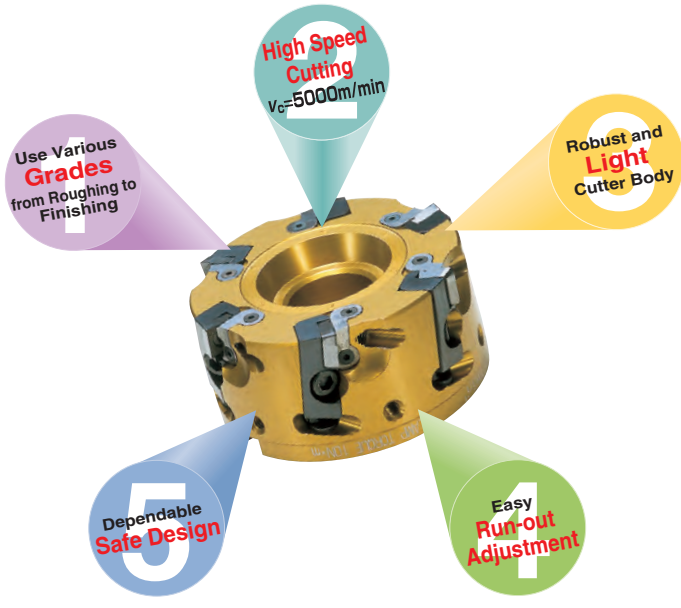
- Excellent for milling cam shafts.
- Tapered spline cutter mounting system shortens mounting and removing time while greatly reducing body weight, making it much easier to replace.

Recommended Cutting Conditions
 $v_c = 140$ to 200 m/min
 $f_z = 0.1$ to 0.5 mm/t
 $a_p = 3$ mm or less
 Dry

High-speed Cutter for Aluminum RF Type / Aluminum Machining Cutter SRF Type



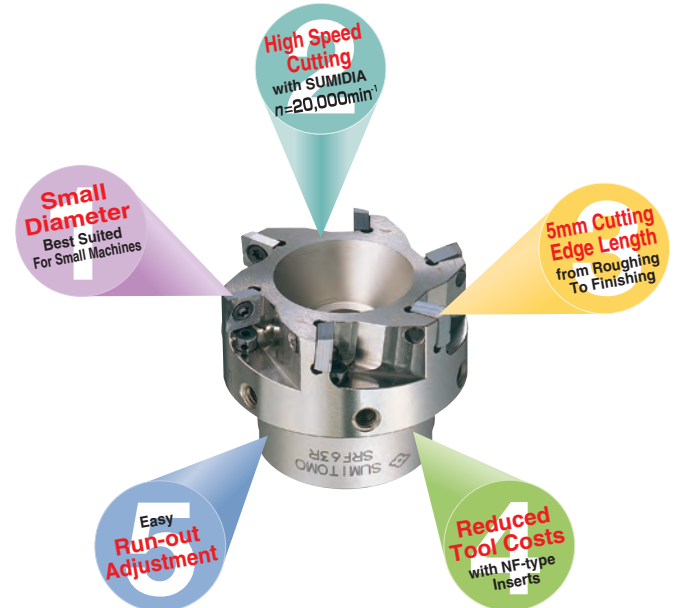
RF Type



RF Type
Special Aluminum Alloy Body!
 High Precision, High Speed, Light, Easy, Safe!

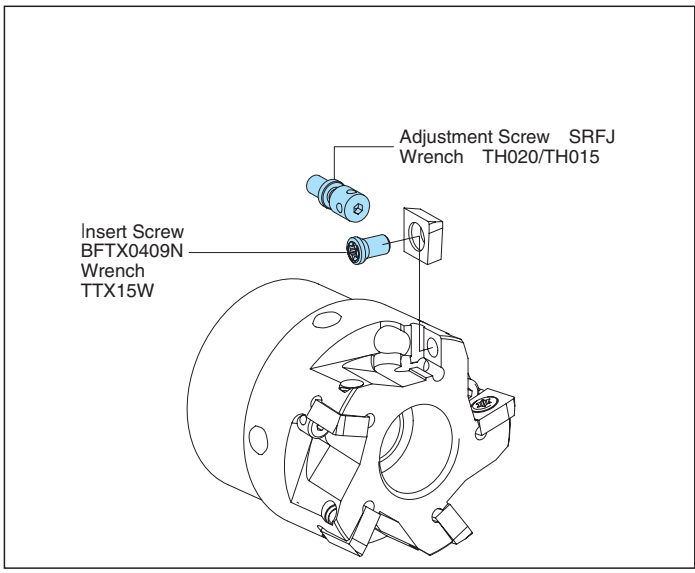
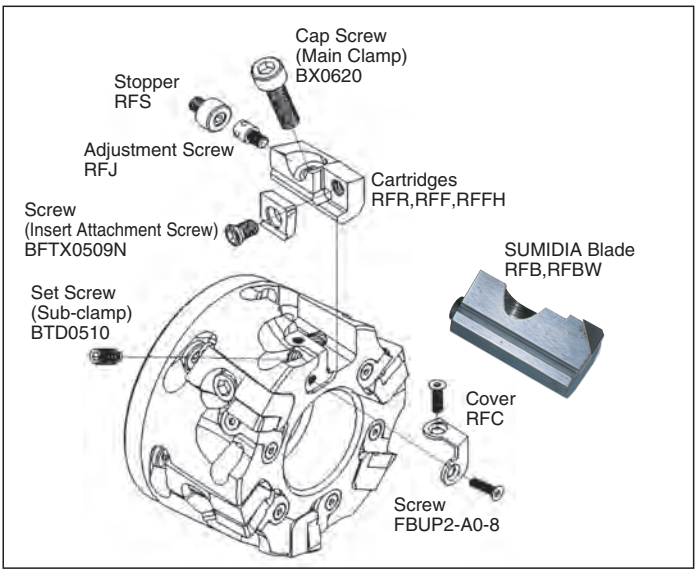
$V_c=5,000\text{m/min}$

SRF Type

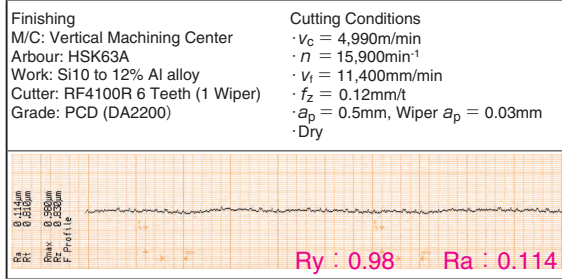


SRF Type
Best Suited For Small Machines!
 High Precision, High Speed, Easy, Safe!

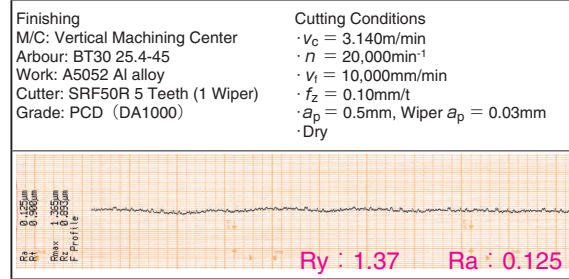
$n=20,000\text{min}^{-1}$



■ Surface Finish (RF Type)



■ Surface Finish (SRF Type)



■ Special Design Examples

Lightweight $\phi 200\text{mm}$

Multiple teeth design achieves $V_f = 10,000$

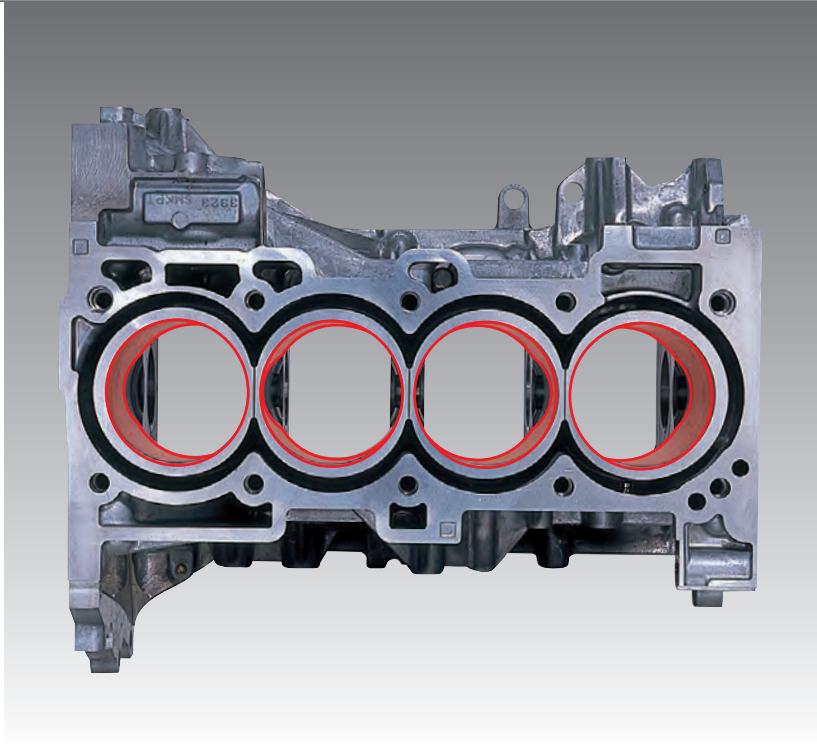
● Integrated HSK body

Applicable for large diameters $\phi 200\text{mm}$ and above

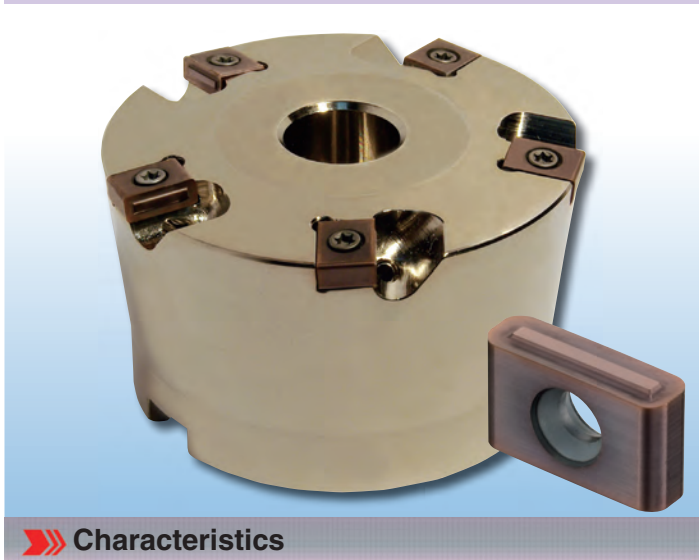
● Endmill Type

■ Application Examples

Work	Tool	Cutting Conditions	Results
Work Material Materials	Cat. No. Grades	v_c = Cutting Speed (m/min) n = (S/Speed) min^{-1} v_f = Feed Rate (mm/min) a_p = D.O.C. (mm)	
Contact surface of Transmission Case ADC12	RF4125R SUMIDIA Inserts DA1000	$v_c = 3,000$ $v_f = 7,640$ $a_p = 1.5$	Surface finish: $R_a = 0.3\mu\text{m}$ Output: 20,000 pieces
Contact surface of Cylinder Head AD4C	RF4250R Carbide Inserts H1	$v_c = 3,000$ $v_f = 11,460$ $a_p = 3.5$	Roughing Output: 10,000 pieces
Rear Cover Mounting Surface ADC12	RF4080R Carbide Inserts (DLC-Coat) DL1000	$v_c = 2,500$ $v_f = 5,000$ $a_p = 1.5$ to 5.0	Competitor 200 pieces RF Type still in use after 1,000 pieces
Valve Body Mating Surface ADC12	RF4125R SUMIDIA Inserts DA1000	$v_c = 2,512$ $v_f = 9,000$ $a_p = 0.3$	Competitor's tool reached life at 10,000 pieces RF Type reached life at 20,000 pieces
Valve Body Mating Surface ADC12	RF4080R SUMIDIA Inserts DA1000	$v_c = 1,508$ $v_f = 6,120$ $a_p = 2.1$	Competitor: preset tool change at 5,000 pieces RF Type used for 10,000 pieces
Differential case ADC12	SRF63R NF-SNEW09T3ADTR DA1000	$n = 8,000$ $v_f = 4,000$ $a_p = 0.5$	No obstructions on tool magazine when mounting $\phi 63\text{-mm}$ cutter on small machines.
Inter cooler ADC12	SRF50R NF-SNEW09T3ADTR DA1000	$n = 6,000$ $v_f = 4,000$ $a_p = 0.5$ to 1.0	Surface Finish: 0.8S
Pump parts ADC12	SRF63R NF-SNEW09T3ADTR DA1000	$n = 12,000$ $v_f = 7,000$ $a_p = 0.5$	Features improved finished surface roughness, efficiency, and tool life compared to carbide endmills. Achieves high efficiency and high precision performance.



▼ Rough Boring Cutters



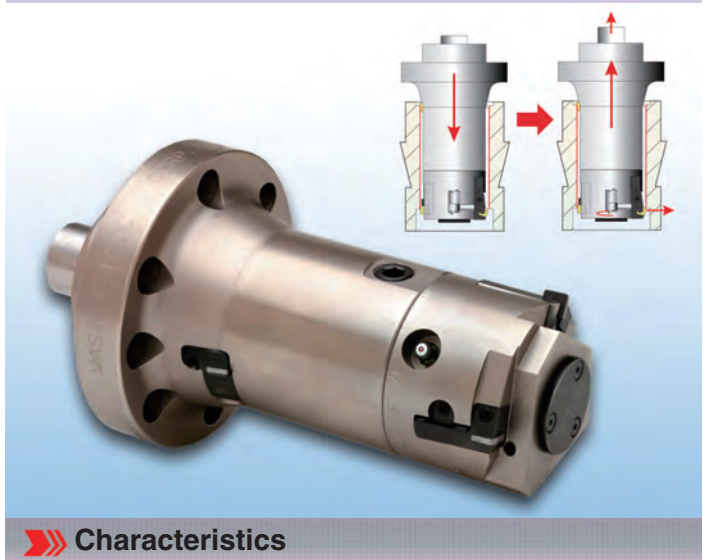
»» Characteristics

- Inserts with optimized chipbreaker and cutting edge layout reduces resistance and controls chattering.
- Economical, 8 cornered insert.

Recommended Cutting Conditions

$v_c = 80$ to 200 m/min
 $f_z = 0.1$ to 0.3 mm/t
 $a_p = 3$ mm
 Wet

▼ Special Boring Cutter



»» Characteristics

- Finishing cutter by Sumitomo's Master Tool brand.
- Draw bar activated cartridge performs medium finish on plunge and finish on pull out.

Recommended Cutting Conditions (Carbide/SUMBORON)

$v_c = 100$ to $250/500$ to $1,200$ m/min
 $f_z = 0.05$ to $0.25/0.08$ to 0.25 mm/t
 $a_p = 0.5$ mm or less
 Wet

Roughing

Actual Applications (Representative example)



Work Material: Cast Iron
Cutting Conditions: $V_c=61.5\text{m/min}$
 $f_z=0.25\text{mm/t}$
 $a_e=2.0\text{mm}$
Life: 1,600 holes



Work Material: Aluminum + Liner
Cutting Conditions: $V_c=144\text{m/min}$
 $f_z=0.2\text{mm/t}$
 $a_e=1.5\text{mm}$
Life: 900 holes



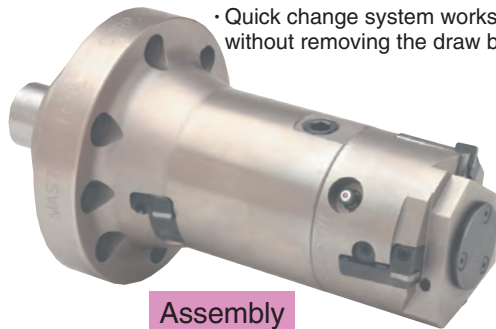
Work Material: Aluminum + Liner
Cutting Conditions: $V_c=88\text{m/min}$
 $f_z=0.27\text{mm/t}$
 $a_e=1.45\text{mm}$
Life: 1,000 holes



Work Material: Cast Iron
Cutting Conditions: $V_c=150\text{m/min}$
 $f_z=0.27\text{mm/t}$
 $a_e=4.0\text{mm}$
Life: 320 holes

Medium Finishing / Finishing

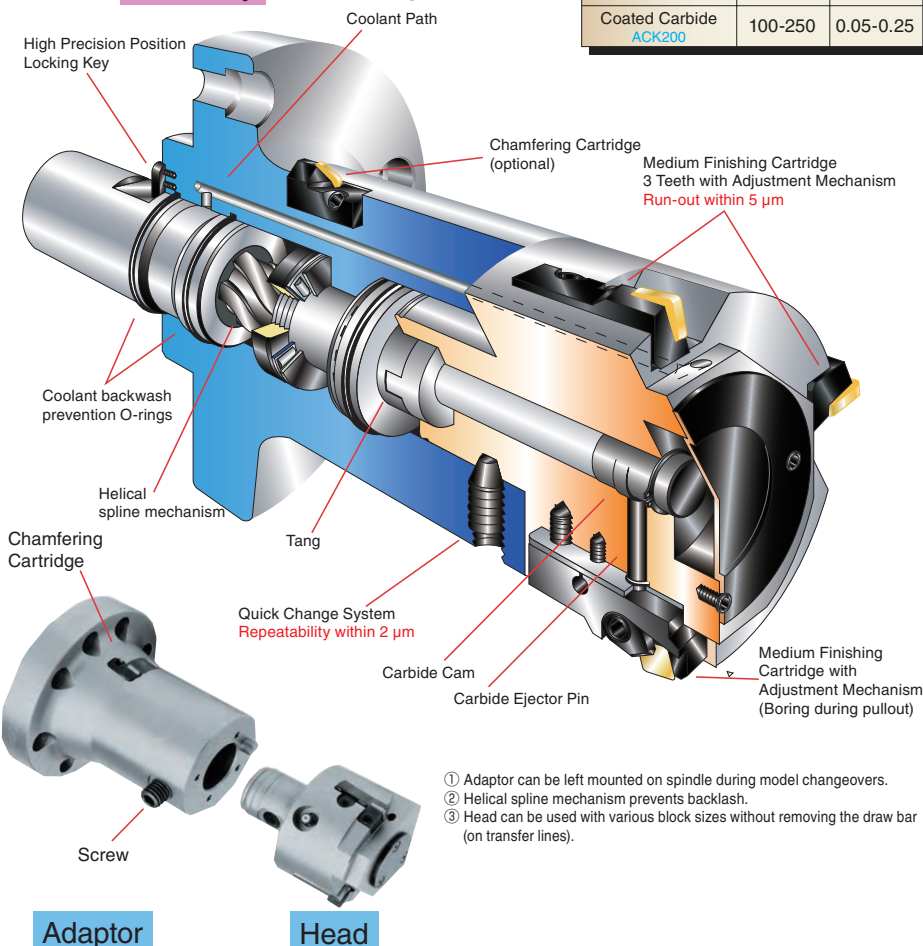
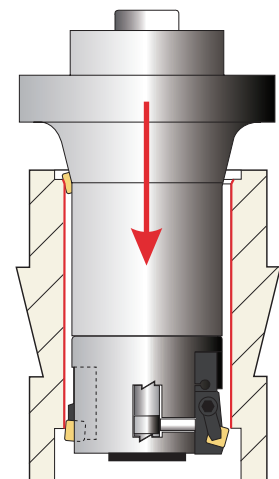
- Delivers process capability of more than 2.5 CPK on a transfer line.
- Quick change system works with various block sizes without removing the draw bar.



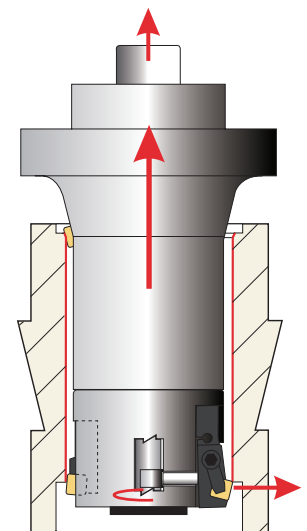
Assembly

Materials	Cast Iron	
	Cutting Speed (m/min)	Feed Rate (mm/t)
SUMIBORON BN700/BNS800	500-1200	0.08-0.25
Coated Carbide ACK200	100-250	0.05-0.25

Machining Step 1 Medium finish on entry

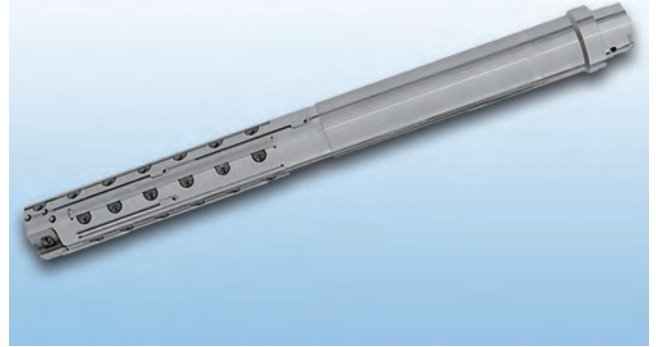
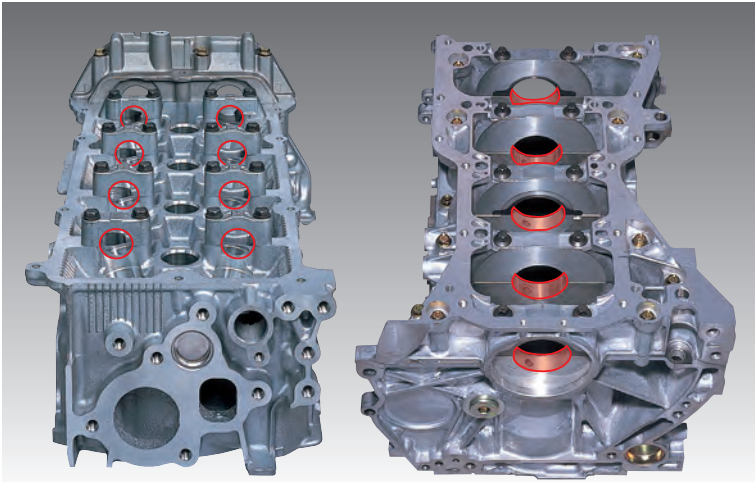


Machining Step 2 Finishing during pullout Medium finishing cartridge emerges



- ① Adaptor can be left mounted on spindle during model changeovers.
- ② Helical spline mechanism prevents backlash.
- ③ Head can be used with various block sizes without removing the draw bar (on transfer lines).

Self-guided Reamer



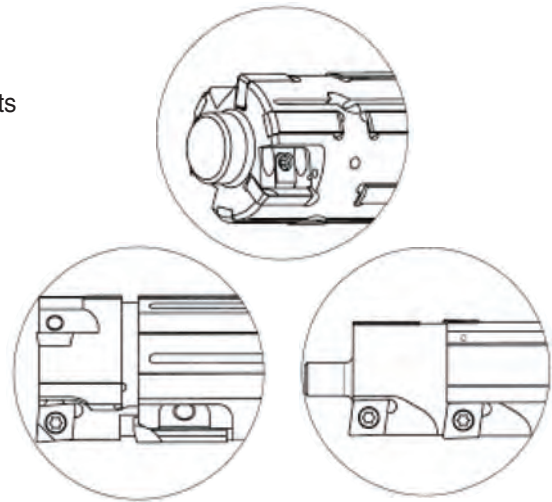
● Application

Automotive manufacturer: tools for crank shafts and cam shafts

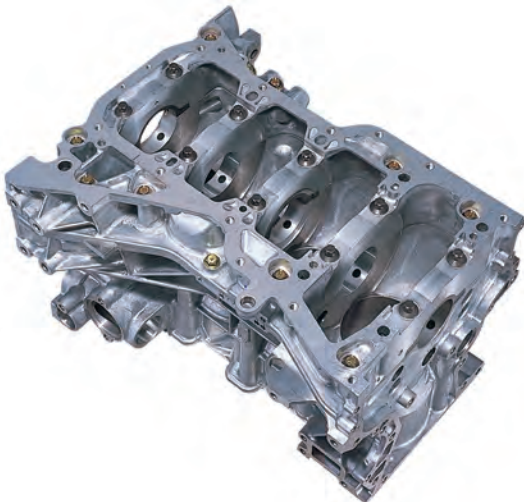
Construction machine manufacturer: drilling tools for hydraulic pipe joint parts

● Characteristics

- Replaces line boring bars
- Body, cutting edge (consists of blade and pad)
- Usable on machining centers for lower machine costs.
- Features clamp-on carbide pad for easy maintenance.
- High precision machining.
- Supports use of either carbide, CBN, or diamond coated cutting edge depending on work material.
- Supports both inserts and blade cutting edges.



