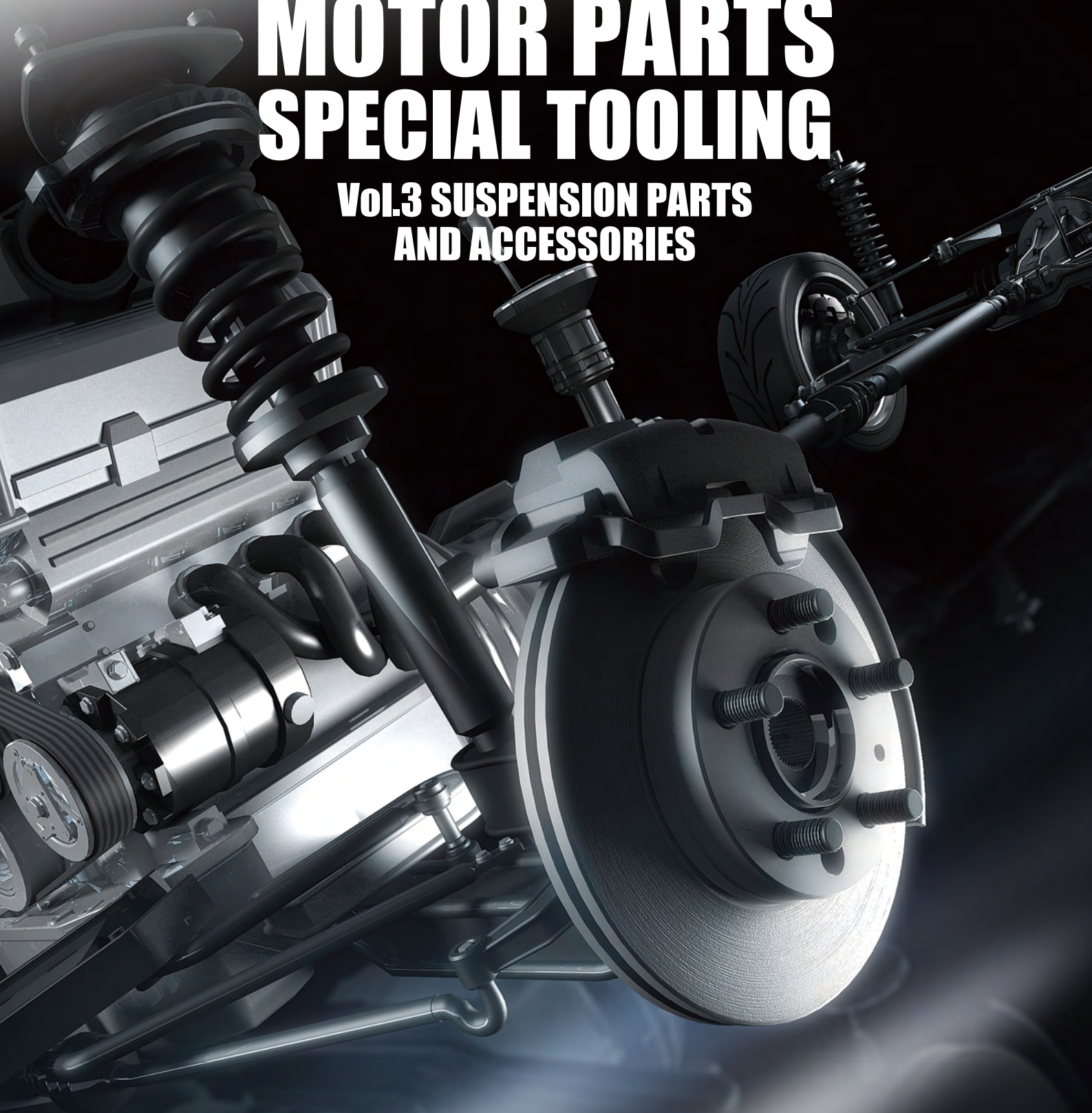


MITSUBISHI CARBIDE
MOTOR PARTS TOOLING

MOTOR PARTS SPECIAL TOOLING

**Vol.3 SUSPENSION PARTS
AND ACCESSORIES**



SUSPENSION PARTS AND ACCESSORIES





Knuckle arm

01



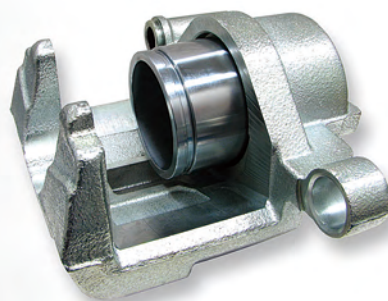
Constant velocity
universal joint

05



Hub

09



Brake caliper

15



Rail

19



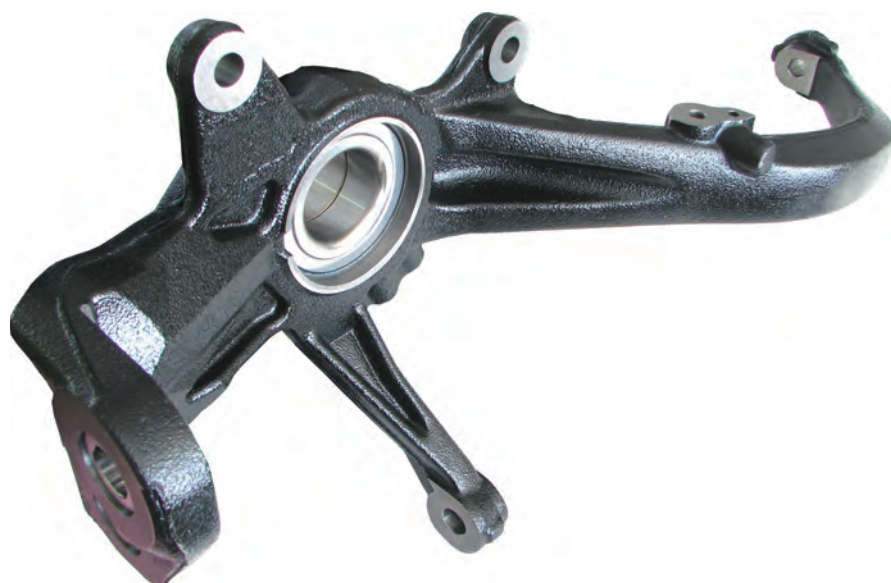
Injector

25

MITSUBISHI AUTOMOTIVE TOOLING



Knuckle arm



Main machining

- ① Various holes
- ② Various locating faces

Machining methods

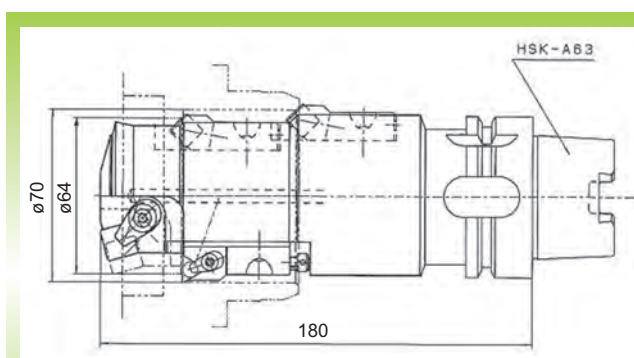
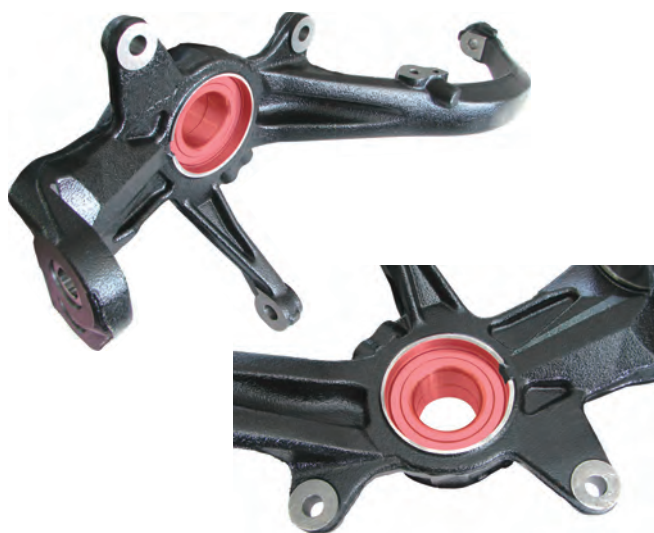
Milling

Drilling

Boring

Work material : FCD450 equivalent

OP.10 T1 (Rough boring of boss) For machining centres



SPGN120312 HTi10
SPGN090304 HTi10
TPGN110304 HTi10

Tool features

Combination boring cutter with HTi10 inserts.
Facing and chamfering can be performed in one process,
allowing higher production efficiency.
Cartridge type prevents the body from damage.

Cutting conditions

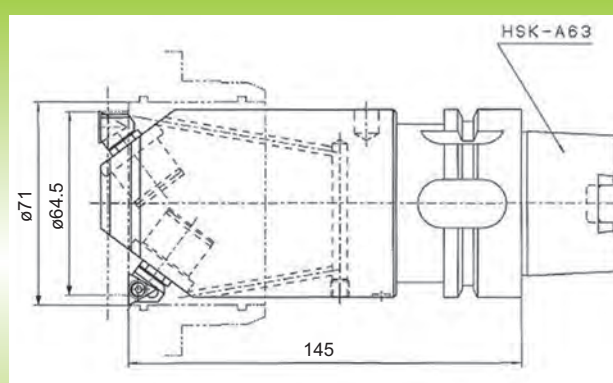