Machining Method



● Basic Machining Method

First operation: Use the basic hole tool to machine 1 to 2 journals on the near side to serve as guide holes.

Second operation: Use the long tool to machine the journal on the far side using journals 1 and 2 (near side) as a guide.

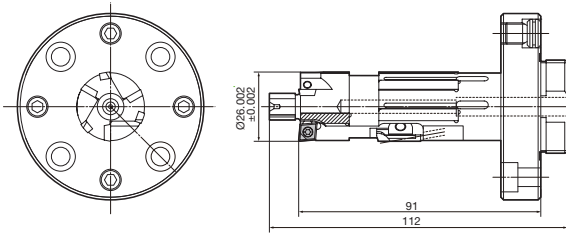
* Finish the journal just machined with a single tooth using the pad as a guide.

● Other Machining Methods

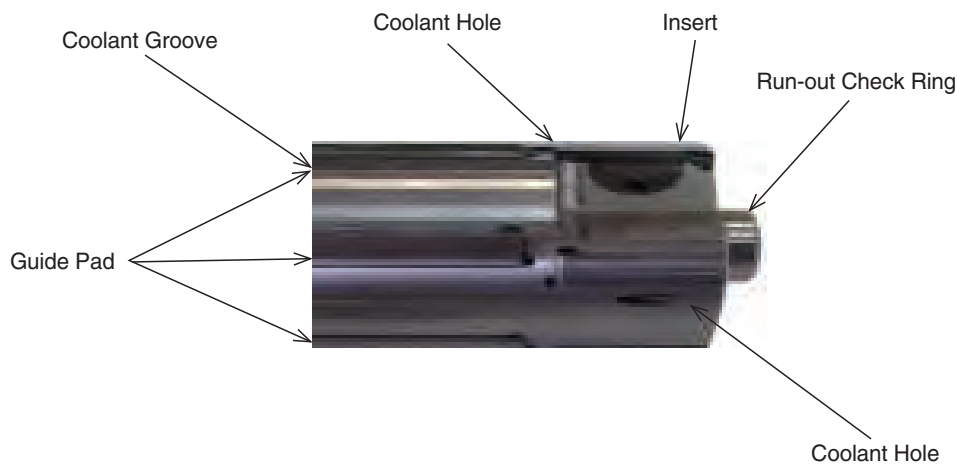
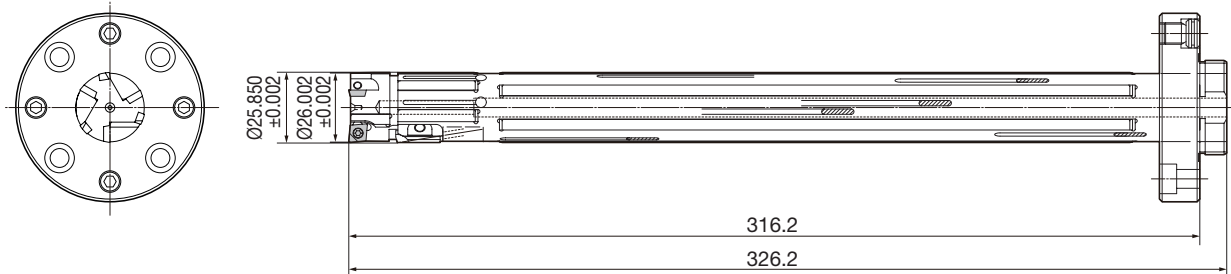
- ① Flip the work over and machine using the basic hole tool working from left to right.
- ② Install a guide bush (reference hole) on the near side of the work piece and machine using only the long tool.

Design Examples

● Basic Hole Tool



● Long Tool

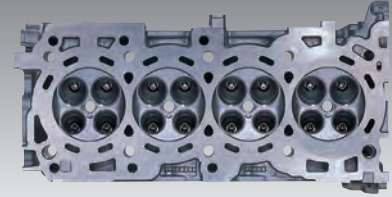
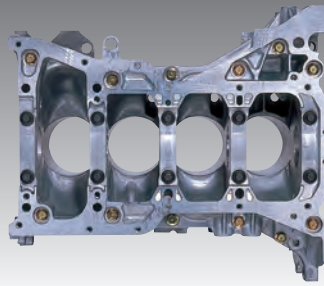


Performance Record

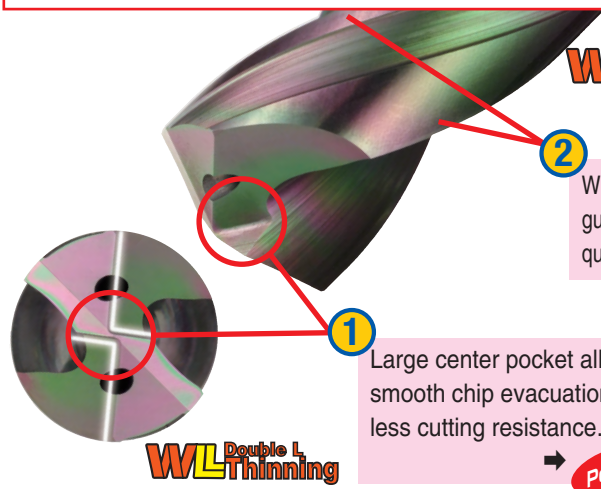
Area of Cut	Work Material	Cutting Conditions	Drilling Precision (mm)		
			Concentricity	Coaxialness	Surface Roughness
Crank Hole	FC28 – 21 + FCD400	$v_c = 300$ to 350 m/min $f_z = 0.1$ mm/t $a_e = 0.35$ mm	0.007	0.008 (Linearity)	5.30Rz
Crank Hole	FC250 + SMF4040	$v_c = 290$ m/min $f_z = 0.1$ mm/t $a_e = 0.25$ mm	0.002	ϕ 0.007	3.30Rz
Cam Hole	AC4B – F. AC2C – T6	$v_c = 240$ m/min $f_z = 0.1$ mm/t $a_e = 0.25$ mm	0.002	ϕ 0.005	0.80Rz
Balance Shaft Hole	ADT4 – T5 HRB30 to 50	$v_c = 90$ m/min $f_z = 0.08$ mm/t $a_e = 0.25$ mm	0.002	ϕ 0.008	0.82Rz
Crank Hole	TAC4DS, Hardness < BHN75	$v_c = 483$ m/min $f_z = 0.2$ mm/t $a_e = 0.25$ mm	0.002	ϕ 0.005	0.88Rz
Cam Hole	T6 coating	$v_c = 376$ m/min $f_z = 0.2$ mm/t $a_e = 0.25$ mm	0.002	ϕ 0.004	0.88Rz

Super MultiDrill for Aluminum NHGS Type SUMIDIA Drills for Aluminum DAL / DDL / DML Type

Super MultiDrill NHGS Type



Cutting Force Less Than 1/2 of Existing Drills, Enables High Efficiency Drilling at 2 to 4 Times Faster Feed Rates



WW Double Margin

2

Wide W (double) margin improves guiding precision for excellent hole quality. → **Point 2** **Point 3** **Point 4**



1

Large center pocket allows smooth chip evacuation for less cutting resistance. → **Point 1**

WL Double L Thinning

3

AURORA coating (DLC) enhances adhesion resistance and wear resistance.

NHGS Type (After 100 holes)	Competitor's 30° helix angle (After 20 holes)
Used 5x more but still adhesion free.	Severe adhesion.
	
Drill: $\phi 8$ (5D) Work Material: ADC12 Drilling Conditions: $v_c=200\text{m/min}$ $f=1.0\text{mm/rev}$ $H=32\text{mm}$ Coolant: Internal (Emulsion type 1.5 MPa)	

Characteristics of the NHGS Type

- Low resistance thinning profile WL (Wide L type) thinning**
Unique wide thinning profile delivers stable drilling at high feeds like never before.
Brings high feed drilling performance to small size machines and low rigidity work materials.
- Wide W (double) margin WW (Wide W) margin**
Wide double margin provides accurate guiding even during high efficiency drilling.
- DLC-Coat AURORA COAT®**
AURORA coating improves adhesion resistance in high speed range.

- Produces starter holes for rotary formed taps at high efficiency in a single pass.
- * Stable drilling at IT8 precision
- Thrust resistance is only 1/4 of straight cut edges, 1/3 of light helix edges, and 1/2 of 30° helix edges, allowing up to 2x to 4x faster feed rates.
- * A high precision type is currently in development.
Target: 2x feed rate of a straight edge drill with same level of accuracy. IT6 to IT7.

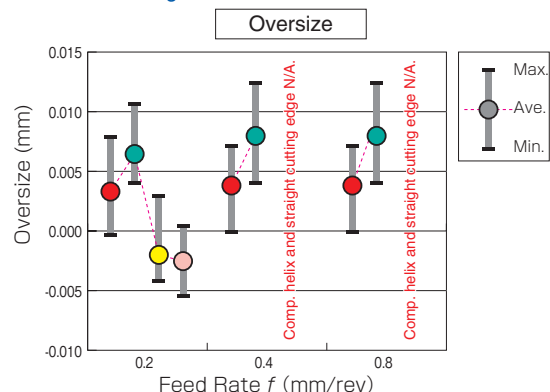
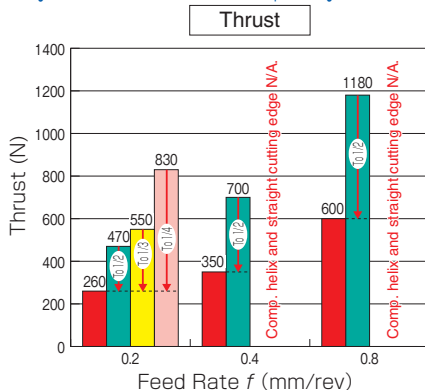
Point 1 **Low Cutting Force Achieves 2 to 4 Times Faster Feed Rates!**

Cutting force of the NHGS Type is 1/2 the competitor's 30° helix $\Rightarrow 2x$ faster feed rate!
1/3 the competitor's light helix $\Rightarrow 3x$ faster feed rate! 1/4 the competitor's light helix $\Rightarrow 4x$ faster feed rate!

Point 2 **Stable Hole Accuracy Holds Enlargement Within 0.01mm!**

Minimal enlargement with stable machining, from low to high feed rates.

Legend (common)

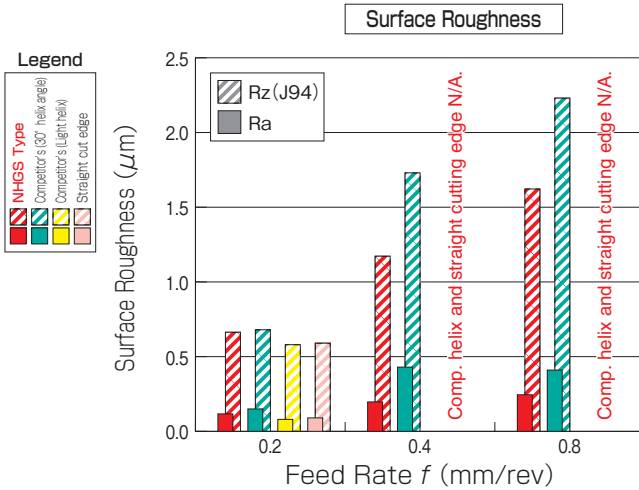


Drill Size: $\phi 8.0$ mm Work material: ADC12 Cutting Speed: $v_c=200\text{m/min}$
Machine: Vertical M/C (BT30) Coolant Supply: Internal (1.5 MPa) Coolant: Emulsion (25x dilution)

Point 3

Wide feed rate range achieves good surface roughness!

Excellent finish from low to high feed rates, Ra=0.11 to 0.25, Rz(J94)=0.66 to 1.62



Drill Size: $\phi 8.0\text{mm}$ Work material: ADC12
 Cutting Speed: $v_c=200\text{m/min}$ Machine: Vertical M/C (BT30)
 Coolant Supply: Internal (1.5MPa) Coolant: Emulsion (25x dilution)

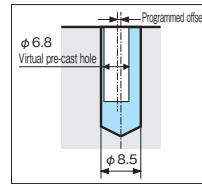
Series

Coolant Supply	Type	Diameter Range (mm)	Hole Depth (L/D)
Internal (NHGS Type)	MDW□□□□NHGS5 type	$\phi 3.0$ to $\phi 16.0$	up to 5

Drills for deep hole drilling can be custom-made.
 Production range: Drill dia.: $\phi 3.0$ to 16 mm Total length: Available on inquiry.

Point 4

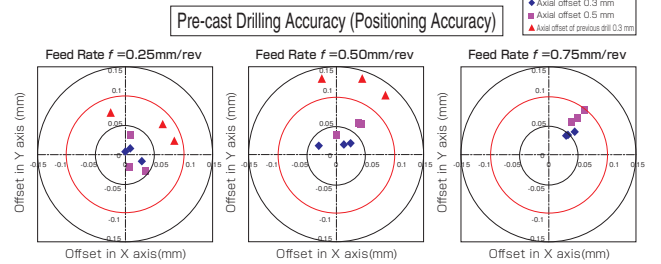
Pre-cast Drilling Accuracy is Within $\pm 1/10\text{th}$ to $\pm 1/5\text{th}$ of Axial Offset!



Pre-cast Drilling Accuracy (Positioning Accuracy)			
Feed Rate	0.25mm/rev	0.50mm/rev	0.75mm/rev
Offset			
0.3mm	$\pm 0.03\text{mm}$	$\pm 0.04\text{mm}$	$\pm 0.06\text{mm}$
0.5mm	$\pm 0.05\text{mm}$	$\pm 0.07\text{mm}$	$\pm 0.10\text{mm}$
Previous drill 0.3mm	$\pm 0.09\text{mm}$	$\pm 0.19\text{mm}$	

Testing method

Set axial offset to 0.3mm to 0.5mm with respect to the virtual pre-cast hole size ($\phi 6.8$), drill the hole, then measure difference with target position.

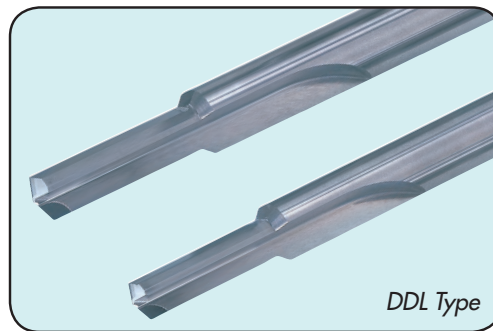
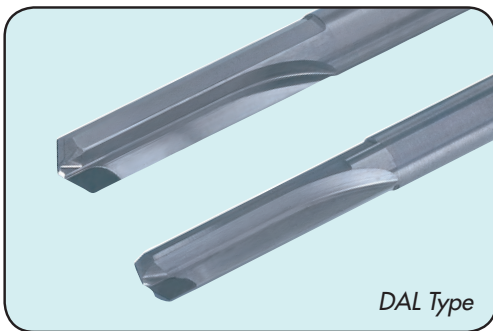


Drill: MDW0850NHGS5 (DL1300) Work material: AC4C-T6
 Cutting Speed: $v_c=200\text{m/min}$ ($n=7489\text{min}^{-1}$)
 Machine: Vertical M/C (BT30) Coolant: Emulsion

Recommended Cutting Conditions (v_c : Cutting Speed m/min f : Feed Rate mm/rev)

Drill Diameter (mm)		Aluminum Casting / Die Cast Aluminum	Wrought Aluminum Alloy
$\phi 3.00$ to $\phi 6.00$	V_c	80 to 200	80 to 200
	f	0.2 to 0.6	0.2 to 0.4
up to $\phi 10.00$	V_c	100 to 250	100 to 250
	f	0.4 to 0.8	0.2 to 0.5
up to $\phi 16.00$	V_c	120 to 250	120 to 250
	f	0.4 to 1.0	0.3 to 0.6

SUMIDIA Drills DAL / DDL / DML Type



DAL Type / DDL Type $\phi 5$ to $\phi 12\text{mm}$

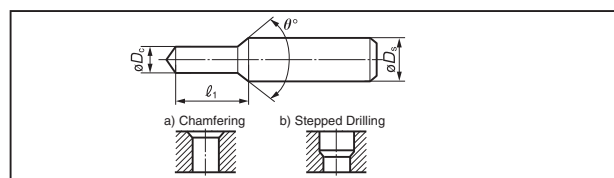
From general to High Precision Drilling of Aluminum Alloys!

- High precision DAL type is able to produce holes of IT Class of 7 to 8.
- General DDL type is able to produce holes of IT class of 11 to 12, mainly for drilling of pre-tap holes.
- DML type is the DDL type with a chamfering edge allowing it to drill and chamfer simultaneously.

Recommended Cutting Conditions

Tool ϕD_c (mm)	Cutting Speed (m/min)	Feed Rate (mm/rev)	Depth	Oil
up to $\phi 8.0$	80 to 250	0.05 to 0.2	L/D=Below 3	Water soluble
$\phi 8.1$ and above		0.1 to 0.3		

DML Type Possible Profiles



- ① ℓ_1 tolerance for dimension 1 is more than $\pm 0.2\text{mm}$
- ② θ° is less than 180°
- ③ a) Chamfering, b) Stepped drilling possible

New



SEC-GOALMILL Series





■ General Features

SEC-GOALMILL cutters use tangential mounted screw-locking inserts developed for high efficiency machining and finishing of cast iron parts such as engine cylinder blocks, transmission cases, etc.

■ Characteristics

- Special cutters for high feed machining of cast iron
- Highly reliable shoulder milling cutter with tangential inserts
- Multi-edge design (approx. 3 edges per inch)
- Finishing models feature an easy-to-use edge runout fine adjustment
- Chipbreaker type inserts for low cutting force

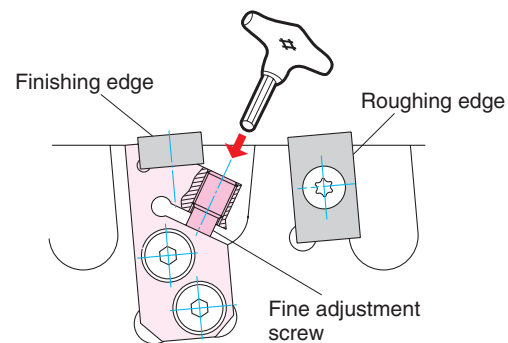
■ Series

Series Code	GRV Type	GFV Type	Special (Lightweight type) *1	Special (Lightweight type) *2
Application	Roughing	Finishing	Finishing	Finishing
Surface Roughness	< 50Rz	< 12.5Rz	< 12.5Rz	< 12.5Rz
Appearance				
			*1 Two Piece Cutter with Slotted Hole	*2 Two Piece Cutter With Center Bolt

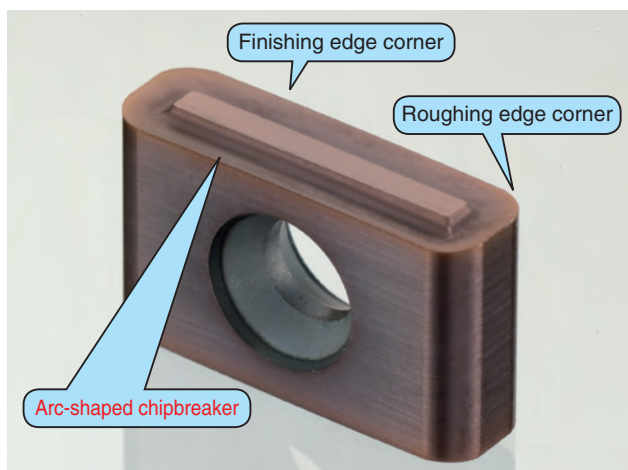
Refer to pages H93 and H94 of ['11-'12 GENERAL CATALOGUE] for details and specifications on the two piece mounting system and adapter.

■ Characteristics of the GFV Type

- The set screw finely adjusts the cutting edge.
- Easily adjust face runout accuracy of finishing edge to within 0.005mm.
Adjustment range: 0.002 to 0.1mm.
- No skill required to preset.
- Arc chipbreaker achieves high precision finished surface.
- All 8 corners of insert usable regardless of direction.



■ GFV Type Insert



Finishing Edge Adjustment on GFV Type

Fine Adjustment of the Finishing Cartridge

- (1) Note the roughing insert with the highest edge.
- (2) Make sure the fine adjustment screw for the finishing edge is loose.
- (3) Raise the height of the edge on the finishing cartridge 30 to 50 μm higher than the highest roughing insert.
- (4) Adjust the runout of each finishing insert to within 5 μm of the raised edge.

High Feed Roughing for Cast Iron

New

Rake Angle	Radial	-14° to -6°
	Axial	-5°



P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-Ferrous Metal	Exotic Alloy	Hardened Steel



Fig 1

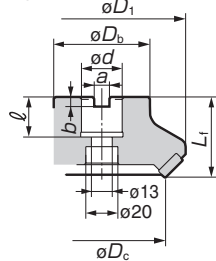


Fig 2

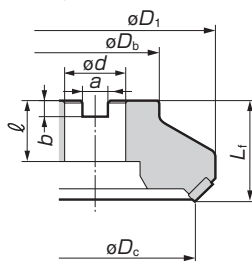


Fig 3

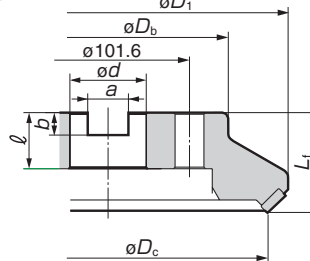
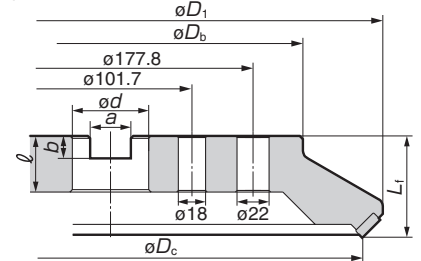


Fig 4



Body

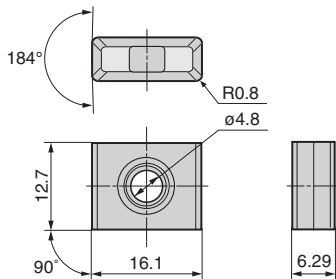
Cat. No.	Stock	Dimensions (mm)								Total Teeth	Weight (kg)	Fig
		ϕD_c	ϕD_1	ϕD_b	L_f	ϕd	a	b	ℓ			
GRV 16080R/L		80	104	60	50	25.4	9.5	6	25	9	1.9	1
GRV 16100R/L		100	124	70	50	31.75	12.7	8	32	12	3.2	2
GRV 16125R/L		125	149	80	63	38.1	15.9	10	38	15	4.3	2
GRV 16160R/L		160	184	120	63	50.8	19	11	38	18	5.7	2
GRV 16200R/L		200	225	150	63	47.625	25.4	14	35	24	8.1	3
GRV 16250R/L		250	275	200	63	47.625	25.4	14	35	30	13.5	3
GRV 16315R/L		315	340	240	80	47.625	25.4	14	35	36	21.6	4

Inserts are not included.

Please use hexagonal bolt (JISB1176) M12 x 30 tp 35 mm for securing $\phi 80$ cutter to the arbor

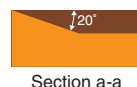
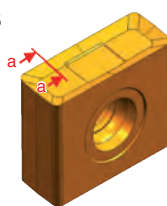
Insert

P Steel **M** Stainless Steel **K** Cast Iron **N** Non-Ferrous Metal **S** Exotic Alloy **H** Hardened Steel



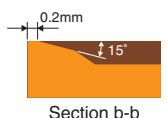
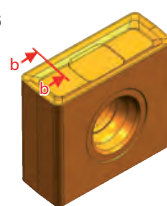
General Purpose G-Type

Fig 5



Strong Edge H Type

Fig 6



Grade		Coated Carbide			Fig	Application	Remarks
Application	High Speed/Light	K	K				
	General Purpose	K	K				
	Roughing			K			
Cat. No.		ACK100	ACK200	ACK300			
LNMX 160608PNSN-G			●	●	5	General Purpose	Recommended
LNMX 160608PNSN-H		●	●	●	6	Heavy interrupted cutting and other unstable applications	

Spare Parts

Screw	Wrench	Anti-seizure Cream	Recommended Tightening Torque (N·m)
BFTX0412N	TTX15W	SUMI-P	3.0

Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed v_c (m/min) Min. - Optimum - Max.	Feed Rate f_z (mm/t) Min. - Optimum - Max.	Grade
K	Cast Iron	250HB	200-250-300	0.15-0.23-0.30	ACK200 ACK300

● : Standard stocked item Blank : Made-to-order item

High-Feed Mill For Cast Iron SEC-GOALMILL Series

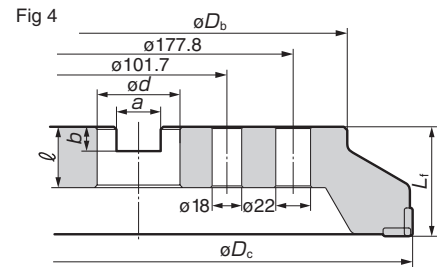
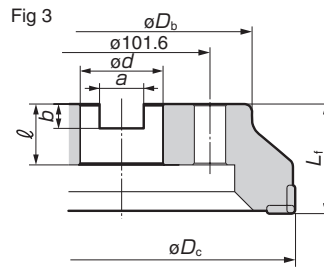
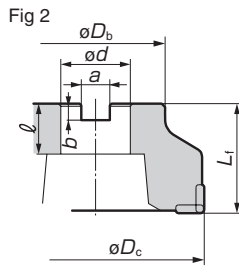
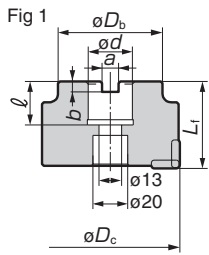
High Feed Finishing for Cast Iron

New

Rake Angle	Radial	-8°
	Axial	-5°

1 mm 90°

P	M	K	N	N	S	H
Steel	Stainless Steel	Cast Iron	Non-Ferrous Metal	Non-Ferrous Metal	Exotic Alloy	Hardened Steel



Body

Cat. No.	Stock	Dimensions (mm)							Total Teeth	Weight (kg)	Fig
		ϕD_c	ϕD_b	L_f	ϕd	a	b	ℓ			
GFV 16080R/L		80	60	50	25.4	9.5	6	25	8	1.5	1
GFV 16100R/L		100	70	50	31.75	12.7	8	32	12	1.7	2
GFV 16125R/L		125	80	63	38.1	15.9	10	38	16	3.3	2
GFV 16160R/L		160	120	63	50.8	19	11	38	20	6.4	2
GFV 16200R/L		200	150	63	47.625	25.4	14	35	28	7.8	3
GFV 16250R/L		250	200	63	47.625	25.4	14	35	36	12.6	3
GFV 16315R/L		315	240	80	47.625	25.4	14	35	44	21.0	4

Inserts are not included.

Please use hexagonal bolt (JISB1176) M12 × 30 to 35 mm for securing $\phi 80$ cutter to the arbor

Insert

P Steel M Stainless Steel K Cast Iron N Non-Ferrous Metal S Exotic Alloy H Hardened Steel

Grade	Coated Carbide	Carbide	
Application	High Speed/Light	K	K
	General Purpose	K	K
	Roughing	K	K
Cat. No.	ACK300	H10E	
LNGX160516PNFN-W			

Cartridge Parts

					Recommended Tightening Torque (N·m)
GFVK5R/L	BTD05F09	TTX15W	BFTX03588	BX0418	

*Finishing cartridges do not come assembled with inserts.
Anti-seizure cream SUMI-P included in the package.

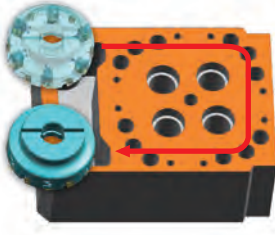
Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed v_c (m/min) Min. - Optimum - Max.	Feed Rate f_z (mm/t) Min. - Optimum - Max.	Grade
K	Cast Iron	250HB	200-250-300	0.15-0.33-0.50	ACK300

Blank : Made-to-order item


Application Examples

Application: Finishing

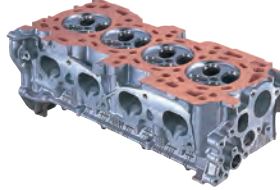
Work		Sumitomo's tool	Competitor's tool	
Work part: Engine C/H for construction machinery Work material: FC (E771) Roughness: Ra: 2.5 to 3.2 μm Initial roughness: 0.6 μm Machine: Special-purpose machine	Grade	K10+PVD	Equivalent	
	v_c (m/min)	107		
	v_f (mm/min)	680		
	Feed rate (mm/out edge)	Rough edge 0.30	0.19	
	a_p (mm)	0.8		
	Coolant	Dry		
	Tool diameter	ϕ 355		
	No. of inserts	24 roughing, 4 finishing	38	
	Insert shape	GVF Type	Wedge type	
	Results	Grade	Output/Corners 300 600 900	
		K10+PVD	1000	
Competitor's tool	300			
Evaluation	Tool life, surface roughness, operability of fine tuning mechanism			

With 24 finishing cut edges, surface roughness was poor due to slight chattering caused by use of old machine. By reducing cut edges from 24 to 4 chattering stopped and tool life improved.

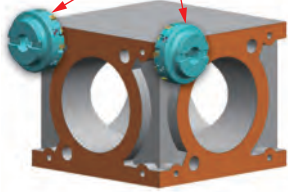
Application: Finishing

Work		Sumitomo's tool	Competitor's tool	
Work part: Top surface of C/B Work material: FC250 Roughness: Rz10 μm or smaller Initial: 2.86 μm 300 blocks: 2.95 μm 600 blocks: 4.99 μm Flatness: 0.025 $\mu\text{m}/\square$ 76 Machine: Special-purpose machine	Grade	K10+PVD	K10 carbide	
	v_c (m/min)	335		
	v_f (mm/min)	2240		
	Feed rate (mm/out edge)	0.31/0.31	0.2	
	a_p (mm)	0.3 to 0.5		
	Coolant	Dry		
	Tool diameter	ϕ 266.7		
	No. of inserts	18 roughing, 18 finishing	All 28 finishing based on prev. specifications	
	Insert shape	GVF Type	Wedge type	
	Results	Grade	Output/Corners 300 600 900	
		K10+PVD	600	
Competitor's tool	300			
Evaluation	Tool life (criteria edge chipping), surface roughness			

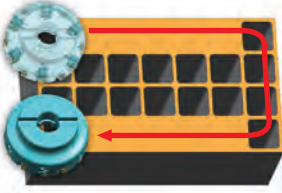
Application: Finishing

Work		Sumitomo's tool	Competitor's tool	
Work part: C/H mating surface Work material: FC material (details unknown) Roughness: Rz: 13.5 μm Initial roughness: up to 5.5 μm Flatness: 12 μm Initial flatness: up to 5 μm	Grade	K10+PVD	Equivalent	
	v_c (m/min)	223		
	v_f (mm/min)	1762		
	Feed rate (mm/out edge)	0.37(0.37)	0.17(2.2)	
	a_p (mm)	0.5		
	Coolant	Wet		
	Tool diameter	ϕ 355		
	No. of inserts	48 (effective 24)	52 roughing + 4 finishing	
	Insert shape	GVF Type	∇ TA wedge + lengthwise W	
	Results	Grade	Output/Corners 300 600 900	
		K10+PVD	700	
Competitor's tool	300			
Evaluation	Tool life			

Application: Finishing


Work		Sumitomo's tool	Competitor's tool	
Work part: C/B for ships Work material: FC250 Roughness: Ra: 1.6 μm Machine: Large horizontal plane miller	Grade	K20+PVD	K grade	
	v_c (m/min)	160		
	v_f (mm/min)	900	400	
	Feed rate (mm/out edge)	0.25(0.25)		
	a_p (mm)	0.2		
	Coolant	Dry		
	Tool diameter	ϕ 315		
	No. of inserts	22 (effective 22)		
	Insert shape	GVF Type	Special tool	
	Results	Grade	Output/Corners 300 600 900	
		K10+PVD	300	
Competitor's tool	300			
Evaluation	Favourable with better efficiency			

Application: Finishing

Work		Sumitomo's tool	Competitor's tool	
Work part: Die holder Work material: FCD600 (W2.0m x L2.5m)	Grade	K20+PVD	K grade	
	v_c (m/min)	252	252	
	v_f (mm/min)	2000	300	
	Feed rate (mm/out edge)	0.42	0.42	
	a_p (mm)	0.5		
	Coolant	Dry		
	Tool diameter	ϕ 100		
	No. of inserts	12 (effective 6)	ASX400 + 1 finishing	
	Insert shape	Lengthwise screw-on	Flat screw-on	
	Results	Grade	Output/Corners 200 400 600	
		K10+PVD	380	
Competitor's tool	350			
Evaluation	Formally adopted for improved efficiency			


* Finishing cutter used after roughing

Application: Finishing


Work		Sumitomo's tool	Competitor's tool	
Work part: Front and rear surfaces of C/B Work material: FC250 + Al (Si within 12%) Roughness: Ra: 1.8 to 3.2 μm Initial: 0.18 to 0.45 μm Flatness: within 0.1 Machine: Specialized machine	Grade	K10+PVD	Equivalent	
	v_c (m/min)	181		
	v_f (mm/min)	850		
	Feed rate (mm/out edge)	0.23	0.15	
	a_p (mm)	0.5		
	Coolant	Wet		
	Tool diameter	ϕ 400		
	No. of inserts	52 (effective 26)	40	
	Insert shape	GVF Type	Wedge type	
	Results	Grade	Output/Corners 200 400 600	
		K10+PVD	500	
Competitor's tool	200~350			
Evaluation	Operability of adjustment mechanism			

Note: Aluminum and cast iron cut at same time.

Application: Finishing

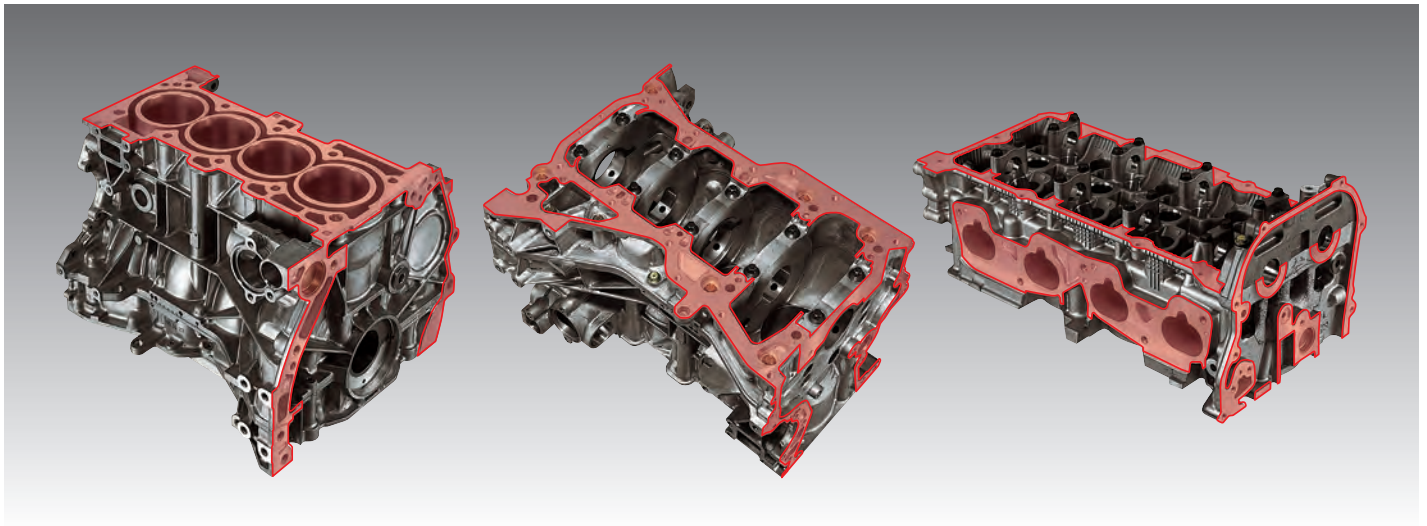
Work		Sumitomo's tool	Competitor's tool	
Work part: C/B Work material: GG25 (FC250) Roughness: Ra: 3.2 μm Flatness: 15 μm Area of cut: front and rear surfaces (see arrow) Machine: Specialized machine	Grade	K10/20+PVD	K10+PVD	
	v_c (m/min)	200		
	v_f (mm/min)	1800~2500		
	Feed rate (mm/out edge)	0.44~0.61	0.39~0.54	
	a_p (mm)	0.5~0.8		
	Coolant	Wet		
	Tool diameter	ϕ 125		
	No. of inserts	16 (effective 8)	18 (effective 9)	
	Insert shape	GVF Type	Lengthwise, screw-on	
	Results	Grade	Output/Corners 200 400 600	
		K20+PVD K10+PVD	380 600	
Competitor's tool	350			
Evaluation	Customer liked operability of fine tuning mechanism			

Application: Finishing

Work		Sumitomo's tool	Competitor's tool	
Work part: Top surface of C/B Work material: FC250 Roughness: Rmax2.96 μm Machine: Specialized machine	Grade	K10+PVD	CBN	
	v_c (m/min)	362		
	v_f (mm/min)	1400		
	Feed rate (mm/out edge)	0.16/0.16	0.10	
	a_p (mm)	0.5		
	Coolant	Dry		
	Tool diameter	ϕ 240		
	No. of inserts	18 roughing, 18 finishing	All 28 finishing based on prev. specifications	
	Insert shape	GVF Type	Wedge type	
	Results	Grade	Output/Corners 150 300 450	
		K10+PVD	300	
Competitor's tool	300			
Evaluation	Same life and surface roughness as CBN			

Champion data for Goal Mill life was 388 but 300 provides stable production.

High Speed Mill for Cast Iron SUMIBORON RM Type



Recommended Cutting Conditions (SUMIBORON)
 $V_c = 800$ to $1,500$ m/min
 $f_z = 0.05$ to 0.20 mm/t
 $a_p = 0.3$ to 3.0 mm
Dry

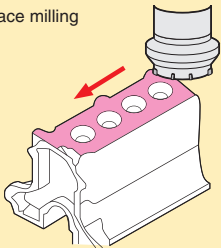



Characteristics

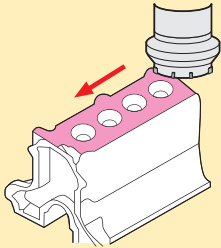
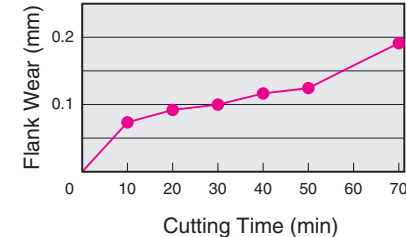
- Uses high strength SUMIBORON inserts BNS800 for use in high speed, high efficiency machining applications.
- Economical, 8 cornered solid insert is regrindable.
- Features a shim-based fine tuning mechanism designed for front wedge clamping to allow regrinding.

Regrinding Notes

- Inserts can only be reground once (inscribed circle dimension must be at least 9.125mm)
- When using a reground insert, make sure all inserts are also reground.
- Do not mix new and reground inserts on a single cutter setting.

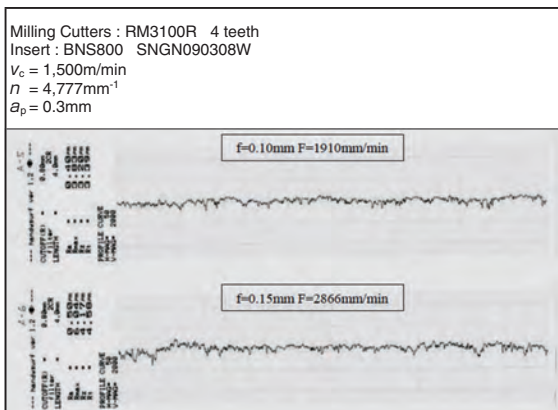
Application Examples

Process details		Conditions		
<p>High Speed Milling of a Cylinder Block Work Material : FC250 Process details : Face milling</p> 	Grade	BNS800 / BN500 / Comp. CBN		
	Insert	SNGN090308W		
	Cutters (pcs.)	8		
	v_c (m/min)	2,500		
	f_z (mm/t)	0.12		
	a_p (mm)	0.3		
	Coolant	Dry		
Results	<p>☆With its excellent fracture resistance, the cutting edge of the BNS800 showed minimal chipping and no signs thermal cracks after 50 passes, thus outliving the tool life of competitor CBN and BN500 grades.</p>			
		BNS800	BN500	Comp. Solid CBN

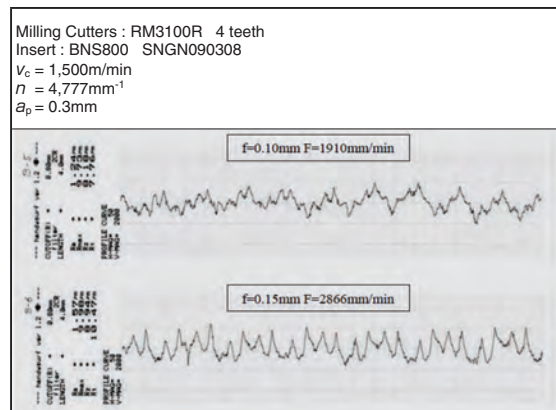
Process details		Conditions	
<p>Milling Top Surface of a Cylinder Block Work Material : FC250 Process details :</p> 	Grade	BNS800	
	Insert	SNGN090308	
	v_c (m/min)	1,600	
	f_z (mm/t)	0.13mm/tooth	
	a_p (mm)	1.5mm	
	Coolant	Dry	
Results	<p>☆Tool life criteria: Surface roughness</p> 		

Surface Roughness With / Without Wiper Edge

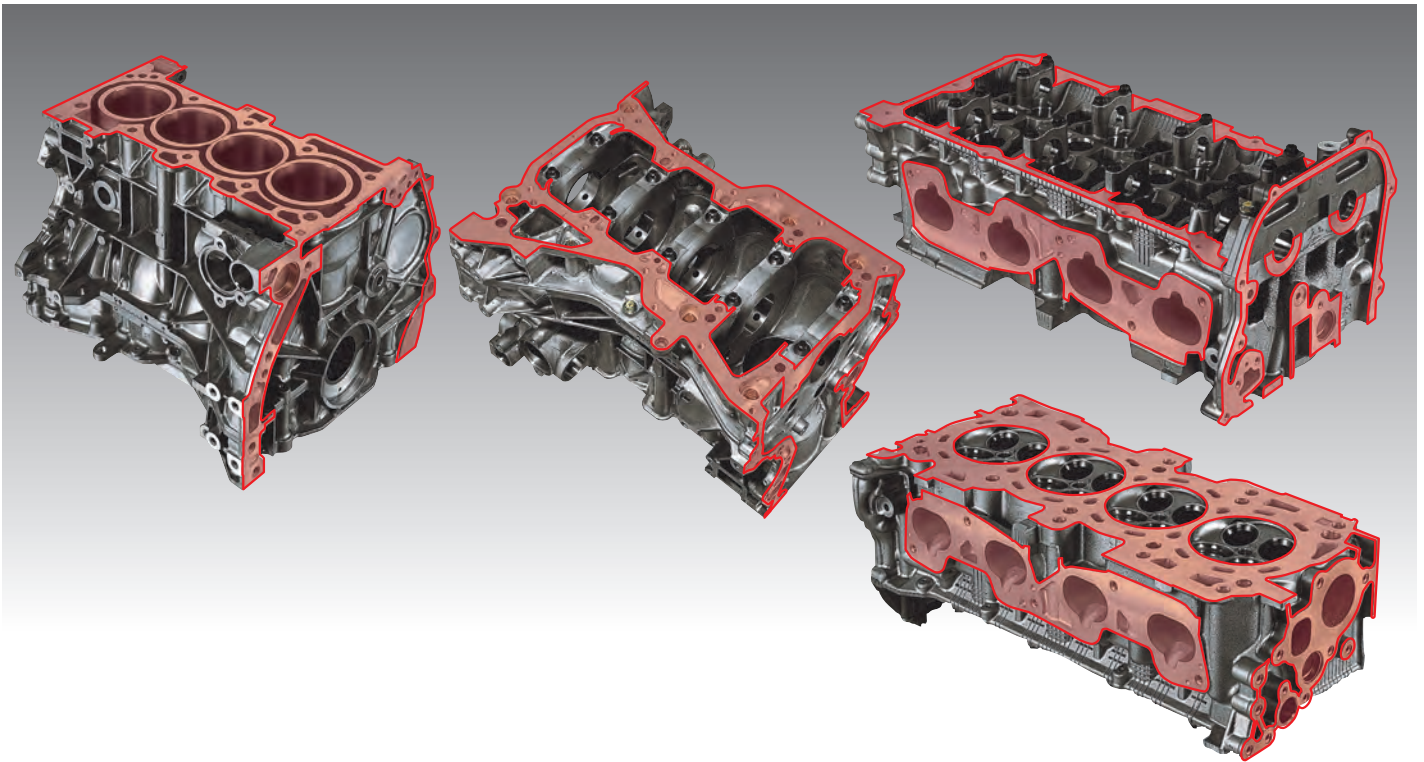
Surface Finish (With Wiper Edge)



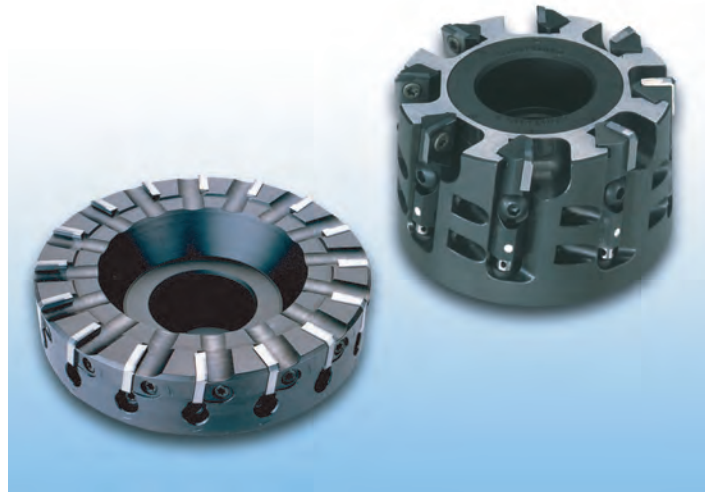
Surface Finish (Without Wiper Edge)



Cutter for High-Speed Finishing of Cast Iron BN Finish Mill



▼ SUMIBORON BN Finish Mill FM Type
BN Finish Mill EASY FMU Type ▼



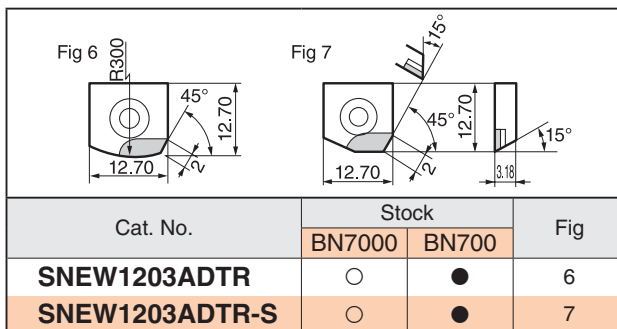
Characteristics

- Uses SUMIBORON inserts and features a part flyout safety mechanism for use in high speed machining at $V_c=1500$ m/min.
- Unique edge design holds surface roughness to $Rz3.2$ ($Ra1.0$) μm .
- Cutting edge run-out stays within 10 μm just by attaching the cartridge. Cartridges can be assembled off-line for easy adjustment. (FMU Type)

- Specifications** Cutter Size : $\phi 80$ to $\phi 315$ (FMU Type)
 : $\phi 40$ to $\phi 63$ (FMU-E Type)
 Standard Insert : SNEW1203ADTR
 Low Cutting Force Type Insert : SNEW1203ADTR-S

- Application** Pearlite matrix FC250 to FC300 (200HB to 250HB) and Ferrite matrix 130HB to 160HB.
 Examples: Engine block, Cylinder block, etc.