$vc=108\sim 120\text{m/min}$ $fz=0.20\text{mm/tooth}$
 $ap=1.0\text{mm}$ Wet

OP.10 T2 (Finish boring of the boss) For machining centres



Tool features

Combination boring cutter with NX2525 inserts.
Facing and chamfering can be performed in one process, allowing higher production efficiency.
Use of micro-boring units enables high precision machining.



TPGX110304
NX2525

Cutting conditions

$vc=180\sim 200\text{m/min}$ $fz=0.15\text{mm/tooth}$
 $ap=0.5\text{mm}$ Wet

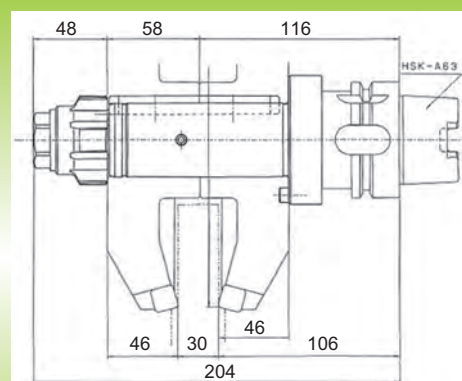
Tooling Sheet 2

OP.20 T1 (Tie-rod mounting face) For machining centres



Tool features

Special side cutter with UC5115 inserts.
Use of quick change system for easy tool change.
Shorten tool change time and increase efficiency in machining lines.



SNMN120416
UC5115

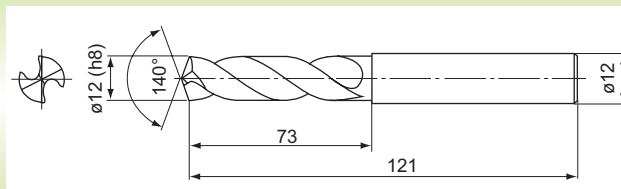
Cutting conditions

$vc=120\text{m/min}$ $fz=0.10\text{mm/tooth}$
 $ap=0.6\text{mm}$ Wet

Tooling Sheet 3

OP.20 T2 (Tie-rod mounting holes)

For machining centres



MWE1200MB
VP15TF

Tool features

Standard WSTAR drill.

Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces cutting resistance, resulting in high precision, stable machining.

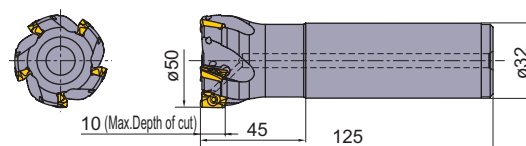
Cutting conditions

vc=60m/min fr=0.25mm/rev
ld=30mm Wet

Tooling Sheet 4

OP.20 T3 (ABS sensor mounting face)

For machining centres



APX3000R507SA32SA
AOMT123608PEER-M
VP15TF

Tool features

Standard APX3000 type cutter with VP15TF inserts.

Effective in various 3-D machining operations including ramping, leading to a substantially reduction of tool exchange time.

Use of a general-purpose low resistance M type breaker.

Cutting conditions

vc=100m/min fz=0.08mm/tooth
ap=1.2mm Wet

Tooling Sheet 5

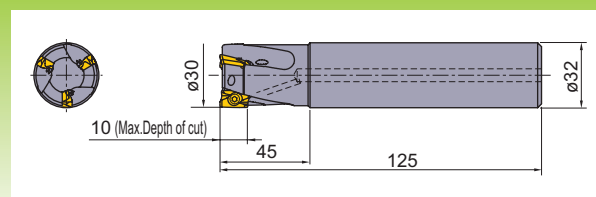
OP.30 T1 (Brake caliper mounting face) For machining centres



Tool features

Standard APX3000 type cutter with VP15TF inserts.
Effective in various 3-D machining operations including ramping, leading to a substantially reduction of tool exchange time.

Use of a general-purpose low resistance M type breaker.



APX3000R304SA32SA
AOMT123608PEER-M
VP15TF

Cutting conditions

$vc=200\text{m/min}$ $fz=0.12\text{mm/tooth}$
 $ap=1.2\text{mm}$ Wet

Tooling Sheet 6

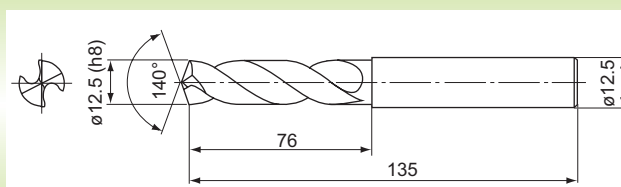
OP.30 T2 (Brake caliper mounting holes) For machining centres



Tool features

Standard WSTAR drill.

Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces cutting resistance, resulting in high precision, stable machining.



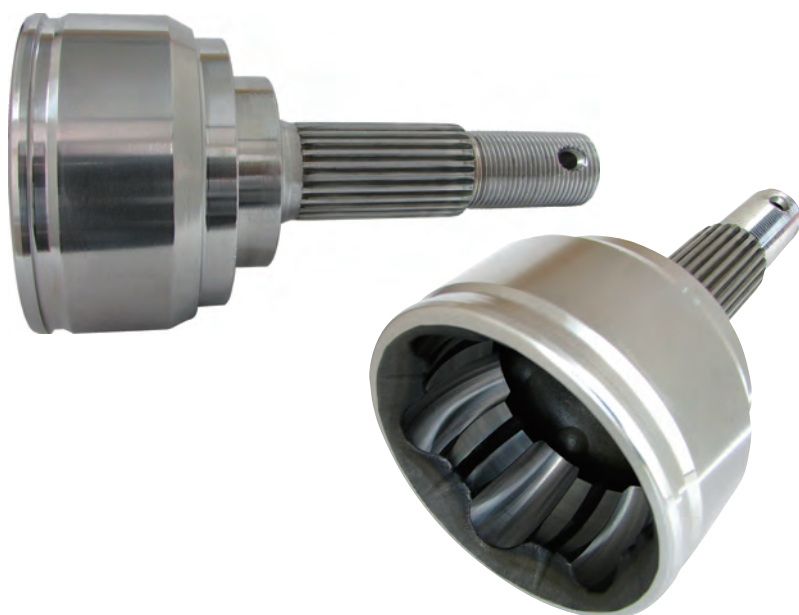
MWE1250MA
VP15TF

Cutting conditions

$vc=60\text{m/min}$ $fr=0.25\text{mm/rev}$
 $ld=10\text{mm}$ Wet

Tooling Sheet 7

Constant velocity universal joint



Main machining

- ① External turning
- ② Boring

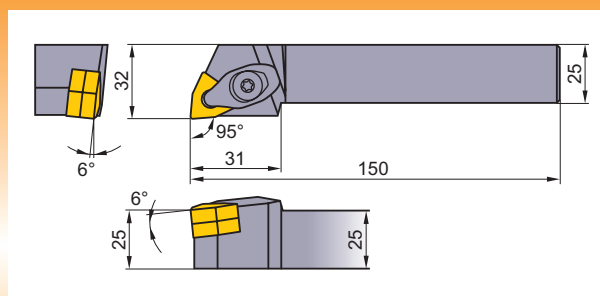
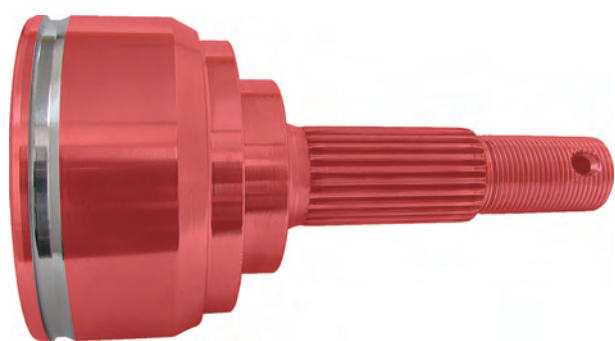
Machining methods Turning

Work material : S53C equivalent

Constant velocity
universal joint

OP.10 T1 (External roughing)

For CNC lathes



DWLNL2525M08
WNMG080412-MP
UE6020

Tool features

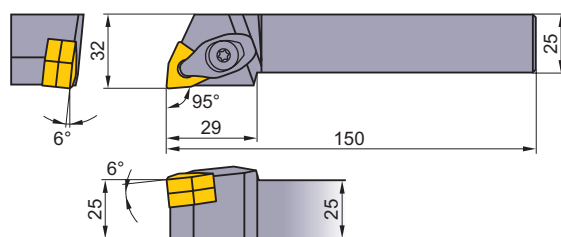
Standard holder with UE6020 inserts.
The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. The MP breaker gives good chip control in a wide application area, ensuring higher productivity.