Insert



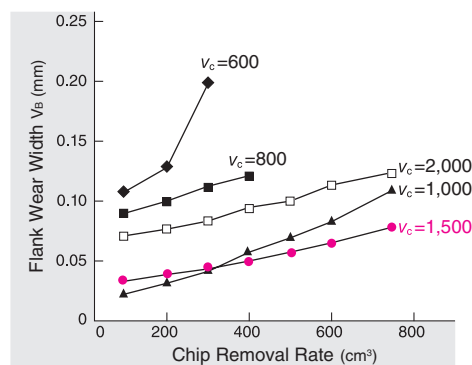
* -S denotes low cutting force insert



Recommended Cutting Conditions : $v_c=800$ to $2,000$ m/min, $f_z=0.1$ to 0.3 mm/t, $a_p=0.5$ mm or less. Dry

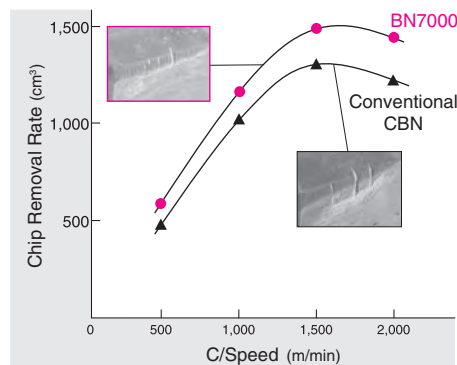
Cutting Performance

• Tool life diagram



Work material : FC250 240HB (Pearlite)
 Cutting Speed : $v_c=600$ to $2,000$ m/min
 Feed Rate : $f_z=0.15$ mm/t
 D.O.C. : $a_p=0.5$ mm Dry
 Grade : BN700

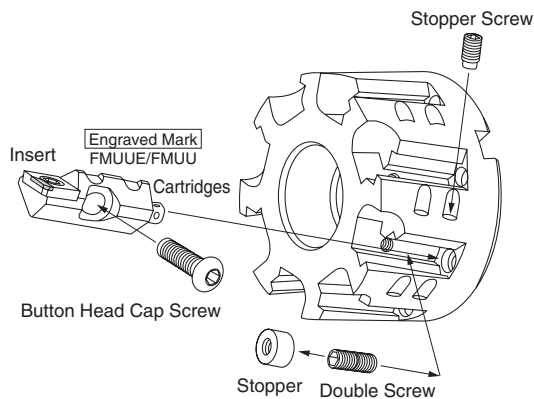
• Estimated tool life



Work material : FC250 (Pearlite)
 Cutting Speed : $v_c=500$ to $2,000$ m/min
 Feed Rate : $f_z=0.2$ mm/rev
 D.O.C. : $a_p=0.3$ mm Dry
 Grade : FMU4100R SNEW1203ADTR

Structure

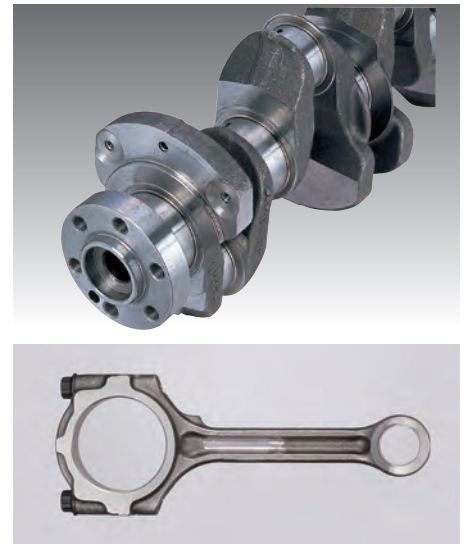
1. The EASY type is comprised of the cutter body, cartridges, and inserts.
2. Cartridge position is established by pressing it against the stopper built into the cutter body. (Stopper is factory adjusted and ready for use.)
3. Main clamp screw tightens the cartridge in the cutter.
4. Tighten the sub clamp screw to prevent inserts from dislodging by centrifugal force.



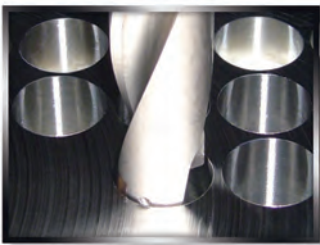
Application Examples

Work Material ① Part Name ② Materials	Tool Cat. No.	Cutting Conditions v_c =Cutting speed (m/min) v_f =Feed Rate (mm/min) f_z =Feed Rate (mm/t) a_p =Depth of cut (mm) Dry	Results
① Cylinder Block Top Surface ② Equivalent to FC300	FMU4250R 24 teeth	$v_c=996$ m/min $v_f=2,437$ mm/min $f_z=0.08$ mm/t $a_p=0.3$ mm Dry	● Tool life 5,000 parts ● Surface finish: 0.3 to 0.4Ra
① Cylinder Block Top Surface ② Equivalent to FC300	FMU4250R 12 teeth	$v_c=860$ m/min $v_f=3,600$ mm/min $f_z=0.15$ mm/t $a_p=0.18$ mm Dry	● Tool life 3,000 parts ● Surface roughness meets 3Rz
① Cylinder Block Bottom Surface ② Equivalent to FC250	FMU4160R 12 teeth	$v_c=1,500$ m/min $v_f=3,600$ mm/min $f_z=0.10$ mm/t $a_p=0.5$ mm Dry	● Tool life 3,500 parts
① Machine Parts Case ② Equivalent to FC250	FMU4200R 8 teeth	$v_c=1,500$ m/min $v_f=2,860$ mm/min $f_z=0.15$ mm/t $a_p=0.3$ mm Dry	● Tool life 8 hours
① Valve Parts ② Equivalent to FC250	FMU4160R 6 teeth	$v_c=1,800$ m/min $v_f=2,860$ mm/min $f_z=0.10$ mm/t $a_p=0.1$ mm Dry	● Tool life for 5,000 parts
① Motor Mount ② Equivalent to FC250	FMU4160R 12 teeth	$v_c=720$ m/min $v_f=1,400$ mm/min $f_z=0.08$ mm/t $a_p=0.13$ mm Dry	● Tool life 10 hours

Indexable Drills SumiDrill WDX Type



Balanced Design for Stable High Quality Drilling!



Balanced design for high quality drilling



Uses new ACP300/ACK300 grades



3 types of chipbreakers for various applications

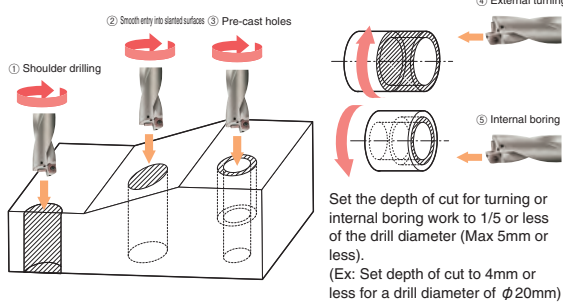


Also suitable for turning

Versatile Tool for a Variety of Machining Applications

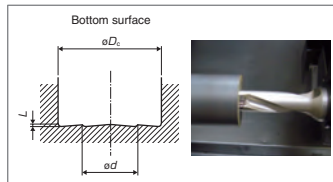
A special hard surface treatment gives added durability, allowing stable, long-term drilling in a variety of applications including hole widening and spot facing.

Suitable for Various Applications



Near-flat Bottom of Hole

Finishing is easy because bottom of hole is almost flat!



Bottom Surface Dimensions

Drill dia. ϕD_c	ϕd	L (Max. step)
$\phi 13.0$ to $\phi 18.0$	$\phi D_c / 2$	0.4
$\phi 18.5$ to $\phi 28.5$	$\phi D_c / 2$	0.6
$\phi 29.0$ to $\phi 36.0$	$\phi D_c / 2$	0.8
$\phi 37.0$ to $\phi 55.0$	$\phi D_c / 2$	1.2
$\phi 56.0$ to $\phi 68.0$	$\phi D_c / 2$	1.2

Series

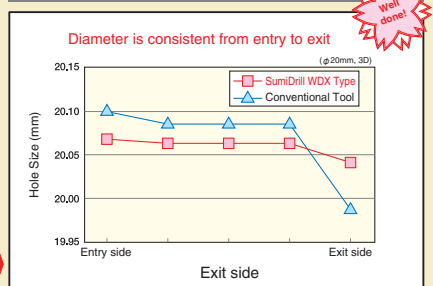
(Units: mm)

Drilling Depth	Stock Size	Made to Order Sizes
2D	$\phi 13.0$ to $\phi 65.0$	$\phi 66.0$ to $\phi 68.0$
3D	$\phi 13.0$ to $\phi 65.0$	$\phi 66.0$ to $\phi 68.0$
4D	$\phi 13.0$ to $\phi 60.0$	$\phi 61.0$ to $\phi 63.0$
New 5D	$\phi 13.0$ to $\phi 36.0$	$\phi 37.0$ to $\phi 55.0$

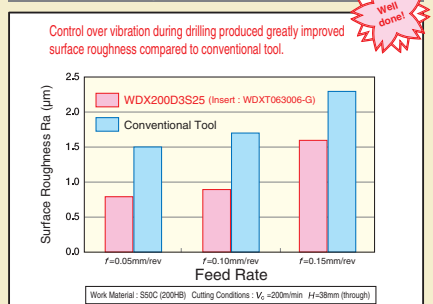
Balanced Design for Stable and Precision Drilling with Good Surface Roughness

High Quality Drilling

Hole Diameter Comparison



Surface Roughness Comparison



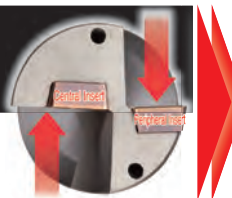
Unsurpassed

Balanced Design!

▶▶ Cutting resistance of inner insert \approx that of outer insert ◀◀

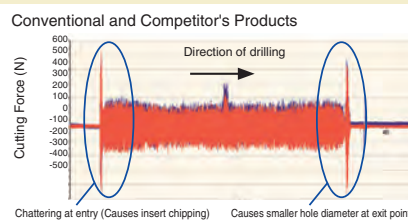
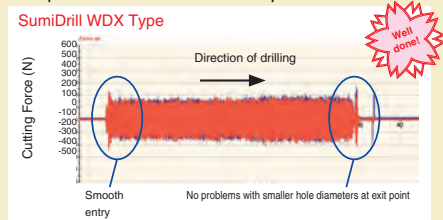
Advantages of the Balanced Design

Cutting resistance during machining is balanced between central and peripheral inserts, and the relative position of each insert are optimized to provide stable drilling.

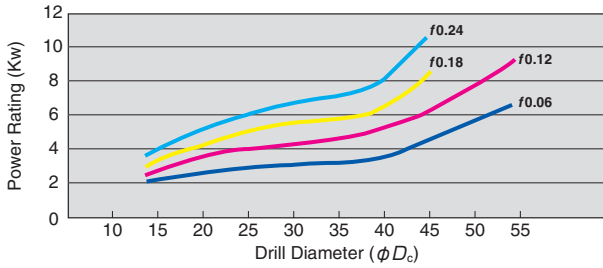


Comparison of Horizontal Component of Force

Balance is maintained at the entry and exit points, and drilling is stable.



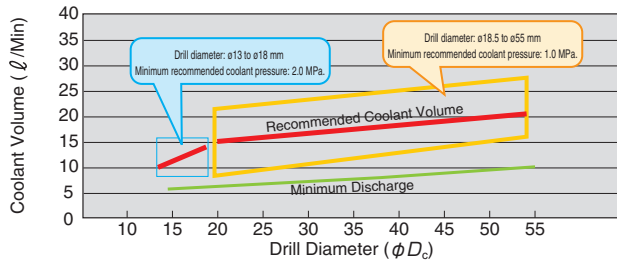
Typical Power Ratings



<CAUTIONS>

- Power ratings are subject to change based on conditions such as work material and cutting speed and should only be used for reference.
- Cutting Conditions (Reference)
Work material : S50C (230HB)
Cutting speed : $v_c=150\text{m/min}$

Typical Coolant Volume



<CAUTIONS>

- Coolant volume is a factor that affects drilling performance, particularly with respect to chip evacuation and lubricity.
- Coolant pressure should be set higher for smaller diameter drills. ($\phi 18.0\text{ mm}$ or smaller)
- Coolant volume is usually adjusted by changing the coolant pressure provided on most CNC machines.
- This table provides guideline values only. More coolant may be required depending on the machine, coolant, and work material.



Application Examples



Work material : Automotive components (SUS304)
 Tool : WDX220D2S25
 Insert : WDXTO63006-L (ACP300)
 Cutting Conditions : $v_c=125\text{m/min}$ $f=0.07\text{mm/rev}$ $H=5\text{mm}$, through hole, Wet

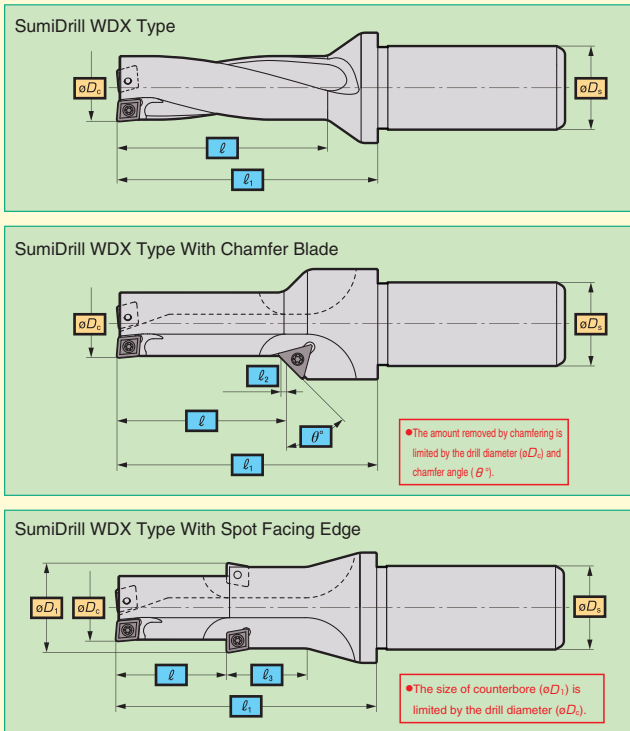
Resolved chipping on inserts, improved chip management, and left a cleaner machined surface.

Special Order Inquiry Form

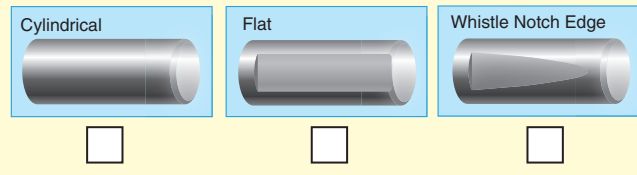
Select the desired special type and enter the dimensions in the table below.
 Give this form to your nearest sales office or dealer.
 For inquiries about other specifications including other shapes and dimensions, feel free to contact us.

Your Company / Contact Information

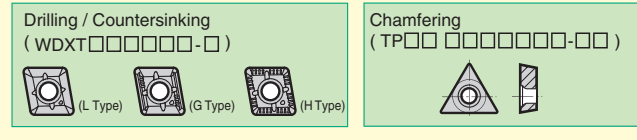
Drill Shape



Cutter Body



Applicable Insert



ϕD_c [Diameter]	$\phi 13$ to $\phi 55\text{mm}$	mm
ϕD_s (*) [Shank Diameter]	$\phi 20$ to $\phi 40\text{mm}$	mm
ϕD_1 [Counterbore dia.]	ϕD_c+2 to 20mm	mm
ℓ [Drill Depth]	$\phi D_c \times 4$ or less	mm
ℓ_1 (*) [Length Below Neck]	200mm or less	mm
ℓ_2 [Chamfering width]	3mm or less	mm
$\ell + \ell_3$ [Drill Depth + Countersinking Depth]	$\phi D_c \times 4$ or less	mm
θ° (*) [Chamfering Angle]	15 to 60°	°

* Note, dimensions may be subject to limitations.

Other requests

Super MultiDrill GS Type / HGS Type



Featuring J Flute, DEX Coating, W Margin (HGS Type only)!!

1 New J-grooved Flute

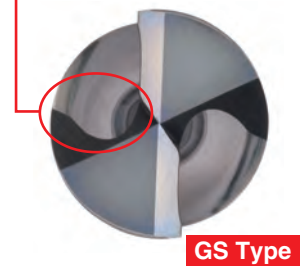
Unique wide and smooth flute shape significantly improves chip management and evacuation.

- Stable drilling with little vibration even in small machine applications.
- Chip Management

GS Type	Conventional Tool
Compact chips	
Work Material : S50C (200HB)	
Tool : MDW0800GS4	
Cutting Conditions : $V_c=80\text{m/min}$ $f=0.25\text{mm/rev}$ $H=24\text{mm}$ External coolant (Water soluble)	

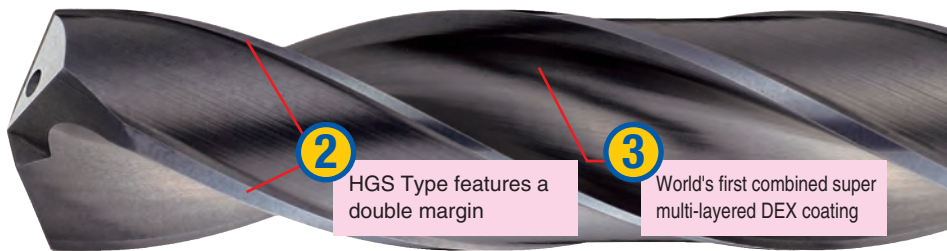


1 Large pocket allows smooth chip evacuation at center of drill.



2 Featuring a Double Margin (HGS Type) *Except sizes $\phi 1.5$ to $\phi 2.4$ mm.

The HGS type features a double margin for stable deep drilling and improved hole accuracy.



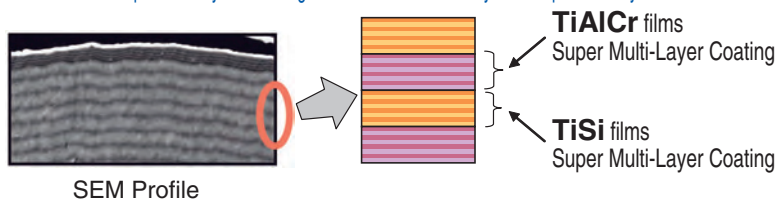
3 Special Drill Coating DEX Coating

Our unique next-generation drill coating utilizes nano-coating technology to provide more than double the tool life of conventional coatings.

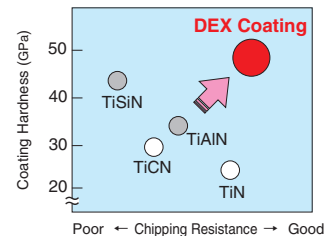
- Silicon and chrome improve wear, heat, and adhesion resistance.
- New super multi-layered structure offers significantly improved chip resistance (coating strength).

Coating Structure

World's first combined super multi-layered coating is made from alternate layers of super multi-layered substrates.



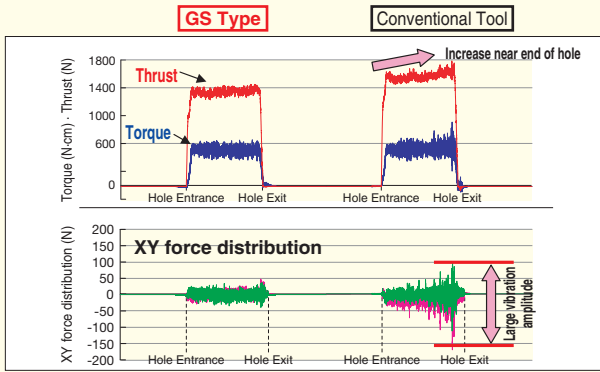
Characteristics of Coatings



World's First!
Super Multi-Layer Coating

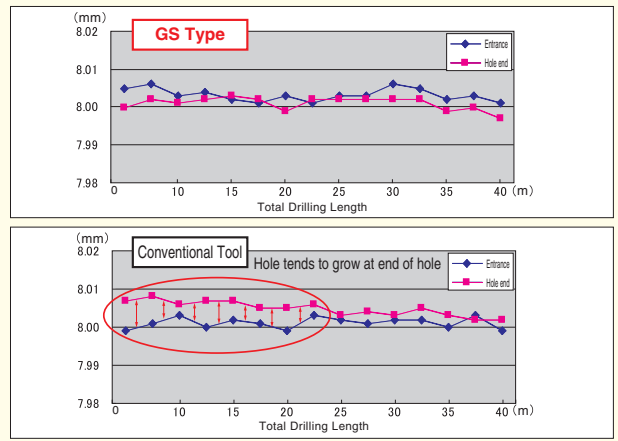
1 Performance Comparison

GS type provides stable drill behavior from throughout the drilling process

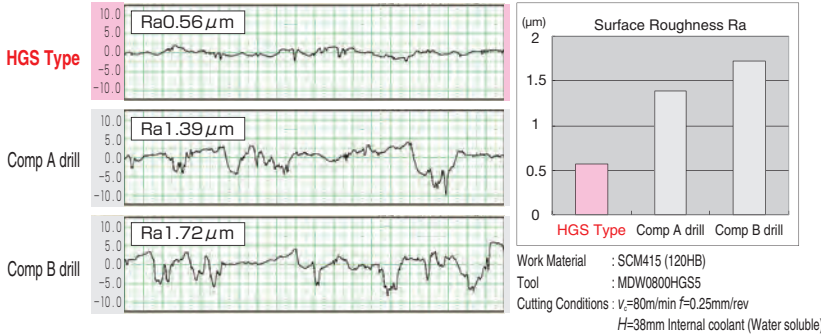


Work Material : S50C (200HB)
 Tool : MDW0800GS4
 Cutting Conditions : $v_c=80\text{m/min}$ $f=0.25\text{mm/rev}$ $H=24\text{mm}$ External coolant (Water soluble)

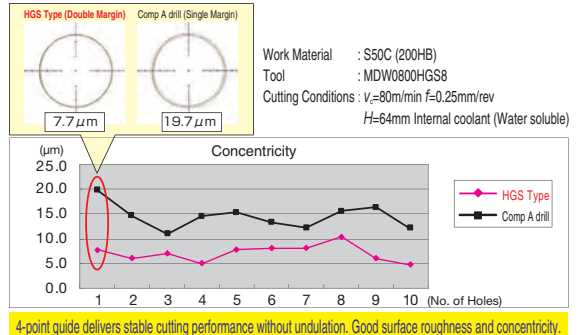
Controls against enlargement at bottom of hole for greater hole accuracy



2 Surface Roughness Comparison



Concentricity comparison



3 DEX Coat Application Examples

Comparison of Wear Resistance	Comparison of Adhesion Resistance
<p>Shoulder and rake face feature improved wear resistance enabling long tool life.</p> <p>Edge Wear Comparison for 70m Drilling</p> <p>MultiDrill GS Type</p> <p>Work Material : MDW0800GS4 Tool : S50C (200HB) Cutting Conditions : $v_c=70\text{m/min}$ $f=0.25\text{mm/rev}$ $H=32\text{mm}$ Internal coolant (Water soluble)</p>	<p>Offers significantly improved fracture resistance to counter problems caused by shoulder and flute adhesion in soft steel drilling.</p> <p>Edge Wear Comparison for 70m Drilling</p> <p>MultiDrill HGS Type</p> <p>Work Material : MDW0800HGS5 Tool : SCM415 (120HB) Cutting Conditions : $v_c=80\text{m/min}$ $f=0.25\text{mm/rev}$ $H=38\text{mm}$ Internal coolant (Water soluble)</p>

Application Examples

Connection rod	Shaft	Bearing parts
<p>● S43C (250HB) Automotive Component</p> <p>Tool : MDW0970GS4 Cutting Conditions : $v_c=80\text{m/min}$, $f=0.25\text{mm/rev}$ $H=25\text{mm}$ External coolant (Water soluble)</p> <p>Achieves 1.5x tool life! Controls wear on periphery of cutting edge</p> <p>GS Type : 1,400 Holes (Wear) Comp A drill : 900 Holes (Fracture)</p>	<p>● SCR440H Automotive Component</p> <p>Tool : MDW0600HGS8 Cutting Conditions : $v_c=80\text{m/min}$, $f=0.25\text{mm/rev}$ $H=48\text{mm}$ Internal coolant (Water soluble)</p> <p>Achieves 1.3x tool life!</p> <p>HGS Type : 650 Holes (Wear) Comp A drill : 500 Holes (Breakage)</p>	<p>● SUJ2 Automotive Component</p> <p>Tool : MDW0570HGS5 Cutting Conditions : $v_c=80\text{m/min}$, $f=0.1\text{mm/rev}$ $H=35\text{mm}$ Internal coolant (Water soluble)</p> <p>Achieves 2.5x tool life!</p> <p>HGS Type : 1,500 Holes (Wear) Comp B drill : 600 Holes (Wear)</p>

Series

Coolant Supply	Cat No.	Diameter Range (mm)	Hole Depth (L/D)
External (GS Type)	MDW□□□□GS2 Type	$\phi 2.0$ to $\phi 16.0$	up to 2
	MDW□□□□GS4 Type	$\phi 2.0$ to $\phi 16.0$	up to 4

Coolant Supply	Cat No.	Diameter Range (mm)	Hole Depth (L/D)
Internal (HGS Type)	MDW□□□□HGS3 Type	$\phi 1.5$ to $\phi 16.0$	up to 3
	MDW□□□□HGS5 Type	$\phi 1.5$ to $\phi 16.0$	up to 5
	MDW□□□□HGS8 Type	$\phi 1.5$ to $\phi 16.0$	up to 8

For details on standard parts, refer to our General Catalogue and brochure.