Cutting conditions

vc=250m/min fr=0.4~0.5mm/rev
ap=1.0mm Dry

OP.10 T2 (Roughing of end face)

For CNC lathes



DCLNR2525M12
CNMG120412-MA
US735

Tool features

Standard holder with US735 inserts.
The US735 grade helps prevent welding problems during low speed cutting and abnormal wear problems and fracturing of cutting edges at medium to low speed, interrupted cutting. General-purpose MA breaker.

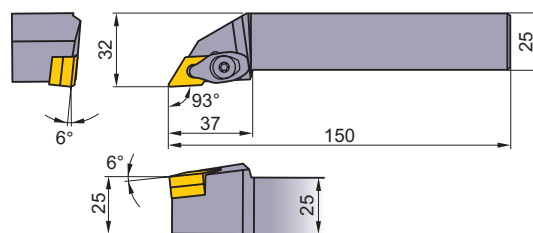
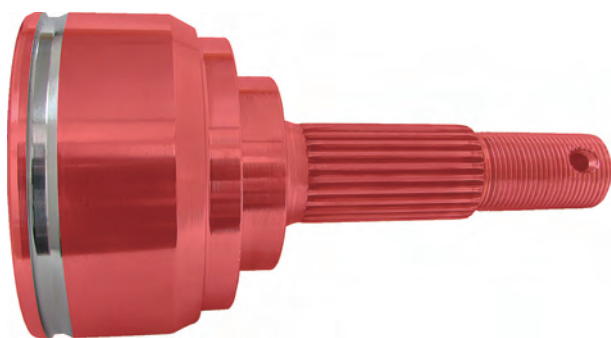
Cutting conditions

vc=230m/min fr=0.3mm/rev
ap=1.0~1.5mm Dry

Tooling Sheet 2

OP.20 T1 (External finishing)

For CNC lathes



DDJNL2525M15
DNMG150412-SH
UE6110

Tool features

Standard holder with UE6110 inserts.
The UE6110 steel turning grade with nano-texture coating provides excellent balance of wear and fracture resistance. The SH breaker featuring the curved edge gives sharp cutting action.

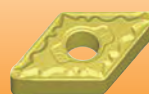
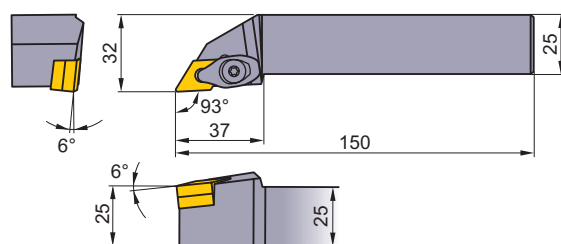
Cutting conditions

vc=250m/min fr=0.3~0.5mm/rev
ap=0.3mm Dry

Tooling Sheet 3

OP.20 T2 (External finishing)

For CNC lathes



DDJNL2525M15
DNMG150412-MP
UE6020

Tool features

Standard holder with UE6020 inserts.
The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. The MP breaker gives good chip control in a wide application area, ensuring higher productivity.

Cutting conditions

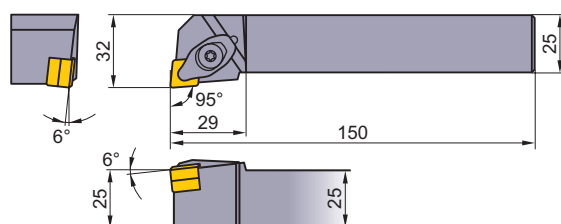
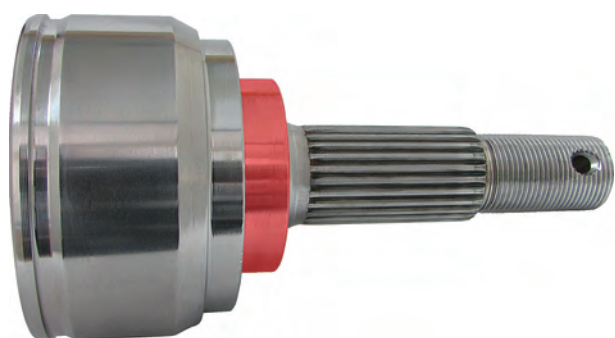
vc=180m/min fr=0.2~0.3mm/rev
ap=0.3~0.4mm Dry

Constant velocity
universal joint

Tooling Sheet 4

OP.30 T1 (External finishing after heat treating)

For CNC lathes



DCLNL2525M12
NP-CNGA120412GN4
MBC020

Tool features

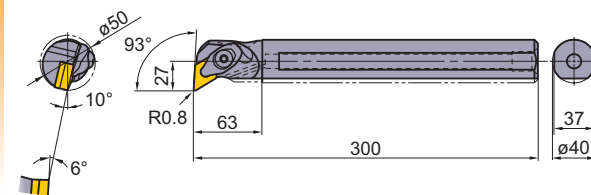
Standard holder with MBC020 inserts.
MBC020 is a MIRACLE coated CBN grade.
The combination of a high rigidity CBN substrate with a coating for higher wear resistance allows MBC020 to cover a wide range of machining applications.
Use of cost effective, double sided, multi-corner type inserts.