Super MultiDrill XHT Type / PHT Type



Available in stock for drilling depths
12D, 15D, 20D, 25D, and 30D!
(Applicable hole diameters ϕ 3.0 to ϕ 14.00mm)



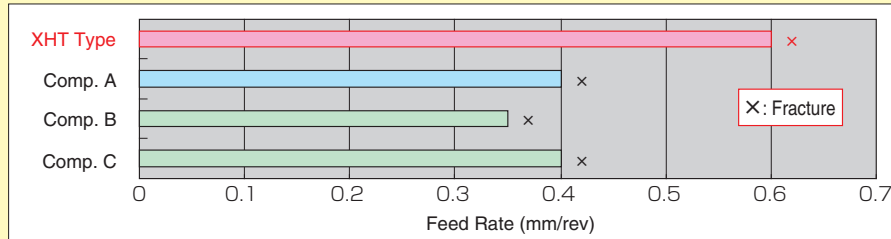
Deep Hole Drilling (30D), High Efficiency Drilling ($V_f = 700$), Long Tool Life

Characteristics of the XHT Type

1. High Rigidity Design Suitable for High Efficiency Machining.

- Optimized back taper and flute design gives drill enough rigidity for high load drilling at high feed rates.
- Double margin (for deep holes and guide holes) improves stability when drilling deep holes.

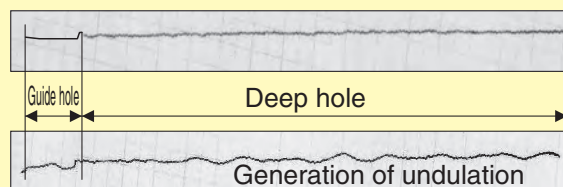
Drill Rigidity Assessment (High Feed, High Load Assessment)



Work Material: S50C (240HB)
Drill: Sumitomo MDW0497XHT25
Competitor ϕ 5 (L/D25)
Cutting Conditions: $V_c=80\text{m/min}$, $H=20\text{mm}$
Coolant supply: MQL coolant (0.65 MPa)

Comparison of Hole Surface Surface Quality

- XHT Type
Guide hole: Double margin
Deep hole: Double margin
- Competitor's Product
Guide hole: Single margin
Deep hole: Single margin



➔ The double margin is extremely effective in stabilizing the behavior of the deep hole drill.

Spindle Load Current Waveform



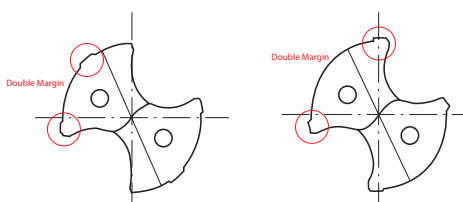
2. Excellent Chip Evacuation

- Optimized web thickness and flute design ensures smooth chip evacuation.
- Smooth surface of flute allows smooth flow of chips.

3. Improved Tool Life During High Efficiency Drilling

- Special DEX coating provides long tool life with a wide variety of work materials.

Characteristics of the W Margin



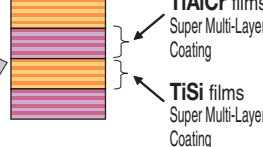
Characteristics of DEX Coating

● Coating Structure

World's first combined super multi-layered coating is made from alternate layers of two super multi-layered substrates.



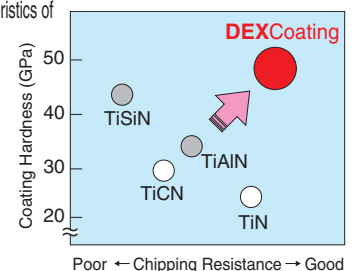
SEM Profile



TiAlCr films
Super Multi-Layer
Coating

TiSi films
Super Multi-Layer
Coating

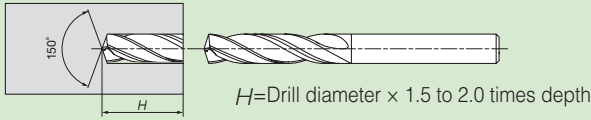
● Characteristics of Coatings



Recommended Drilling Method

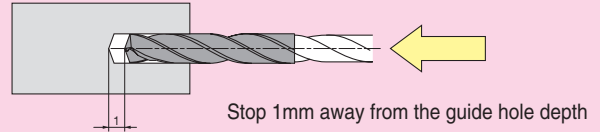
① Make a dedicated guide hole using the PHT type.

- Select the same **hole size** for the dedicated guide hole drill PHT type as the deep hole drill XHT type.
(The guide drill diameter is designed +0.03mm to +0.05 mm larger than the drill diameter)

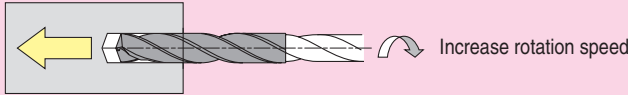


② Feed the deep hole drill XHT type through the guide hole at low rotation speed.

- Spindle Speed: 500min^{-1}
Feed Rate: 1,000 to 2,000mm/min

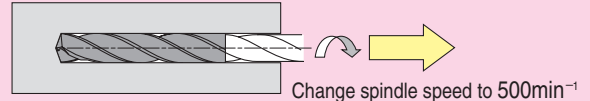


③ Increase spindle speed until the set rotation speed is reached, and start normal drilling operation.



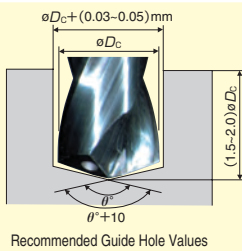
④ After drilling, reduce spindle speed and the retract drill from the work material.

- Spindle Speed: 500min^{-1} , Feed Rate: 1,000 to 2,000mm/min



Other notes

- A flat base should be prepared when the surface for the guide tool is slanted.
- When drilling through a slanted surface, reduce the drill feed to $f=0.05\text{mm/rev}$ before the drill exits.



Coolant

- Internal coolant (water soluble):
Pump pressure Steel...1.5 to 2.0MPa,
Cast Iron or Aluminum...4.0 to 6.0MPa
- Internal MQL coolant:
Air pressure 0.6MPa or more
Output volume (at cut edge)
Steel...2cc/h or more is recommended,
Cast Iron or Aluminum...20cc/h or more is recommended

Application Examples

Part: Crank Shaft (equivalent of S48C)

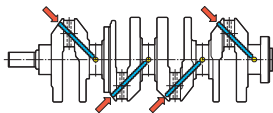
Machining line

Machine: Horizontal single axis
NC machine

Coolant supply: MQL coolant

Air pressure 0.6MPa

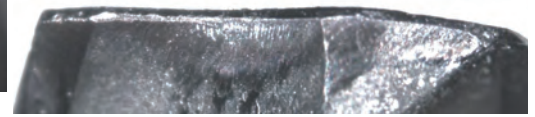
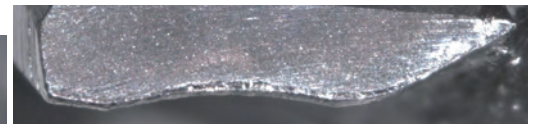
MQL volume 3cc/h



Drilling process

- 1) Drill guide hole ($\phi 6.03 \times 10\text{mm}$ drill point angle 150°)
 $v_c=80\text{m/min}$ $f=0.25\text{mm/rev}$
- 2) Drill deep hole ($\phi 6.00 \times 82\text{mm}$ XHT Type)
 $v_c=80\text{m/min}$ $f=0.25\text{mm/rev}$ $v_f=1061\text{mm/min}$

Tool life: 300 shafts (98.4m/reg)



Cutting edge photo after cutting 98.4m

Part: Automobile Shaft (equivalent of SCM415)

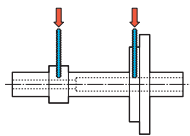
Machining line

Machine: Vertical Machining Center

Coolant supply: MQL coolant

Air pressure 0.6MPa

MQL volume 2cc/h



Drilling process

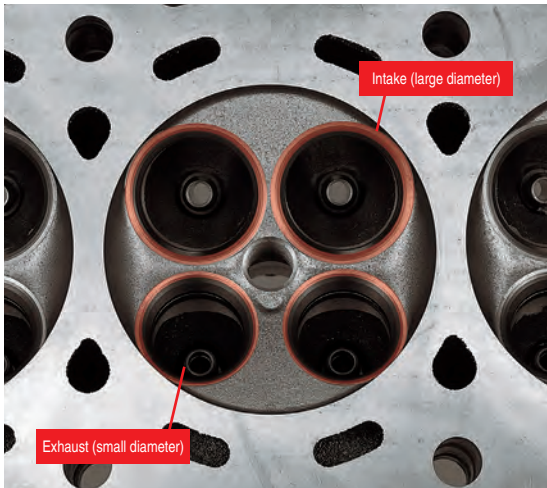
- 1) Drill guide hole ($\phi 3.50 \times 6\text{mm}$ drill point angle 150°)
 $v_c=70\text{m/min}$ $f=0.12\text{mm/rev}$
- 2) Drill deep hole ($\phi 3.47 \times 40\text{mm}$ XHT Type)
 $v_c=75\text{m/min}$ $f=0.11\text{mm/rev}$ $v_f=757\text{mm/min}$

Tool life: 1,500 shafts (60m/reg)

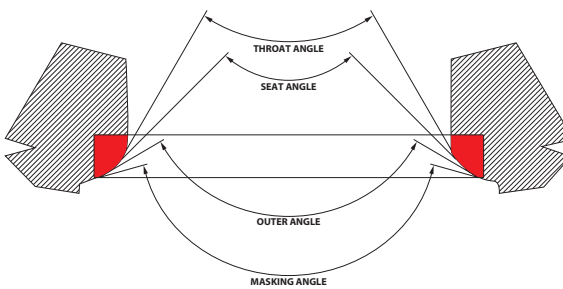


Cutting edge photo after cutting 60m

Valve Seat Cutter VSR Cutter + Reamer



● Seat Profile



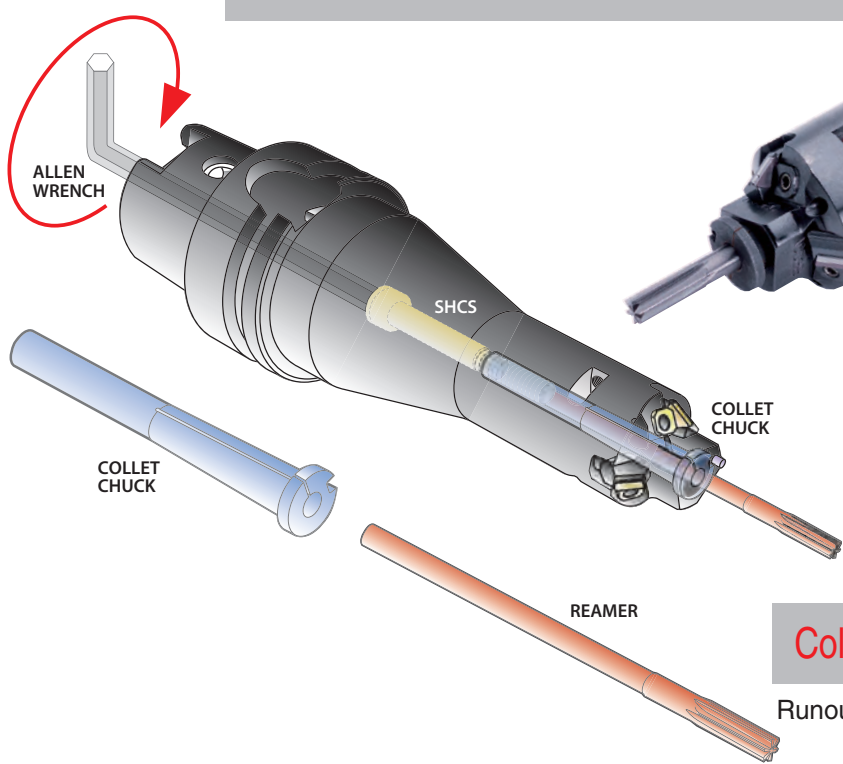
● Recommended Grade (SUMIBORON)

	Gasoline engine VSR material	Diesel engine VSR material
Plunge cut	BN7000 BN7500 BN2000 BN350	BN7000 BN7500 BN2000 BN350
Traverse cut	BN7000 BN7500 BN500	BN7000 BN7500 BN500
Hardness of work material (HV)	Low ← 300HV → High	Low ← 300HV → High

* Carbide grades may also be used.

Designed for Use on a Machining Center

Satisfies Needs for Both Indexable Inserts and Blades!

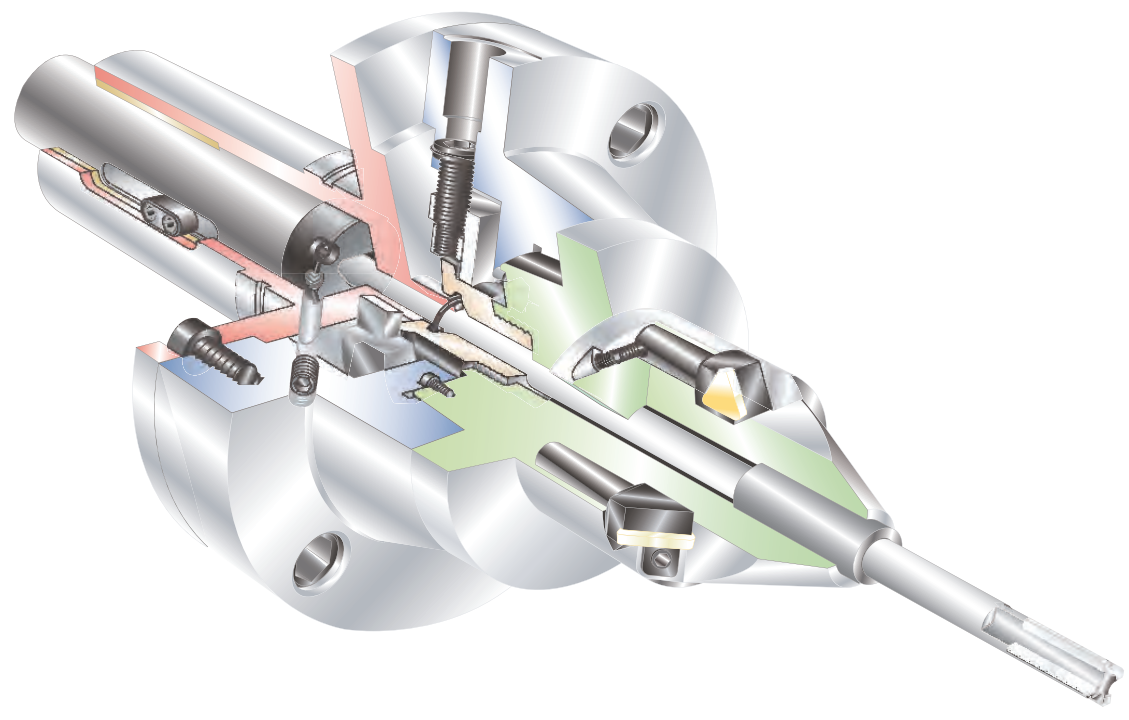


Straight shank reamer supports use of carbide 6-teeth cutter or PCD single-blade + guide pad!

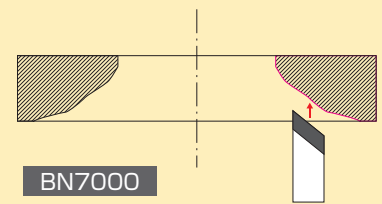
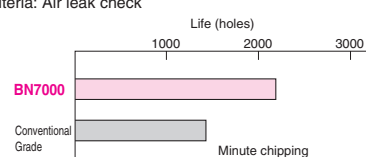
Collet system makes reamer easy to set.

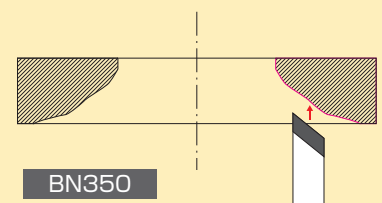
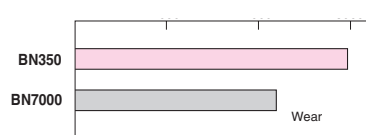
Runout of master on reamer is guaranteed within 5 μm.

Designed for Use on a Special-Purpose Machine



Application Examples

Process details	Conditions	
Plunge Finishing of the VSR Intake Work: VSR intake (250HV to 330HV) Machining method: Plunge cut on 3 surfaces 	Tool Material	BN7000
	Insert	Special holder
	v_c (m/min)	95
	f (mm/rev)	0.08
	a_p (mm)	
	Coolant	WET
Results	Tool Life Criteria: Air leak check 	

Process details	Conditions	
Plunge Finishing of the VSR Exhaust Work: VSR Exhaust(350HV to 450HV) Machining method: Plunge cut on 3 surfaces 	Tool Material	BN350
	Insert	Special holder
	v_c (m/min)	95
	f (mm/rev)	0.08
	a_p (mm)	
	Coolant	WET
Results	Tool Life Criteria: Air leak check 	

Indexable Reamer SumiReamer SR Type

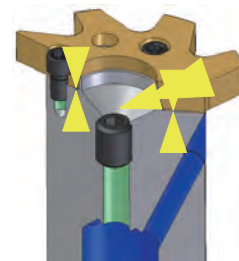
Indexable Reamers

Characteristics

- Achieves efficiency through high speed, high feed ability!!
($v_c=50$ to 200m/min , $f=0.4$ to 1.0mm/rev)
- Compatibility with a wide range of cutting conditions allows less strict cutting conditions and coolant control
- Minimal cutting edge length design eliminates biting and tearing for improved quality and reliability
- Predictable life for reground inserts
Indexable cutting edge design improves reliability of quality and life
- Cutting edge diameters available from $\phi 11.9$ to $\phi 100.6\text{mm}$

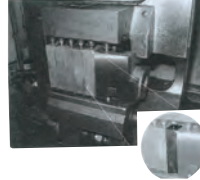


- Easy insert replacement
- Flexible tool overhang lengths possible by combining the modular holder/ arbour and holder with correction mechanism
- Can be used as a self-guiding tool by attaching guide pads to the holder



A taper supports the insert by two faces (based on the HSK standard) for less-than $4\ \mu\text{m}$ repeatability using random inserts

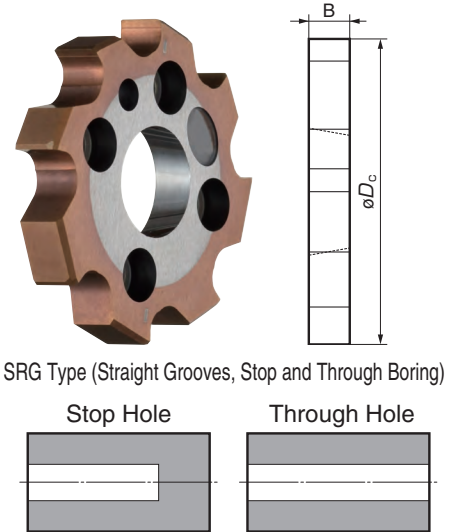
Application Examples

Tool Type					
Work					
Work Material	S50C or equivalent (260 to 310HB)	FC200 (190HB)	CK45 S50C or equivalent	AlMgSi17/ FC200	FCD400
Bore ϕ (mm)	$\phi 17.017$	$\phi 25.159$	$\phi 24\ \text{F7}$	$\phi 65\ \text{H6}$	$\phi 32.984$
Surface Roughness max Ra/Rz	16	7	10	16	10
No. of Teeth	6	8	8	12	8
Lap Speed v_c (m/min)	250	23	127	120	320
Spindle Speed (min^{-1})	4,683	293	1,685	588	3,100
Feed Rate f_z (mm/t)	0.14	0.085	0.16	0.15	0.20
Feed Rate v_f (mm/min)	3,934	199	2,164	1,058	4,941
Depth of Cut a_p (mm/radius)	0.225	0.15	0.15	0.15	0.15
Wet/ Dry	Emulsion Type	Dry	Emulsion Type	Emulsion Type	MQL
Life, etc	1.25 efficiency	13,000 holes	7,500 pcs	160 pcs	90 Set

New

● SR Type Inserts (SRG Type)

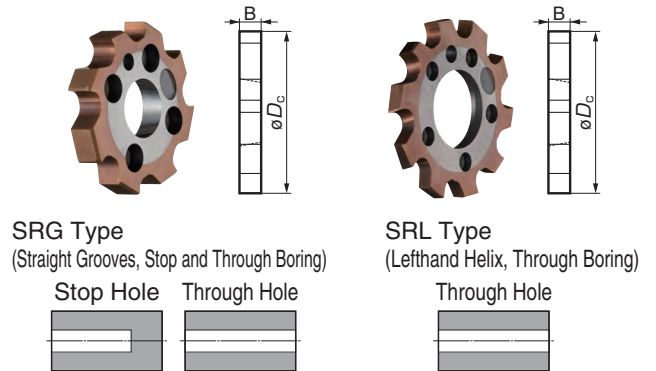
Cat. No.	Stock	Diameter ϕD_c	Tolerance	Thickness B	No. of Teeth
SRG 12.0H7-A01-F0512R1	●	$\phi 12$	H7	4.3	6
SRG 13.0H7-A01-F0512R1	●	$\phi 13$			
SRG 14.0H7-A01-F0512R1	●	$\phi 14$			
SRG 15.0H7-A01-F0512R1	●	$\phi 15$			
SRG 16.0H7-A01-F0512R1	●	$\phi 16$			
SRG 17.0H7-A01-F0512R1	●	$\phi 17$			
SRG 18.0H7-A01-F0512R1	●	$\phi 18$	H7	4.3	6
SRG 19.0H7-A01-F0512R1	●	$\phi 19$			
SRG 20.0H7-A01-F0512R1	●	$\phi 20$			
SRG 21.0H7-A01-F0512R1	●	$\phi 21$			
SRG 22.0H7-A01-F0512R1	●	$\phi 22$			
SRG 23.0H7-A01-F0512R1	●	$\phi 23$			
SRG 24.0H7-A01-F0512R1	●	$\phi 24$	H7	4.3	6
SRG 25.0H7-A01-F0512R1	●	$\phi 25$			
SRG 26.0H7-A01-F0512R1	●	$\phi 26$			
SRG 27.0H7-A01-F0512R1	●	$\phi 27$			
SRG 28.0H7-A01-F0512R1	●	$\phi 28$			
SRG 29.0H7-A01-F0512R1	●	$\phi 29$			
SRG 30.0H7-A01-F0512R1	●	$\phi 30$			



● Made-to-order item

Diameter Range ϕD_c	Thickness B	No. of Teeth	Order Number
$\phi 11.900$ to $\phi 15.600$	4.3	6	SRG... (See below)
$\phi 15.601$ to $\phi 18.600$			
$\phi 18.601$ to $\phi 23.600$			
$\phi 23.601$ to $\phi 28.600$	4.3	8	or
$\phi 28.601$ to $\phi 35.600$			
$\phi 35.601$ to $\phi 43.600$			
$\phi 43.601$ to $\phi 51.600$	4.3	10	SRL... (See below)
$\phi 51.601$ to $\phi 60.600$			
$\phi 60.601$ to $\phi 80.600$			
$\phi 80.601$ to $\phi 106.600$	4.3	12	

SRG (Special) and SRL (Special) are made-to-order items.



■ SumiReamer SR Type Insert Identification

① Ordering by specifying work hole tolerance
The target diameter produced by the reamer cutting edge will be near or at the high end of the work hole tolerance and varies according to the diameter, tolerance range, and tool grade. Ask for further details.

② Ordering by specifying target reamer tool diameter
Place a "Q" after the desired diameter to specify the exact target diameter of the cutting edge. Account for $\pm 2\mu$ for non-coated tools, $\pm 3\mu$ for thin coating, and $\pm 4\mu$ for thick coating.