Cutting conditions

vc=180m/min fr=0.08~0.1mm/rev
ap=0.15mm Dry

Tooling Sheet 5

OP.30 T2 (Finish boring after heat treating) For CNC lathes



A40T-DDUNR15
NP-DNGA150412TA4
MBC020

Tool features

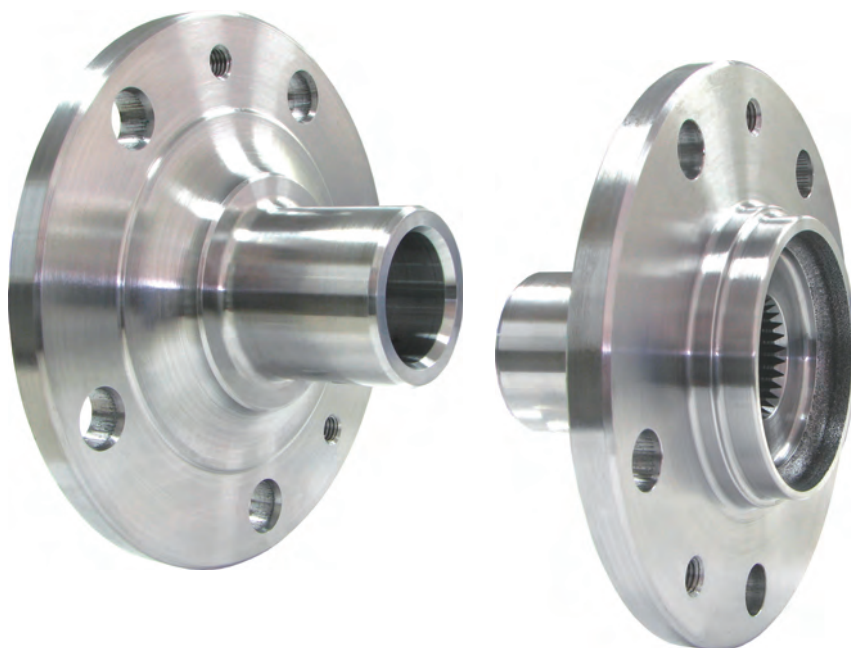
Standard holder with MBC020 inserts.
MBC020 is a MIRACLE coated CBN grade.
The combination of a high rigidity CBN substrate with a coating for higher wear resistance allows MBC020 to cover a wide range of machining applications.
Use of cost effective, double sided, multi-corner type inserts.

Cutting conditions

vc=105m/min fr=0.3mm/rev
ap=0.1mm Dry

Tooling Sheet 6

Hub



Main machining
 ① External turning
 ② Boring
 ③ Bolt hole
 ④ Shaft hole

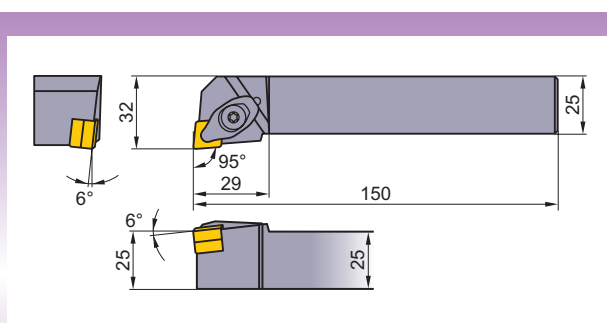
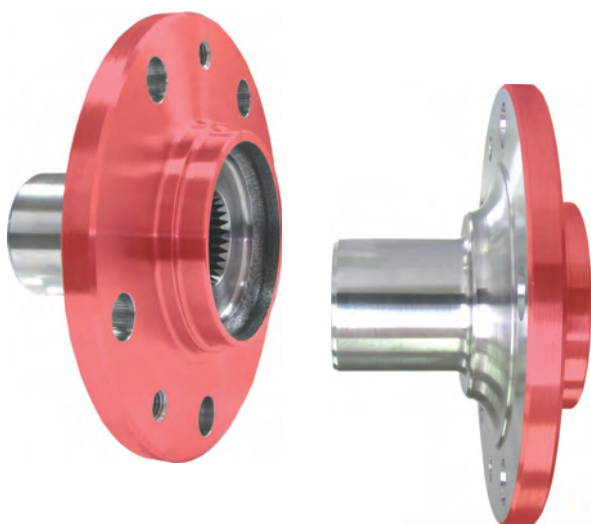
Machining methods
 Turning
 Drilling
 Broach

Work material : S55C equivalent

Hub

OP.10 T1 (Roughing of end face)

For CNC lathes



DCLNR2525M12
 CNMG120412-MP
 UE6020

Tool features

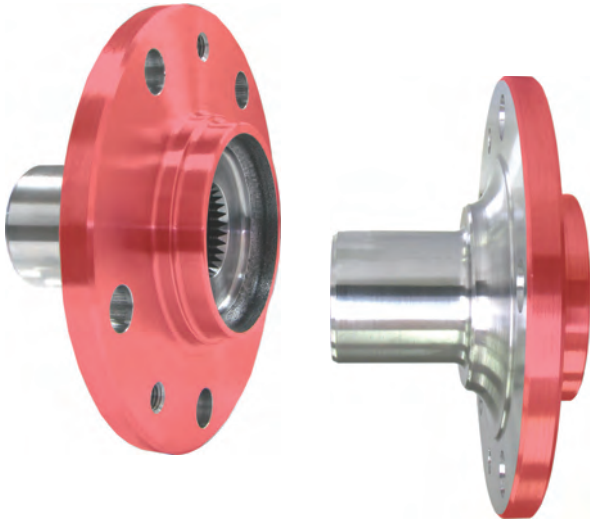
Standard holder with UE6020 inserts.
 The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. The MP breaker gives good chip control in a wide application area, ensuring higher productivity.

Cutting conditions

$vc=180\text{m/min}$ $fr=0.3\sim0.4\text{mm/rev}$
 $ap=0.8\text{mm}$ Wet

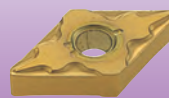
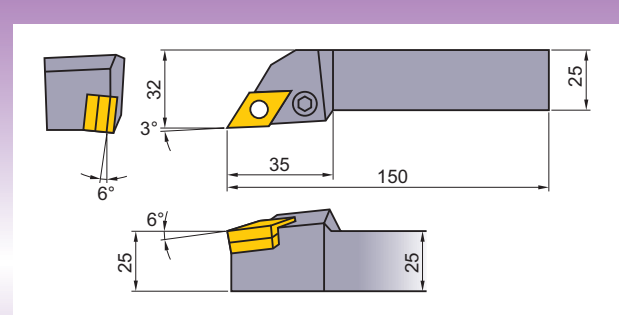
OP.10 T2 (Finishing of end face)

For CNC lathes



Tool features

Standard holder with UE6020 inserts.
The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. The SH breaker featuring the curved edge gives sharp cutting action.



PDJNR2525M15
DNMG150412-SH
UE6020

Cutting conditions

$vc=220\text{m/min}$ $fr=0.3\sim0.4\text{mm/rev}$
 $ap=0.2\text{mm}$ Wet

Tooling Sheet 2

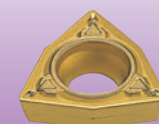
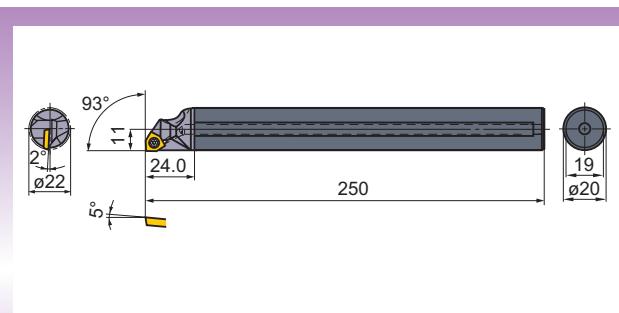
OP.10 T3 (Rough boring)

For CNC lathes



Tool features

Standard boring bar with UE6020 inserts.
The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. The MV breaker gives effective chip control in the light to medium cutting application areas.



FSWUP2220R-06E
WPMT060308-MV
UE6020

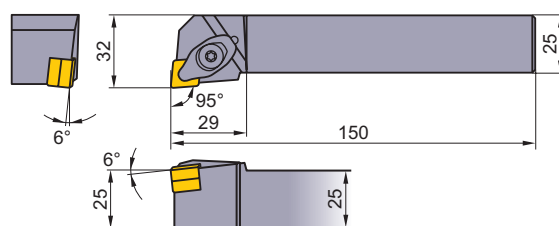
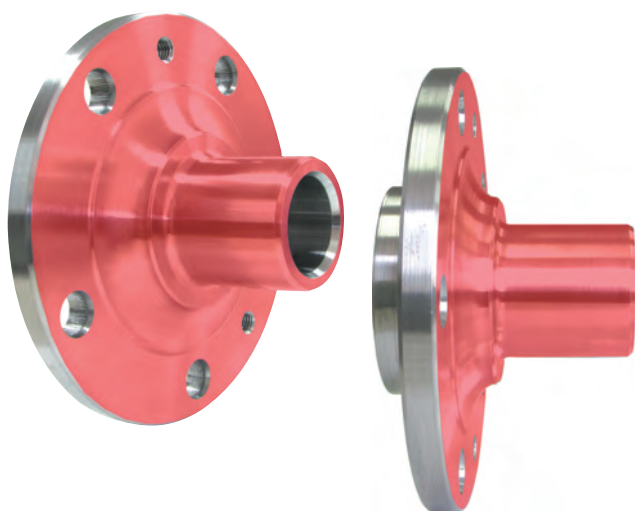
Cutting conditions

$vc=200\text{m/min}$ $fr=0.3\text{mm/rev}$
 $ap=0.8\text{mm}$ Wet

Tooling Sheet 3

OP.20 T1 (External roughing)

For CNC lathes



DCLNR2525M12
CNMG120412-MP
UE6020

Tool features

Standard holder with UE6020 inserts.
The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. The MP breaker gives good chip control in a wide application area, ensuring higher productivity.

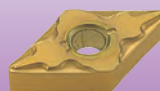
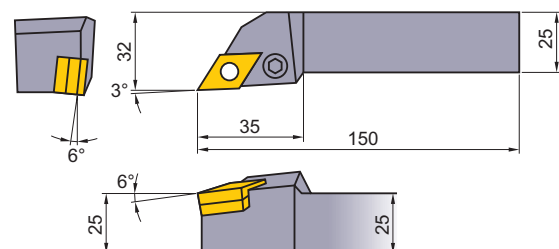
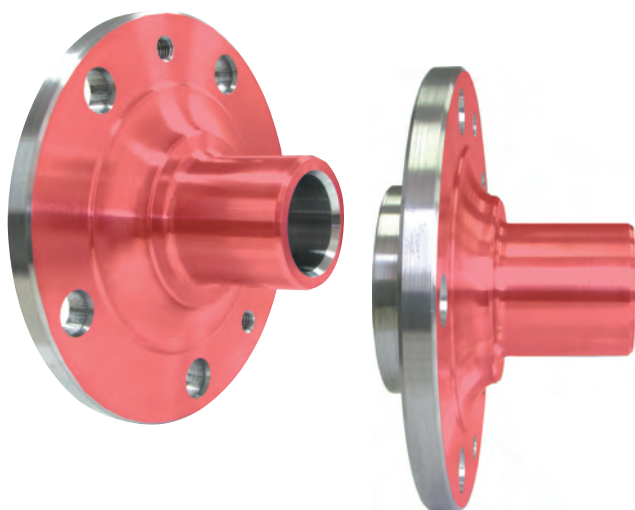
Cutting conditions

vc=200m/min fr=0.2~0.4mm/rev
ap=0.8mm Wet

Tooling Sheet 4

OP.20 T2 (External finishing)

For CNC lathes



PDJNR2525M15
DNMG150412-SH
UE6020

Tool features

Standard holder with UE6020 inserts.
The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. The SH breaker featuring the curved edge gives sharp cutting action.