SRG 18.2 + 20 - 10 - A01 - F05 02P 1

- ① SR Type
- ② G = Straight, L = Lefthand helix
- ③ Work hole diameter (mm)
- ④ Tolerance (μ m) +/- or standard (ex. H7)
- ⑤ Approach Angle Code
- ⑥ Insert Material Code
- ⑦ Coating Code
- ⑧ Coating Thickness Code: 1 = Thin, 2 = Thick

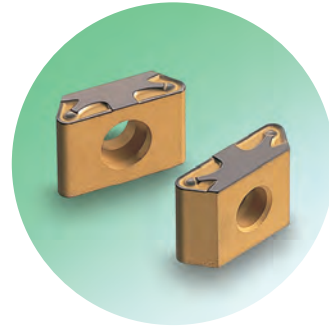
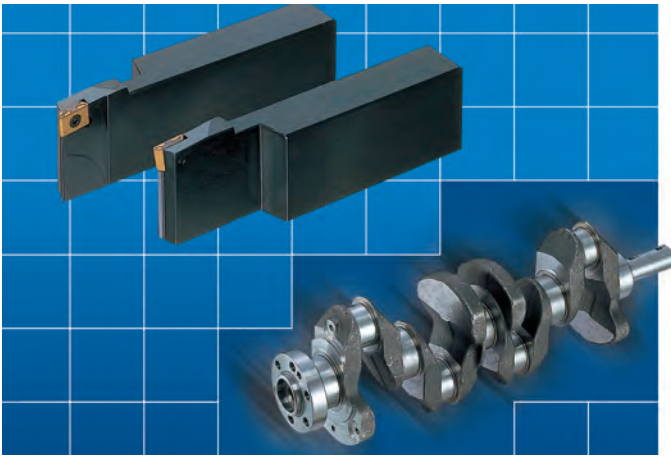
SRG 18.2 Q + 3 - 3 - A01 - F05 02P 1

- ① SR Type
- ② G = Straight, L = Lefthand helix
- ③ Diameter (mm)
- ④ Tolerance (μ m) +/-
- ⑤ Approach Angle Code
- ⑥ Insert Material Code
- ⑦ Coating Code
- ⑧ Coating Thickness Code: 1 = Thin, 2 = Thick

■ Recommended Cutting Conditions

ISO	Work Material	Helix	Adopted Grades	Grade	Depth of Cut a_p (mm/radius)			Cutting Speed V_c (m/min)	Feed Rate f_z (mm/t)
					Below $\phi 20$	$\phi 20$ to $\phi 35$	$\phi 35$ or more		
P	Carbon Steel	G (Straight)	F0512R1	Micro-Fine Grained Carbide + PVD	0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	80 to 220	0.10 to 0.25
		L (Lefthand Helix)			0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	100 to 220	0.15 to 0.35
		G (Straight)	T1200A	Cermet	0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	120 to 250	0.10 to 0.25
		L (Lefthand Helix)			0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	120 to 250	0.15 to 0.35
	Alloy Steel	G (Straight)	F0512R1	Micro-Fine Grained Carbide + PVD	0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	60 to 180	0.06 to 0.20
		L (Lefthand Helix)			0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	60 to 180	0.10 to 0.22
		G (Straight)	T1200A	Cermet	0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	70 to 200	0.08 to 0.20
		L (Lefthand Helix)			0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	70 to 200	0.12 to 0.25
Die Steel	G (Straight)	F0512R1	Micro-Fine Grained Carbide + PVD	0.05 to 0.10	0.08 to 0.15	0.10 to 0.20	15 to 60	0.06 to 0.20	
	Tool Steels	G (Straight)	F0512R1	Micro-Fine Grained Carbide + PVD	0.05 to 0.10	0.08 to 0.15	0.10 to 0.20	15 to 30	0.04 to 0.15
M	Stainless Steel	G (Straight)	F0512R1	Micro-Fine Grained Carbide + PVD	0.05 to 0.10	0.08 to 0.15	0.08 to 0.20	15 to 60	0.06 to 0.20
K	Cast Iron	G (Straight)	F0508P2	Micro-Fine Grained Carbide + PVD	0.05 to 0.18	0.08 to 0.20	0.10 to 0.25	80 to 250	0.10 to 0.30
	Ductile Cast Iron	G (Straight)	F0512R1	Micro-Fine Grained Carbide + PVD	0.05 to 0.18	0.08 to 0.20	0.10 to 0.25	80 to 250	0.10 to 0.30
N	Non-Ferrous Metal	G (Straight)	F0510P	Micro-Fine Grained Carbide + DLC	0.05 to 0.12	0.08 to 0.15	0.10 to 0.25	100 to 250	0.10 to 0.30

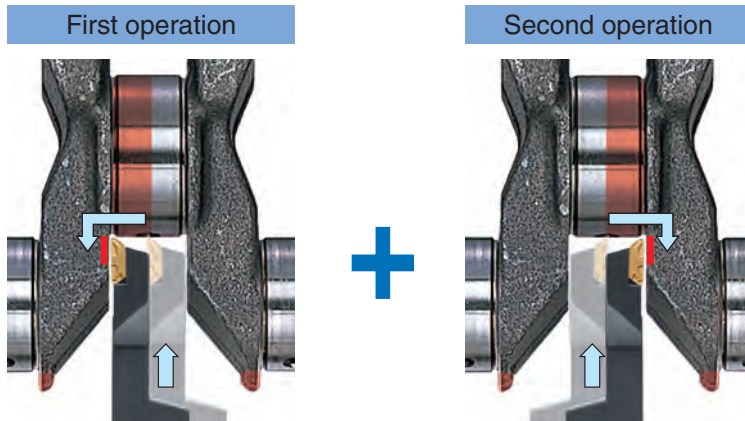
SEC- XD Type Tool Holder



Lengthwise Insert for High Rigidity!

Allows Consolidation of Journal Machining Process!

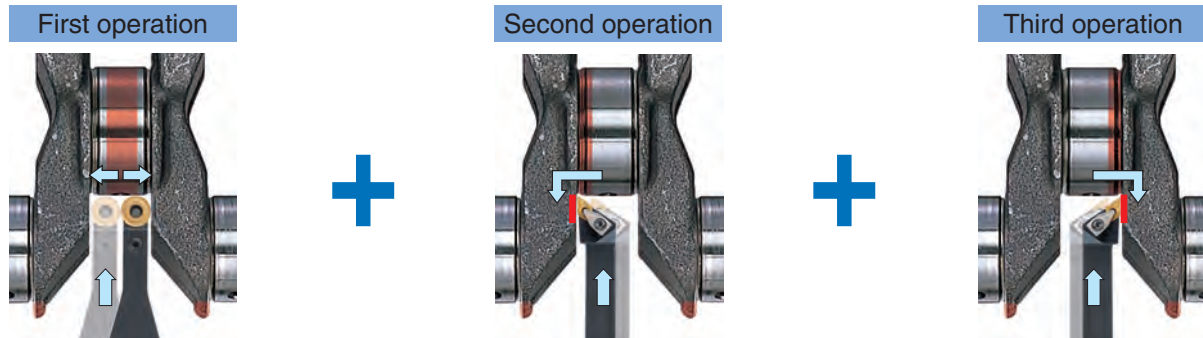
New Tooling (XD Type)



Improvements

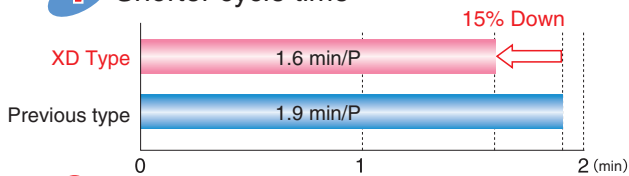
- ① Shorter cycle time
- ② Stable and long tool life
- ③ Improved chip management
- ④ Low-cost design
 - holder uses less parts
 - four-cornered insert

Previous tooling (round insert + 55° diamond shape)

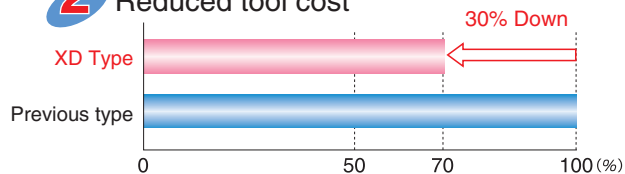


Benefits Process consolidation reduced machining time and afforded significant cost savings!

1 Shorter cycle time

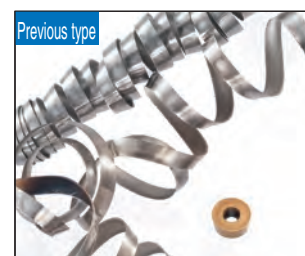


2 Reduced tool cost



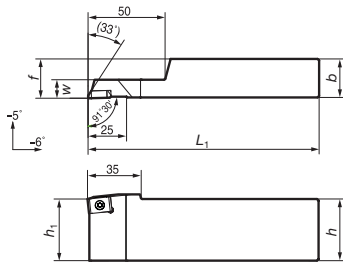
3 Resolved chip control problems

Separated long chips caused by round inserts into smaller chips.

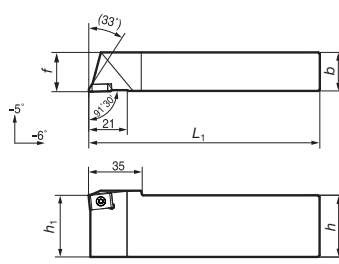


Tool Holder

A type : Journals



B type : Counter-weights periphery

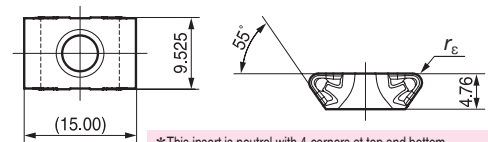


This drawing shows a right-hand (R) holder

Type	Right hand		Left hand		Dimensions (mm)						Insert	Screws	Wrench
	Cat. No.	Stock	Cat. No.	Stock	h	b	h ₁	L ₁	f	w			
A	SXDR2525-15A		SXDL2525-15A		25	25	150	25.5	12		XDM1504○○	BFTX0409N	TRX15
	SXDR3225-15A		SXDL3225-15A		32	25	32	150	25.5	12			
B	SXDR2525-15B		SXDL2525-15B		25	25	150	25.5	—				
	SXDR3225-15B		SXDL3225-15B		32	25	32	150	25.5	—			

(All items are made to order)

Insert



*This insert is neutral with 4-corners at top and bottom.
It is usable on both right and left hand holders by using 2 different corners.

Cat. No.	Grade					Nose radius r _e (mm)	Applicable Holder
	AC700G	AC2000	AC3000	AC820P	AC830P		
XDM150412-GU	●	●	●			1.2	SXDR/ L□□□□-15A
XDM150420-GU	●	●	●			2.0	
XDM150412-LU				●	●	1.2	SXDR/ L□□□□-15B
XDM150420-LU				●	●	2.0	

● mark: Standard stocked item, Blank: Made to order item

Recommended Cutting Conditions

Breaker	Work Material	General Steel			Ductile Cast Iron
	Grades	AC700G	AC2000/AC820P	AC3000/AC830P	AC700G
LU	Cutting Speed v _c (m/min)	150 to 300	100 to 200	80 to 150	100 to 250
	Depth of Cut a _p (mm)	0.5 to 2.0	0.5 to 2.0	0.5 to 2.0	0.5 to 2.0
	Feed Rate f (mm/rev)	0.1 to 0.3	0.1 to 0.3	0.1 to 0.3	0.1 to 0.3
GU	Cutting Speed v _c (m/min)	150 to 300	100 to 200	80 to 150	100 to 250
	Depth of Cut a _p (mm)	1.5 to 3.0	1.5 to 3.0	1.5 to 3.0	1.5 to 3.0
	Feed Rate f (mm/rev)	0.15 to 0.3	0.15 to 0.3	0.15 to 0.3	0.15 to 0.3

Work material : S50C (Crank Shaft)

Tool : ① Comp A

② Comp B

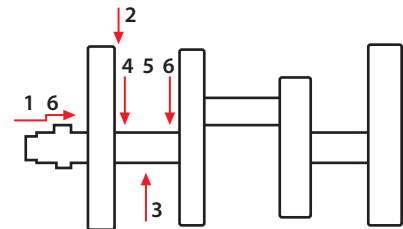
③ XDM150412 (AC700G)

Process details :

1. Rough cut shaft (tool ①) v_c=130m/min f=0.25mm/rev
2. Machine counter-weights (tool ①) v_c=130m/min
3. Machine journal (tool ②) v_c=130m/min
4. Machine journal (tool ③) v_c=150m/min f=0.35mm/rev
5. Machine counter-weights (tool ③) v_c=150m/min f=0.35mm/rev
(Boundary with journal) a_p=2.0 to 2.5mm
6. Finish shaft (tool ③) v_c=200m/min f=0.3mm/rev
a_p=0.5mm



Good chip control



Application Example ②

First operation

Second operation

+

Tool holder : SXD3225-15A

Insert : XDM150412 (Grade AC2000)

Work material : S38C equivalent (240 HB)

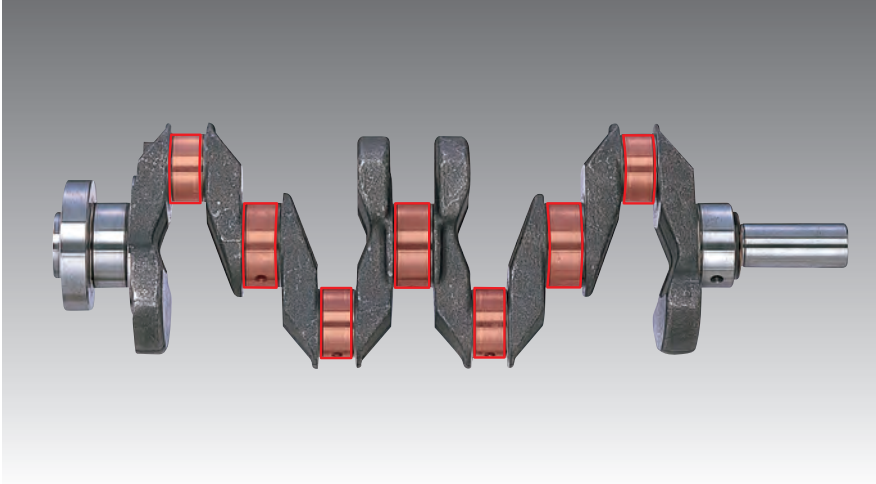
Cutting conditions : Cutting speed v_c=200m/min
Feed rate f=0.3mm/rev
Depth of cut a_p=0.5 to 2.5mm
Dry

Compared to conventional round + diamond-shaped inserts

- Cycle time 15% shorter
- Tooling costs 30% lower
- Improved chip control

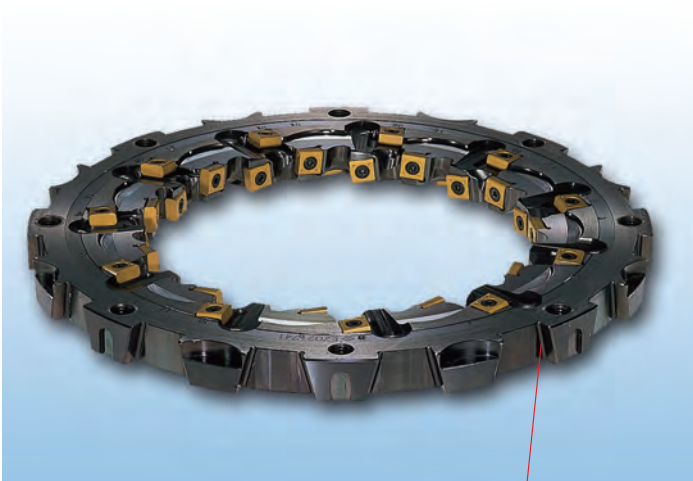
Pin Milling Cutter

Area of Cut



Appearance

Internal Pin Milling Cutter



Tapered Spline Groove

External Pin Milling Cutter



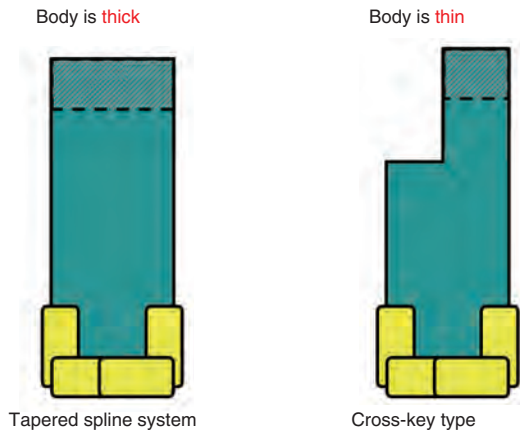
Tapered Spline Groove

Characteristics of the Tapered Spline Type Pin Milling Cutter

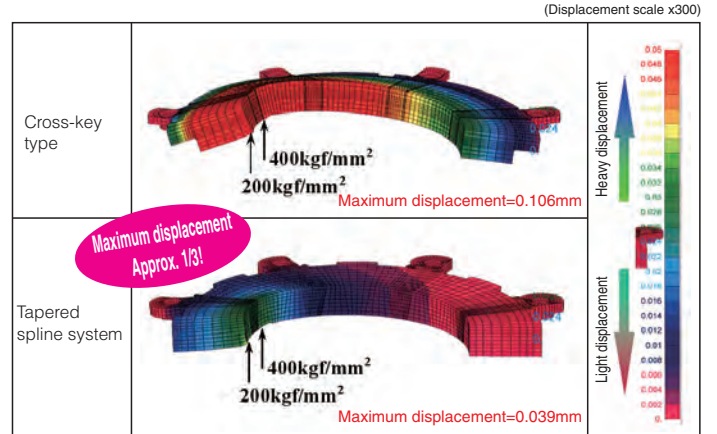
- High rigidity (almost 3x) compared to cross-key type helps extend tool life!
- Designed to tolerate thermal growth and displacement for good milling precision.
- Highly durable clamp and long body life.
- Unique tapered spline system drastically reduces cutter replacement time by 1/3 of cross-key type cutters.

Secret to High Rigidity

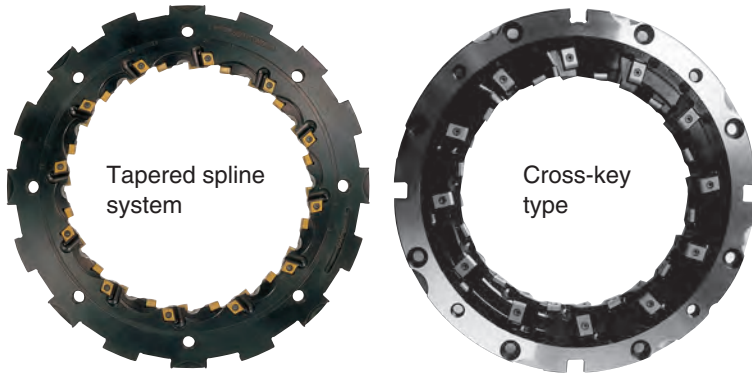
Body Cross Section Comparison



CAE Analysis Result (Max displacement under axial load)

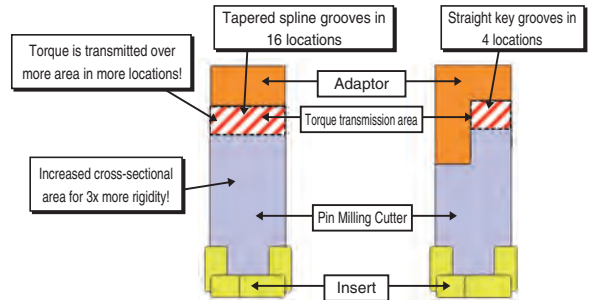


Secret to High Durability



- * Driven by tapered splines at **16 locations**
- * Adaptor **rests tight** against the tapered spline

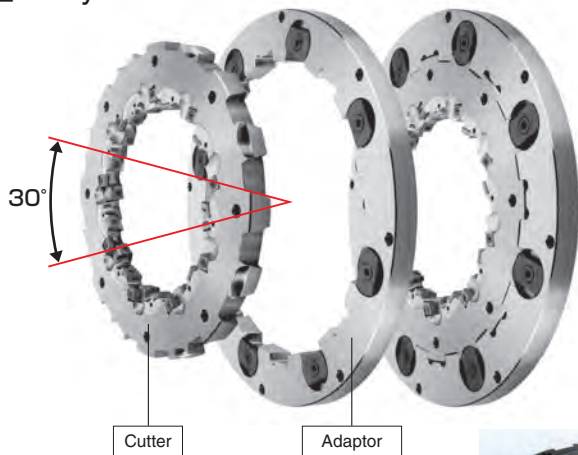
- * Driven straight fitting cross-keys at **4 locations**
- * Vibration from cutting forces affect **play** in key mechanism



CAE Analysis Result (Max. principal stress under radial load)



Easy to Attach / Remove



Cutter and adaptor mate via a tapered spline which makes attaching and removing easy.

Attach / Removal time: 1/2 to 1/4 compared conventional types



Negative - Positive Edge Designs (Some dimensions may not be designable)

- Negative-positive shaped inserts reduce cutting force

Benefits

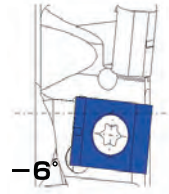
- Improved cutting performance and insert life
- Reduced cutting noise
- Improved efficiency
- Controls heat generation in work for better machining accuracy

Axial toward outer insert
Rake Angle

Negative - Positive Type



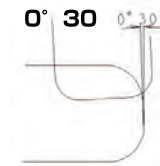
Conventional Type



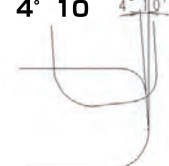
- Reduced relief angle on outer insert from 4°10' to 0°30' improves surface roughness in thrust direction.

Outer insert
Side angle relief

Negative - Positive Type



Conventional Type



- Prevents mis-clamping of inserts

Conventional inserts are easily mis-clamped because the setting seat is always 90°, whereas negative-positive inserts have a distinctive seat angle that prevents mis-clamping.

Negative - Positive Type

Outer insert



Shoulder edge



No markers needed

Double negative edge

Outer insert



Shoulder edge



Orientation marking needed

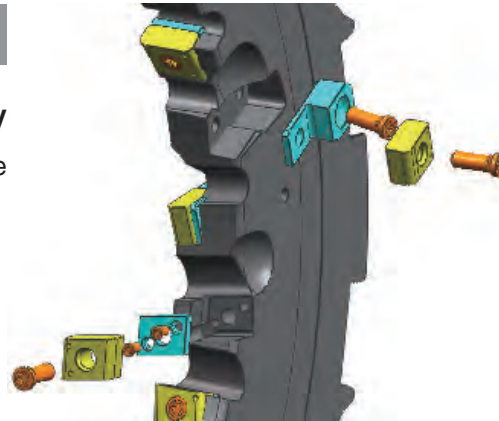
Designed for High-precision Machining

Improved Accuracy of the Cutter Body

- Use of spacers where the insert mounts allows precise control over diameter and width.

Benefits

- High precision machining
- Improved body life (durability)
- Improved insert life



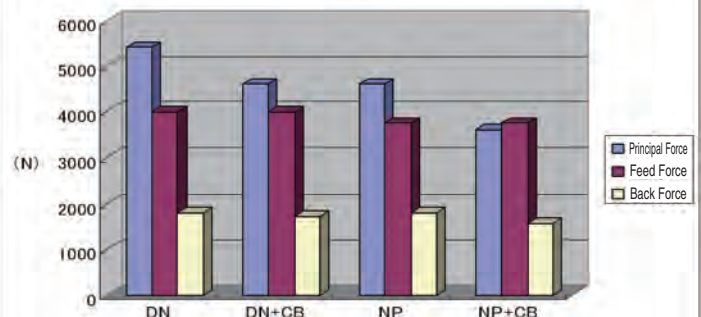
Inserts with Chipbreaker Designs

Press molded breaker achieves low cutting resistance.

* For applicable sizes, please contact us directly.



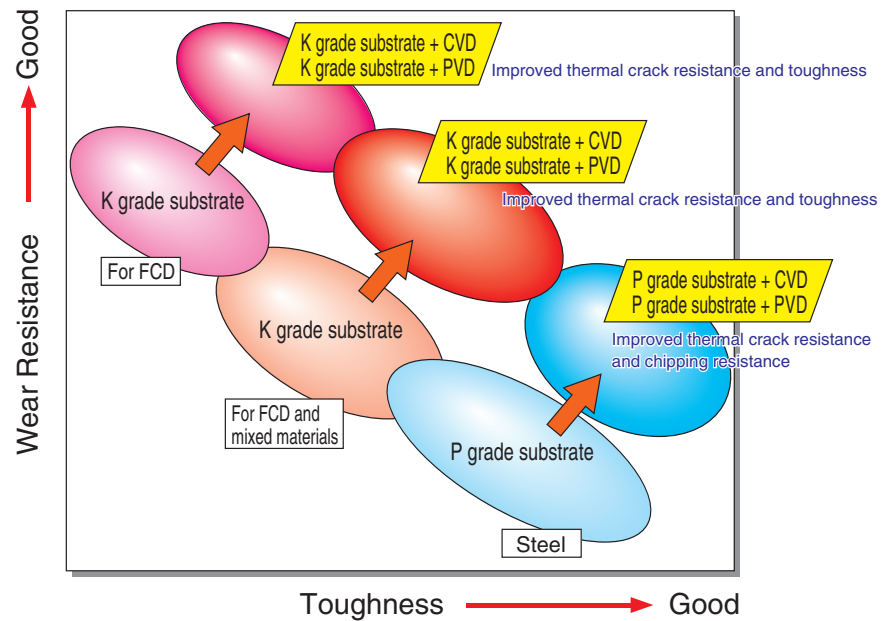
Resistance Comparison



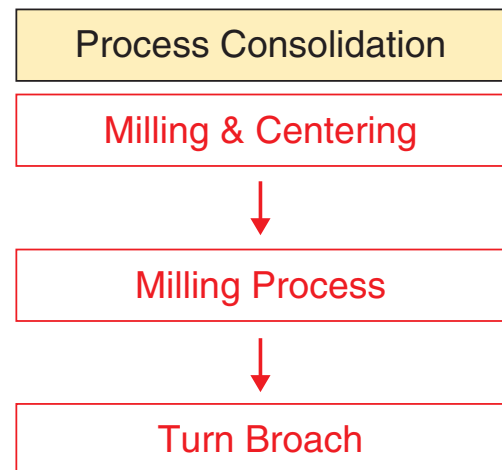
Insert Grades

Contact us to have our staff select the proper grade for your work material.

Both CVD and PVD coatings can be applied.



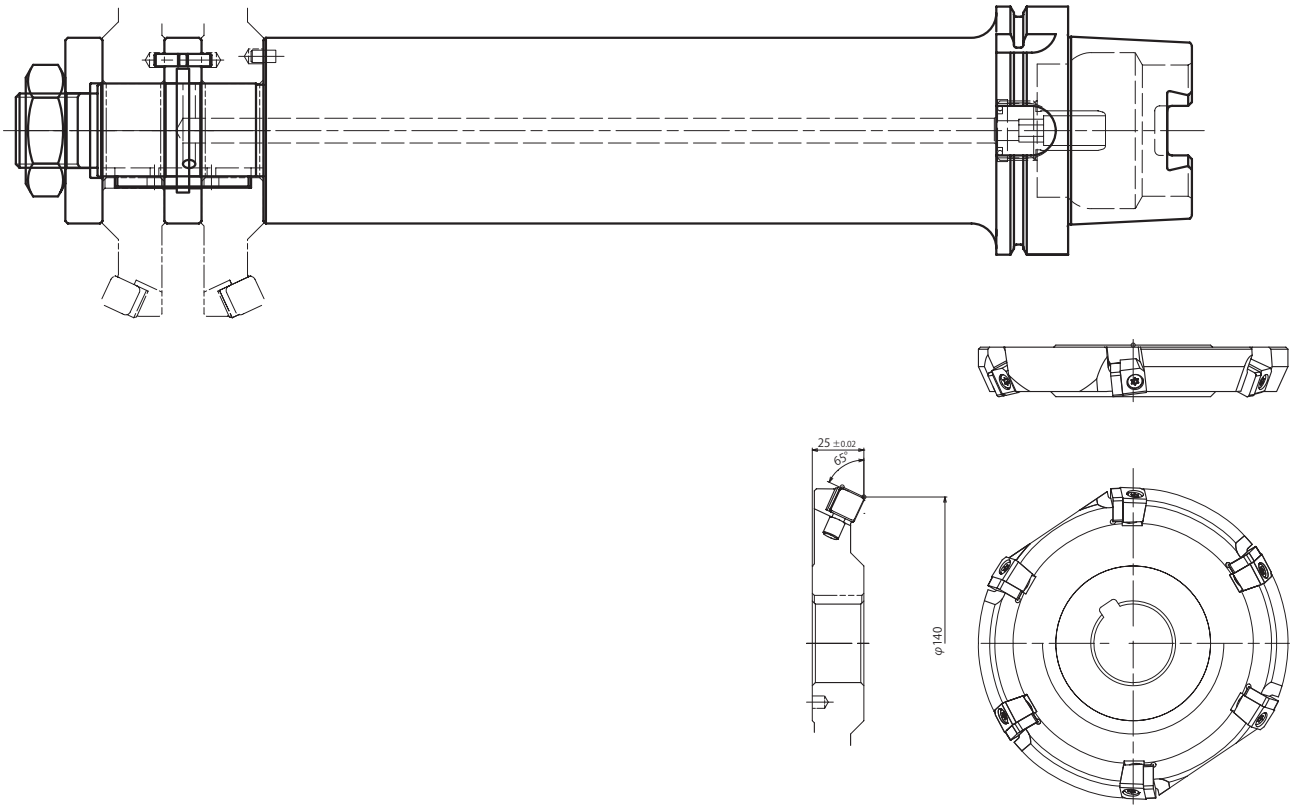
Process Combinations with a Turn Broach



- Allows conventional turn broaches to be used for turning.
- Tool can be used for turning, plunging, and broaching.
- Similar to mounting the tool post of a turret lathe onto both heads of a machining spindle.
- 30 to 40 cartridges equivalent to a turning tool holder can be mounted on the body. (Diameter = $\phi 525$ to $\phi 700$)
- Machining processes are relatively easy to change making this combination suitable for a variety of machining applications. The combination offers ability to index each cartridge at high speeds, broach, and use various cutting edges.
- High speed indexing reduces idle time, and optimized cartridge layout enables many hours of automatic operation.

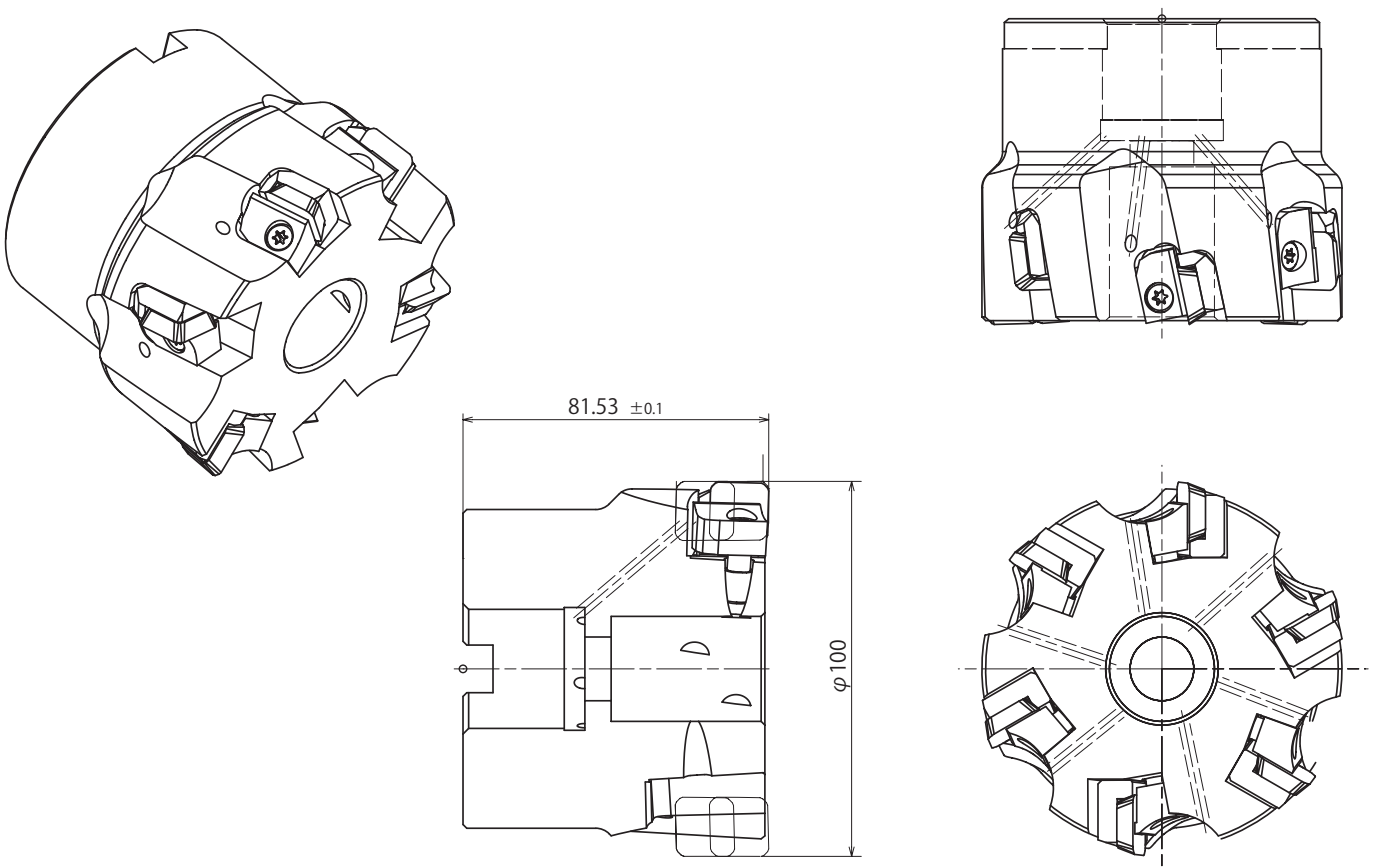
Journal Width Milling Cutter

Cylinder Block



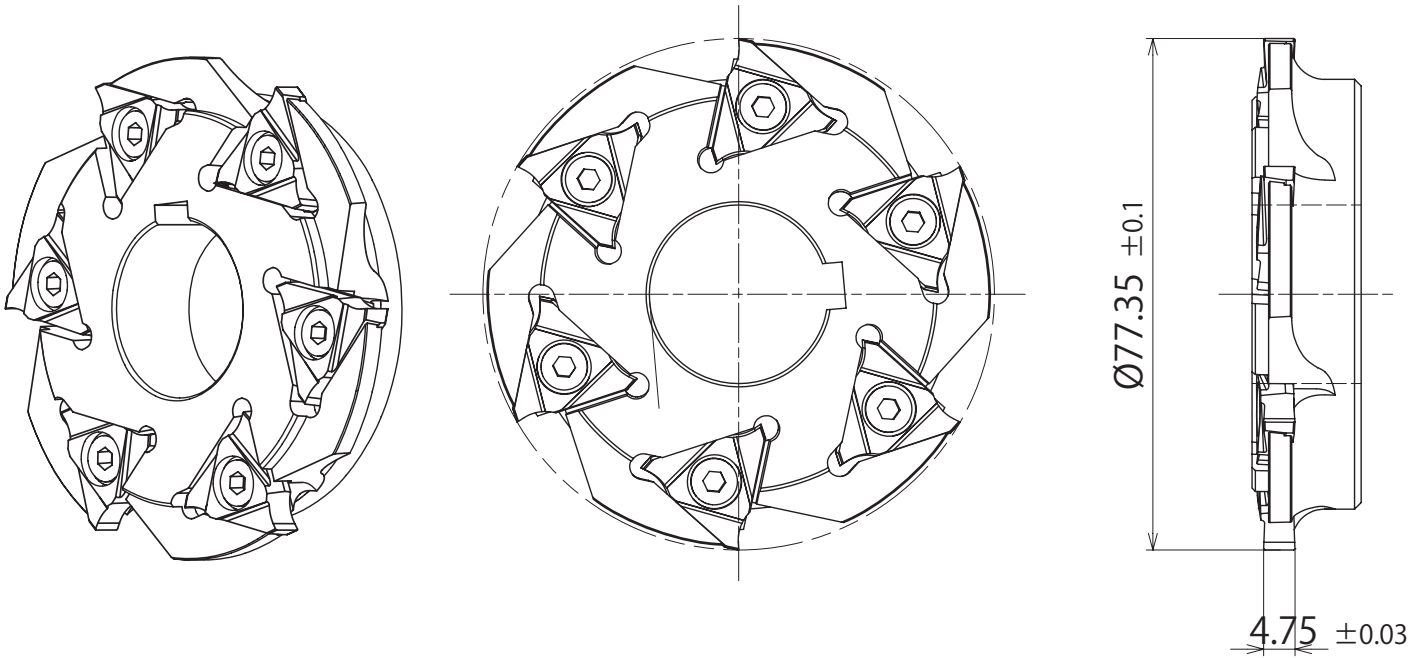
Contouring Cutter for Back Chamfering Bores

Cylinder Block



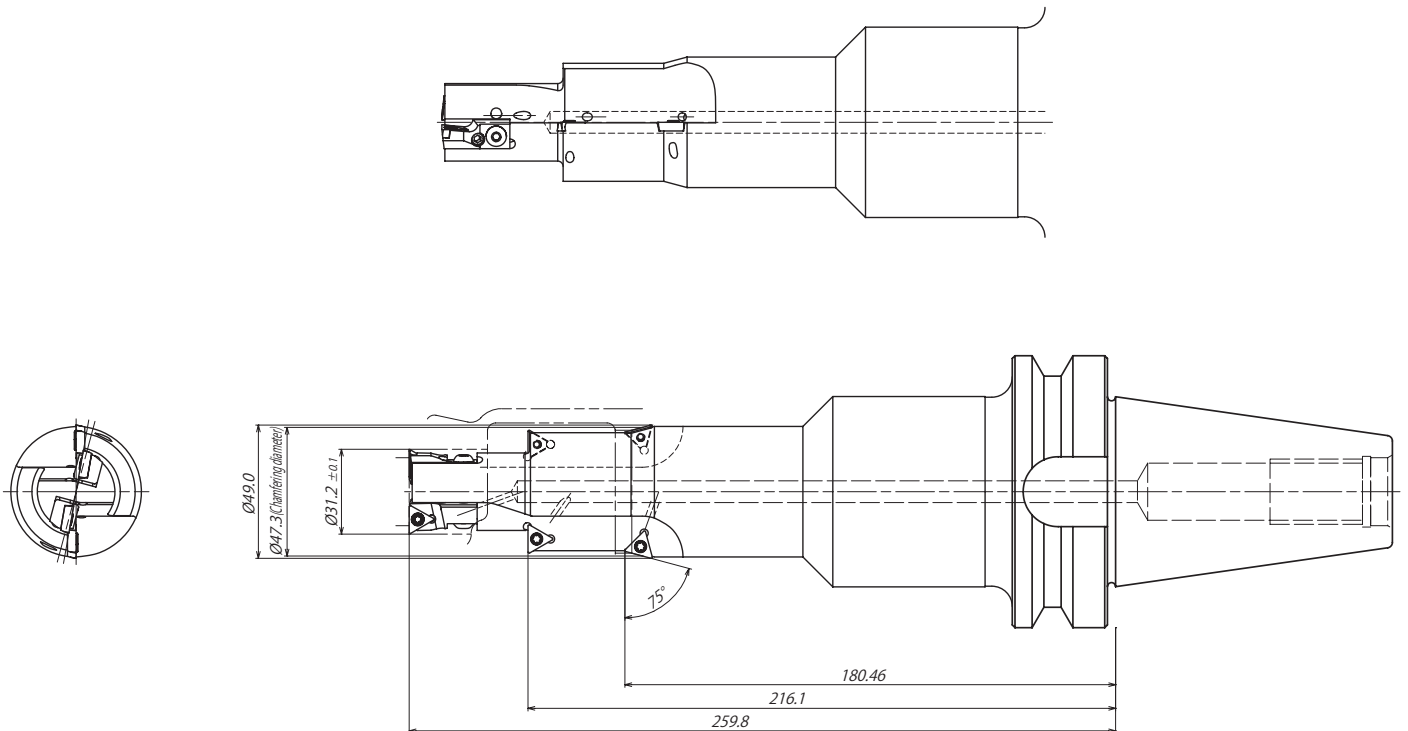
Notching Cutter for Crank Holes

Cylinder Block



Oil Pump Hole Roughing

Cylinder Block

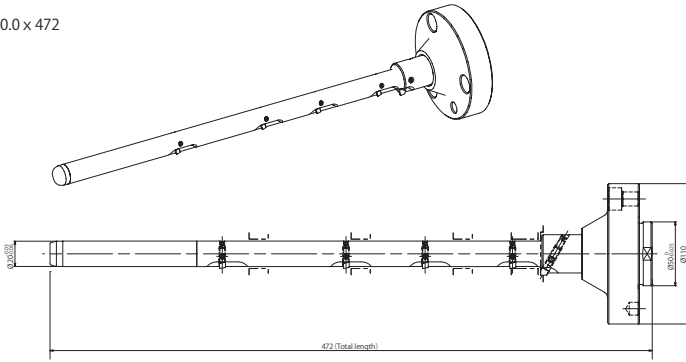


Special Tool Design Examples

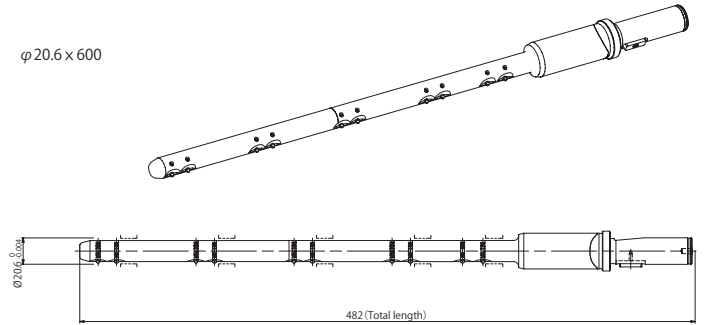
Line Boring Bar for Cam Holes

Cylinder Head

$\phi 20.0 \times 472$

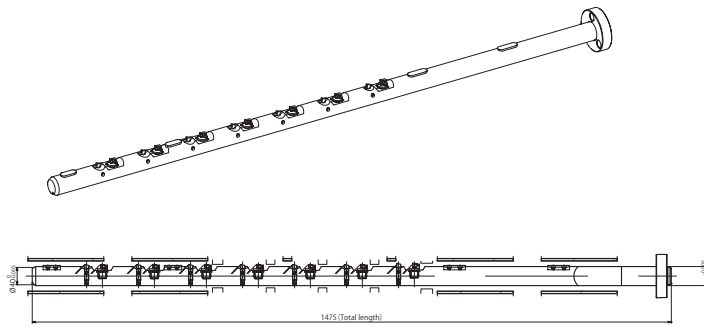


$\phi 20.6 \times 600$



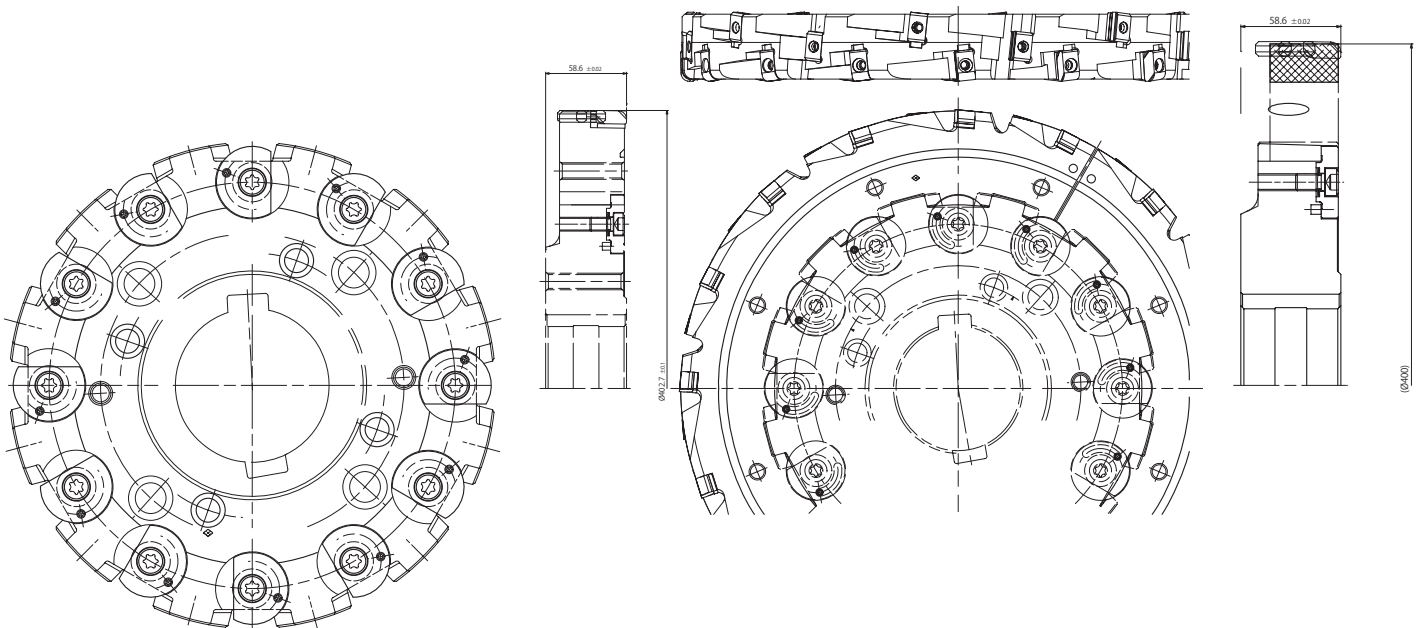
Line Boring Bar for Crank Holes

Cylinder Block



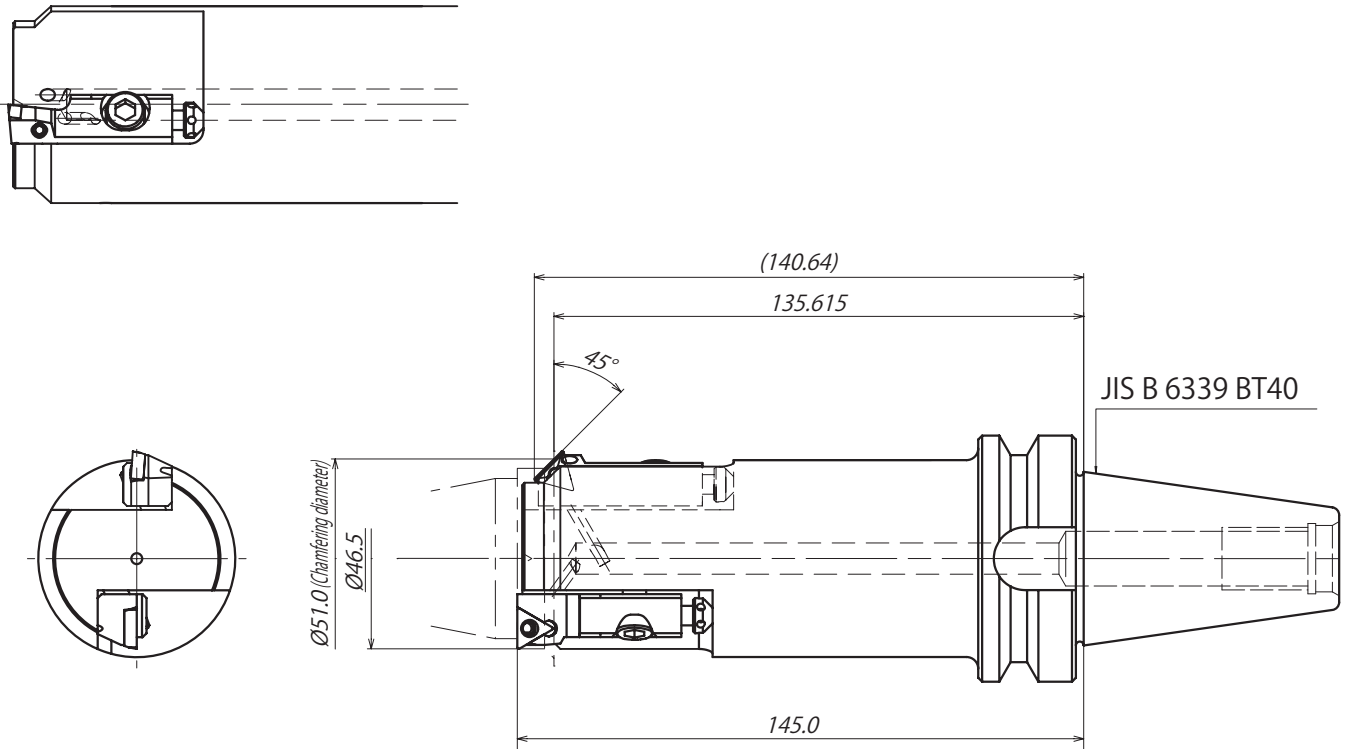
Split Side Cutter for Width Milling

Knuckles, etc.