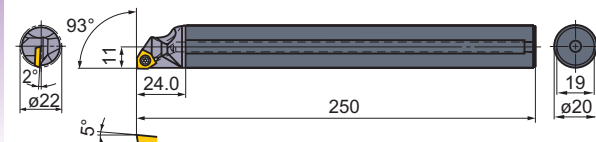
Cutting conditions

vc=230m/min fr=0.2~0.3mm/rev
ap=0.2mm Wet

Tooling Sheet 5

OP.20 T3 (Finish boring)

For CNC lathes



FSWUP2220R-06E
WPMT060308-MV
UE6020

Tool features

Standard boring bar with UE6020 inserts.
The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. The MV breaker gives effective chip control in the light to medium cutting application areas.

Cutting conditions

vc=200m/min fr=0.2~0.3mm/rev
ap=0.2mm Wet

Tooling Sheet 6

OP.30 T1 (Bolt hole)

For CNC lathes



MHE1395x90x14
VP15TF

Tool features

MHE drill for wheel hubs.
Specially designed for drilling of bolt holes, highly efficient, precision drilling can be achieved.
High precision drilling enables production of holes with a single tool.

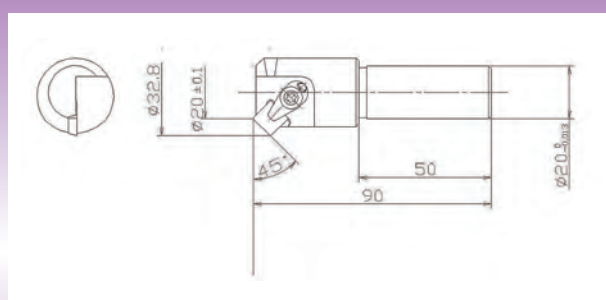
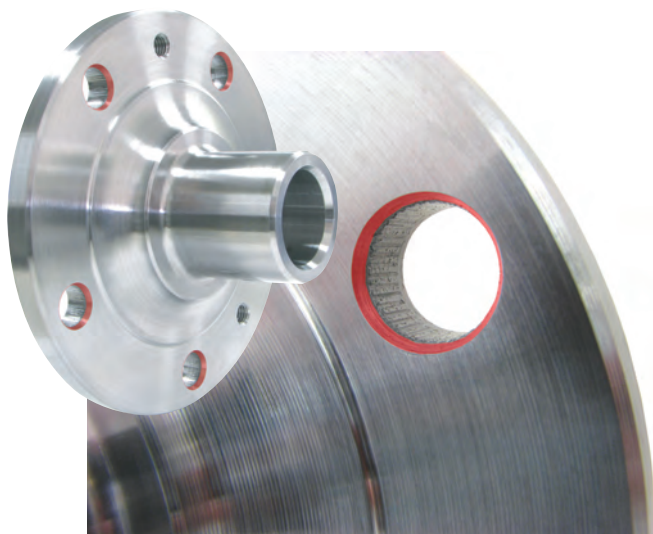
Cutting conditions

vc=80m/min n=1,840min⁻¹ fr=0.15mm/rev
ld=11mm Wet

Tooling Sheet 7

OP.30 T2 (Chamfering of bolt holes)

For CNC lathes



SPMR090304
UE6110

Tool features

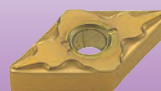
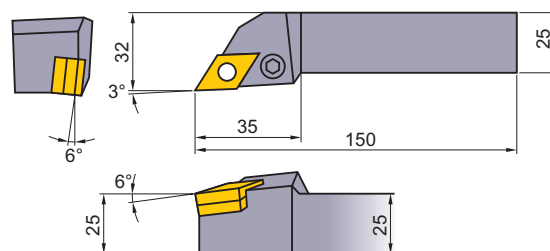
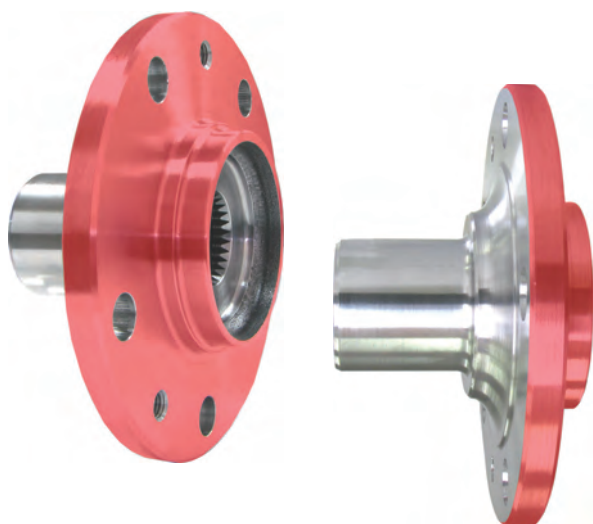
Special chamfering cutter with UE6110 inserts.
Plunging is carried out to chamfer bolt holes.
The UE6110 steel turning grade with a nano-texture coating provides excellent balance of wear and fracture resistance.

Cutting conditions

$vc=210\text{m/min}$ $n=3,342\text{min}^{-1}$ $fr=0.15\text{mm/rev}$
Wet

Tooling Sheet 8

OP.40 T1 (Finishing the end face after heat treating) For CNC lathes



PDJNR2525M15
DNMG150408-SH
US735

Tool features

Standard holder with US735 inserts.
US735 with high welding resistance helps prevent abnormal wear at medium to low speed, interrupted cutting.
The SH breaker featuring the curved edge gives sharp cutting action.