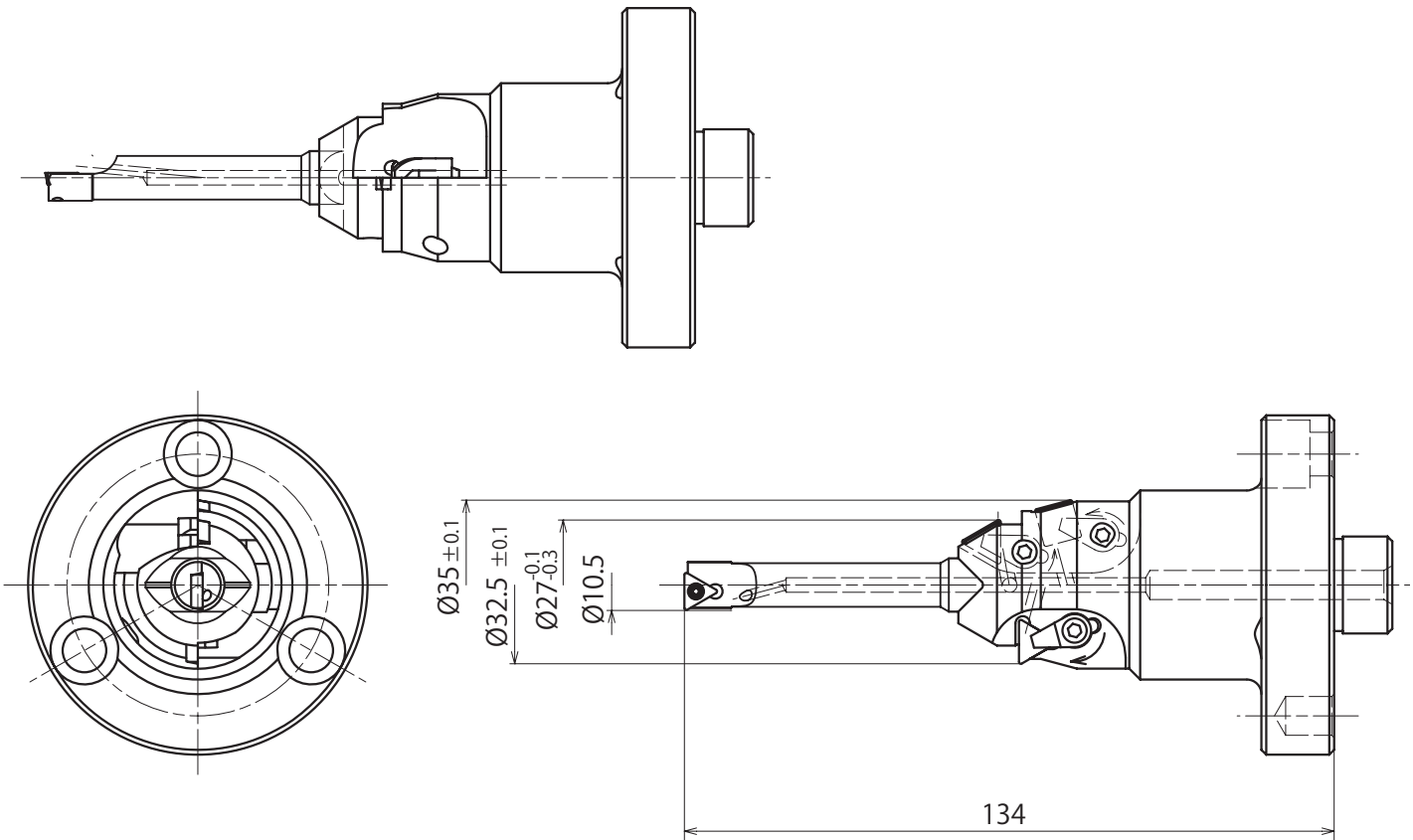
Roughing the Port Before Press-fitting the Seat

Cylinder Head

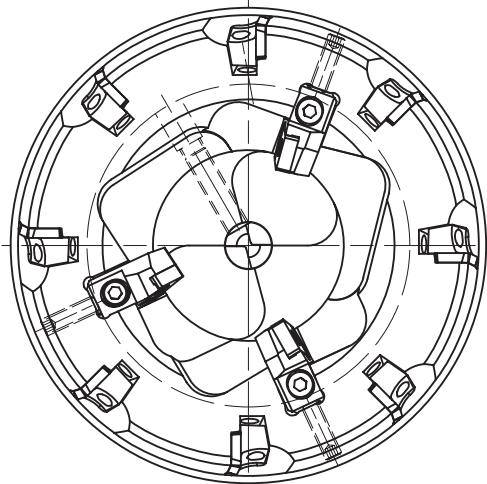
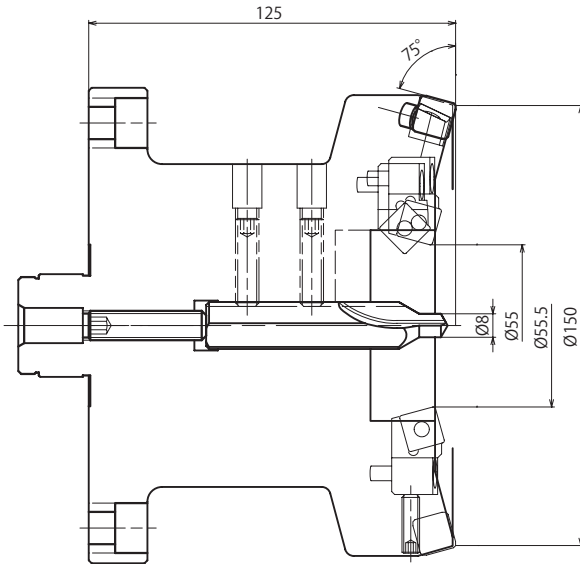
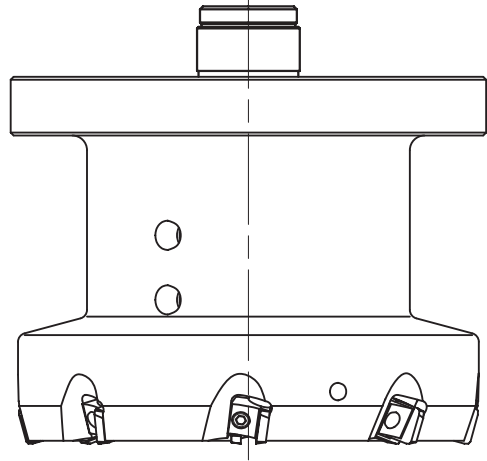
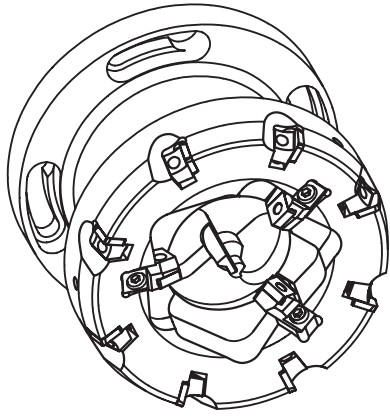


Finishing the Port Before Press-fitting the Seat

Cylinder Head

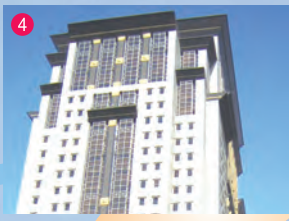


Centering Cutter



MEMO

A series of horizontal dashed lines for writing.



住友電工硬質合金貿易(上海)有限公司
 (中国/上海) [設立2005年]
 中国 販売会社
 Sumitomo Electric Hardmetal Trading(Shanghai) Co., Ltd.
 [Established in 2005/Shanghai, China]
 Sales company for Chinese market.



Sumitomo Electric Hardmetal Asia Pacific Pte. Ltd.
 (シンガポール) [設立1998年]
 アジア太平洋州 統括販売会社
 Sumitomo Electric Hardmetal Asia Pacific Pte. Ltd.
 [Established in 1998 / Singapore]
 Sales and marketing headquarters for Asia-Pacific market.



SEI Carbide Australia Pty Ltd.
 (オーストラリア/シドニー) [設立1977年]
 オーストラリア 販売会社
 SEI Carbide Australia Pty Ltd.
 [Established in 1977 / Sydney, Australia]
 Sales company for Australian market.



Sumitomo Electric Hartmetall GmbH
 (ドイツ/デュッセルドルフ) [設立1981年]
 欧州・統括販売会社
 Sumitomo Electric Hartmetall GmbH
 [Established in 1981 / Düsseldorf, Germany]
 Sales and marketing headquarters for European market.



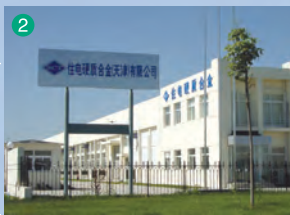
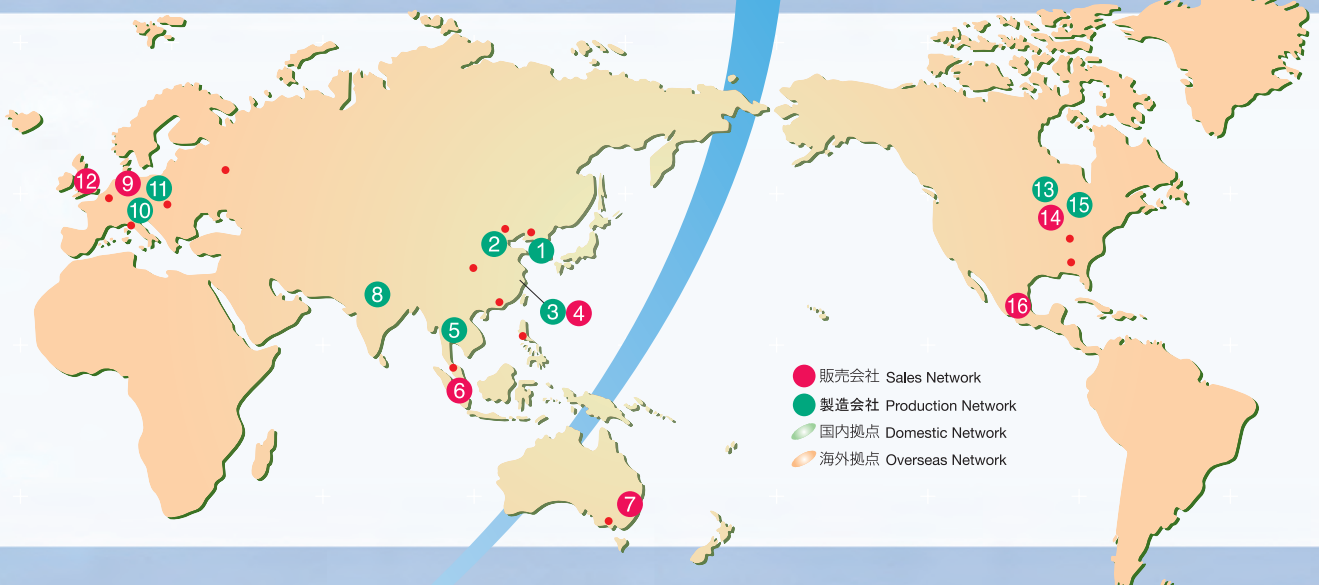
Sumitomo Electric Hardmetal Ltd.
 (イギリス/ロンドン) [設立1984年]
 イギリス 販売会社
 Sumitomo Electric Hardmetal Ltd.
 [Established in 1984 / London, U.K.]
 Sales company for U.K. market.



Sumitomo Electric Carbide, Inc.
 (アメリカ/シカゴ) [設立1979年]
 北米・統括販売会社
 Sumitomo Electric Carbide, Inc.
 [Established in 1979 / Chicago, U.S.A.]
 Sales and marketing headquarters for North, Central and South American markets.



Sumitomo Electric Hardmetal de Mexico, S.A. de C.V.
 (メキシコ/アグアスカリエンテス) [設立2007年]
 メキシコ 販売会社
 Sumitomo Electric Hardmetal de Mexico, S.A. de C.V.
 [Established in 2007 / Aguascalientes, Mexico]
 Sales company for Mexican market.



住電硬質合金(天津)有限公司
 (中国/天津) [設立1997年]
 製造品目: 研磨級チップ, CBNチップ
 Sumiden Carbide Manufacturing (Tianjin) Ltd.
 [Established in 1997 / Tianjin, China]
 Production of carbide and CBN inserts.



住友電工硬質合金(常州)有限公司
 (中国/常州) [2011年10月稼働予定]
 製造品目: 超硬ドリル, PCDチップ
 Sumitomo Electric Hardmetal Manufacturing (Changzhou) Co., Ltd.
 [Scheduled to start operations in Oct. 2011 / Changzhou, China]
 Production of Solid carbide drills and PCD inserts.



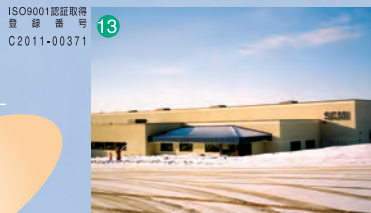
Sumitomo Electric Hardmetal Manufacturing (Thailand), Ltd.
 (タイ/バンコク) [設立1994年]
 製造品目: 超硬ドリルリーマ, CBN・ダイヤ工具, 研磨級チップ
 Sumitomo Electric Hardmetal Manufacturing (Thailand), Ltd.
 [Established in 1994 / Bangkok, Thailand]
 Production of drills, inserts and CBN / PCD tools.



Sumitomo Electric Hartmetallfabrik GmbH
 (ドイツ/ラウハイム) [設立1989年]
 製造品目: マルチドリル, CBN工具
 Sumitomo Electric Hartmetallfabrik GmbH
 [Established in 1989 / Lauchheim, Germany]
 Production of Multidrill and CBN tools.



Sumitomo Electric Hartmetallfabrik GmbH, organizačni slozka.
 (チェコ/イフラフ) [設立2008年]
 製造品目: マルチドリル, CBN工具
 Sumitomo Electric Hartmetallfabrik GmbH, organizačni slozka.
 [Established in 2008 / Jihlava, Czech Republic]
 Production of Multidrill and CBN tools.



Sumitomo Electric Carbide Manufacturing, Inc. SCM Division
 (アメリカ/ミルウォーキー) [設立1991年]
 製造品目: マルチドリル, CBN工具, ダイヤ工具
 SCM Division
 [Established in 1991 / Milwaukee, U.S.A.]
 Production of Multidrill, CBN and PCD tools.



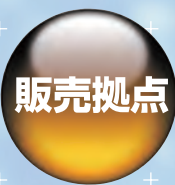
Sumitomo Electric Carbide Manufacturing, Inc. Master Tool Division
 (アメリカ/クリーブランド) [設立2007年]
 製造品目: 自動車部品加工用工具
 Master Tool Division
 [Established in 2007 / Cleveland, U.S.A.]
 Production of Special tools for Automotive related Parts.

ISO9001認証取得
 登録番号
 QC-QM-2-04/019-001

ISO9001認証取得
 登録番号
 C2011-00371

ISO9001認証取得
 登録番号
 JQA-QMA12384

Network



Sales Network

日本国内はもとより“海外活動の積極的な展開”の経営方針のもと、販売拠点網の拡充、現地生産等による海外市場の拡大を意欲的に推進しています。

Sumitomo Electric Hardmetal Corp. is strengthening its global position for high-quality products and services, while contributing technology to market needs around the world.



ISO9001 認証取得
登録番号
YKA0955989



住友電気工業・ハードメタル事業部
住友電気ハードメタル(本社)
Head Office
(住友電気工業株式会社 伊丹製作所内)



04
住友電工ツールネット株式会社
[設立]1979年
イゲタロイ及びダイヤモンド製品の販売並びに技術サービス会社
Sumitomo Electric Tool Net, Inc.
[Established in 1979]
Sales and marketing subsidiary for domestic Japanese market.



Technical Support



●伊丹ツールエンジニアリングセンター [開設2006年]
●横浜ツールエンジニアリングセンター [開設2008年]
●北海道ツールエンジニアリングセンター [開設2009年]
●東海ツールエンジニアリングセンター [開設2011年]
●タイツールエンジニアリングセンター [開設2006年]
ツーリング改善、研修などの技術拠点
Tool Engineering Center
[Opened in 2006~2011]
The main center for tooling improvements and technical trainings.

製造拠点

Production Network



- 販売会社 Sales Network
- 製造会社 Production Network
- 国内拠点 Domestic Network
- 海外拠点 Overseas Network



ISO9001 認証取得
登録番号
YKA0955804



01
北海道住電精密株式会社

[設立1972年]
イゲタロイ刃先交換チップの自動化量産工場

Hokkaido Sumiden Precision Co., Ltd.
[Established in 1972]
Production of carbide inserts.

02



株式会社アスデックス

[設立2002年]
鍛造用金型の開発から製造・販売まで手掛ける総合金型サプライヤー

ASDEX Corporation
[Established in 2002]
Development, production and sales of forging dies.

ISO9001 認証取得
登録番号
QMS-0405



1
Korloy Inc. (韓国冶金)

(韓国/ソウル) [設立1966年]
日韓合併の超硬製造販売会社

Korloy Inc.
[Established in 1966 / Seoul, Korea]
Production of carbide tools.



ISO9001 認証取得
登録番号
YKA0200689



03
東海住電精密株式会社

[設立1984年]
マルチドリルなどの自動化量産工場と中京地区のサービス機能

Tokai Sumiden Precision Co., Ltd.
[Established in 1984]
Production of Multidrill and other carbide tools.



ISO9001 認証取得
登録番号
YKA0200075



05
九州住電精密株式会社

[設立1964年]
エンドミルやプリント基板加工用ドリルなどのイゲタロイ精密工具、CBN工具の自動化量産工場

Kyushu Sumiden Seimitsu Co., Ltd.
[Established in 1964]
Production of PCB drills, endmills and CBN tools.

ISO9001 認証取得
登録番号
IRQSI0810488



8
Motherson Techno Tools Ltd.

(インド/ノイダ) [資本参加2005年]
CBN・ダイヤモンド工具の製造販売、超硬工具の販売会社

Motherson Techno Tools Ltd.
[Participation in 2005 / Noida, India]
Production and sales of CBN/PCD tools, drills, and milling cutters, sales of inserts.

Global Network

[Asia Pacific]

- (Singapore)** **Sumitomo Electric Hardmetal Asia Pacific Pte. Ltd.**
6 New Industrial Road #03-03, Hoe Huat Industrial Building,
536199, Singapore
Tel: 65-6282-4334 Fax: 65-6280-4334
- (Thailand)** **Sumitomo Electric Hardmetal Manufacturing(Thailand), Ltd.**
102 Moo 9, Wellgrow Industrial Estate, Bangna-Trad Road,
Bangwua, Bangpakong, Chachoengsao 24180, Thailand
Tel: 66-38-571-940 Fax: 66-38-571-948
- (Philippines)** **SEI (Philippines) Inc.**
5/F King's Court I Building, 2129 Pasong Tamo, Makati,
Metro Manila, Philippines
Tel: 63-2-811-2755 Fax: 63-2-811-2378
- (Malaysia)** **Sumitomo Electric Hardmetal Asia Pacific Pte. Ltd.**
A-3-1. Level 3, Block A. Mines Waterfront Business Park
No. 3 Jalan Tasik, The Mines Resort City 43300
Seri Kembangan, Selangor, Malaysia
Tel: 60-3-8945-1186 Fax: 60-3-8945-1187
- (Australia)** **SEI Carbide Australia Pty Ltd.**
Unit 2/89, Batt St. (Cnr Penrith St.) South Penrith NSW 2750, Australia
Tel: 61-2-4721-2000 Fax: 61-2-4721-4490

[India]

Motherson Techno Tools Ltd.

A/9A Sector-16, Noida-201 301 Distt., Gautam Budh Nagar, U.P., India
Tel: 91-120-2510045 Fax: 91-120-2510047

[China]

Sumitomo Electric Hardmetal Trading (Shanghai) Co., Ltd.

住友電工硬質合金貿易(上海)有限公司

Headquarters - Shanghai

上海 Room J, 6/F Huamin Empire Plaza, No. 728 Yan An Road (W),
Shanghai, 200050, China
中国上海市長寧区延安西路728号 華敏·翰尊國際大廈6層J座 郵編: 200050
Tel: 86-21-5238-1199 Fax: 86-21-6212-9689

Beijing Branch

北京分公司 Room 1306, Block B, Lucky Tower, No. 3 North Dongsanhuan Road,
Chaoyang District, Beijing, 100027, China
中国北京市朝阳区東三環北路3号 幸福大廈B座1306室 郵編: 100027
Tel: 86-10-6468-8500 Fax: 86-10-6468-9500

Dalian Branch

大連分公司 Room 807D, Yoma IFC, No. 128 Jinma Road, Dalian
Development Area, 116600, China
中国大連經濟技術開發区金馬路128号 祐瑪國際金融中心807D室 郵編: 116600
Tel: 86-411-8792-6266 Fax: 86-411-8792-6277

Guangzhou Branch

廣州分公司 Room 807, Times Square, No. 28 Tian He North Road, Guangzhou,
510620, China
中国广州市天河区天河北路28号 時代廣場東座807室 郵編: 510620
Tel: 86-20-3891-0442 Fax: 86-20-3891-0449

Chongqing Branch

重慶分公司 Room 28-6, Future International Building, 1 Branch 6 Jianxin Road,
Jiangbei Area, Chongqing, 400020, China
中国重慶市江北区建新北路一支路6号 未来國際大廈28-6 郵編: 400020
Tel: 86-23-6785-7656 Fax: 86-23-6785-7780

[North America]

Sumitomo Electric Carbide, Inc. **Headquarters - Chicago**

1001. Business Center Drive, Mt. Prospect, IL 60056-2181, U.S.A.
Tel: 1-847-635-0044 Fax: 1-847-635-9335

Detroit Branch

14496 Sheldon Road, Suite 230, Plymouth, MI 48170, U.S.A.
Tel: 1-734-451-0200 Fax: 1-734-451-5338

Cincinnati Branch

4450 Carver Woods Drive, Cincinnati, OH 45242-5545, U.S.A.
Tel: 1-513-891-4000 Fax: 1-513-794-2911

Alabama Branch

5650 Sanderson St., NW-Suite J Huntsville, AL 35805, U.S.A.
Tel: 1-256-895-2845 Fax: 1-256-895-3150

Los Angeles Branch

21221 S. Western Avenue, Suite 200 Torrance, CA 90501, U.S.A.
Tel: 1-800-950-5202 Fax: 1-310-782-0211

[Mexico]

Sumitomo Electric Hardmetal de Mexico, S.A. de C.V.

Av. Aguascalientes 2625, Jardines de las Fuentes, Aguascalientes,
AGS., 20290, Mexico
Tel: 52-449-993-2740 Fax: 52-449-993-2753

[Europe]

(Germany) **Sumitomo Electric Hartmetall GmbH**

Siemensring 84, D-47877 Willich, Germany
Tel: 49-2154-49920 Fax: 49-2154-41072

(France) **Sumitomo Electric Hartmetall GmbH**

Parc Technologique 22, rue du Bois Chaland
C.E.2924-LISSES-91029 Evry Cedex, France
Tel: 33-1-6989-8383 Fax: 33-1-6086-2316

(U.K.) **Sumitomo Electric Hardmetal Ltd.**

Summerleys Road, Princes Risborough,
Buckinghamshire, HP27 9PW, U.K.
Tel: 44-1844-342081 Fax: 44-1844-342415

(Italy) **Sumitomo Electric Hartmetall GmbH**

Strada della Cebrosa 86, 10156 Torino, Italy
Tel: 39-011-2736-711 Fax: 39-011-2736-791

(Hungary) **Sumitomo Electric Hartmetall GmbH**

H-2310 Szigetszentmiklós, Leshegy, U.14., Hungary
Tel: 36-24-525-290 Fax: 36-24-525-291

(Czech) **Sumitomo Electric Hartmetall GmbH**

Luzna 2, 160 00 Praha 6, Czech Republic
Tel: 420-220105384 Fax: 420-220105388

(Russia) **Sumitomo Electric Hartmetall GmbH**

Naberezhnaya Tower Complex, Block C (REGUS, 4th floor, office 461)
10 Presnenskaya Naberezhnaya, Moscow, 123317, Russia
Tel: 7-495-967-7676 (REGUS, main reception)
Fax: 7-495-967-7600



SUMITOMO ELECTRIC INDUSTRIES, LTD.

Global Marketing Department : 1-1-1, Koyakita, Itami, Hyogo 664-0016, Japan
TEL : 81-72-772-4535 FAX : 81-72-771-0088

<http://www.sumitool.com/>