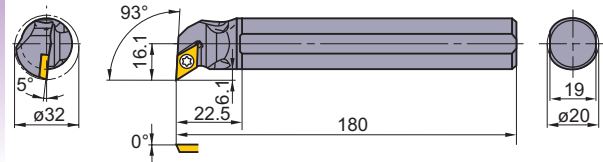
Cutting conditions

$vc=180\text{m/min}$ $fr=0.18\sim 0.22\text{mm/rev}$
 $ap=0.2\text{mm}$ Wet

Tooling Sheet 9

OP.40 T2 (Finish boring after heat treating)

For CNC lathes



FSDUC3220R-11S
DCMT11T308-SV
UE6020

Tool features

Standard boring bar with UE6020 inserts.
The highly reliable UE6020 grade employs Even Coating Technology to deliver higher welding and fracture resistance. Use of the finishing type SV breaker.

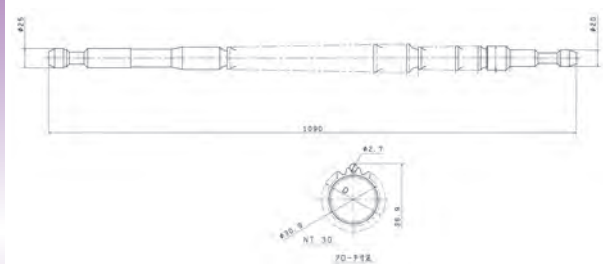
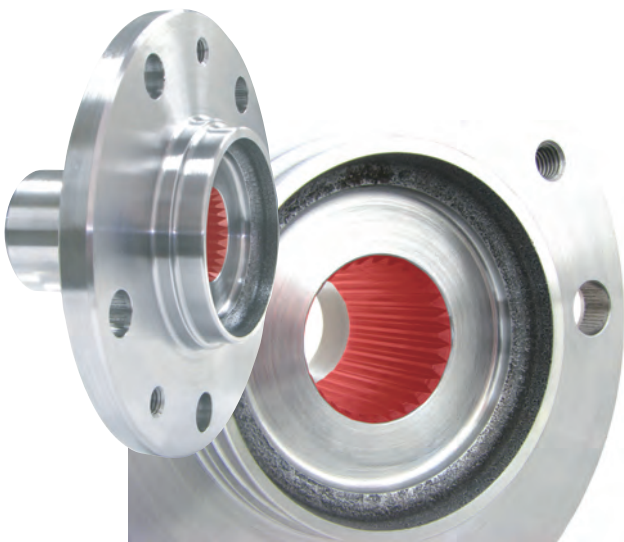
Cutting conditions

$vc=170\text{m/min}$ $fr=0.18\sim0.2\text{mm/rev}$
 $ap=0.2\text{mm}$ Wet

Tooling Sheet 10

OP.50 (Broach)

For broaching machine



M1.0583 PA45 NT30
KHA

Tool features

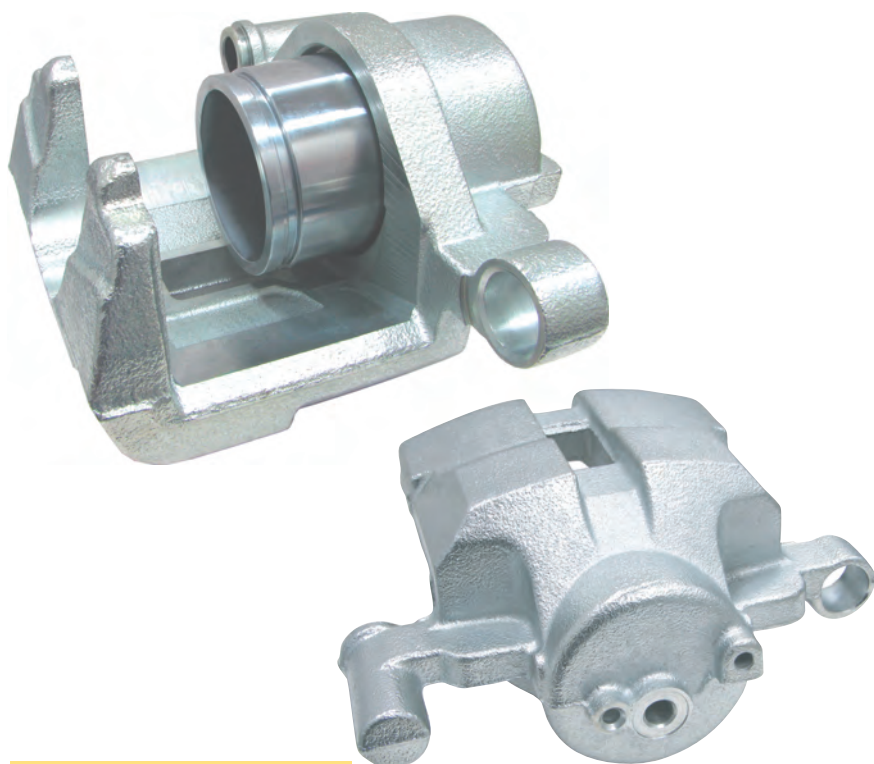
Longer tool life by reducing the load on each cutting edge.

Cutting conditions

$vc=6\sim10\text{m/min}$

Tooling Sheet 11

Brake caliper



Main machining

- ①Piston hole
- ②Outer pad face
- ③Slide pin hole

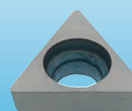
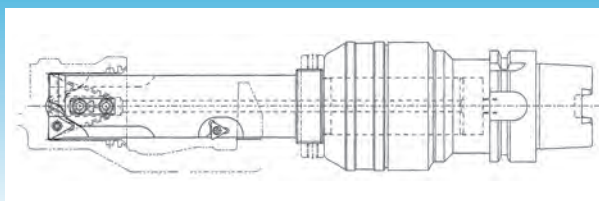
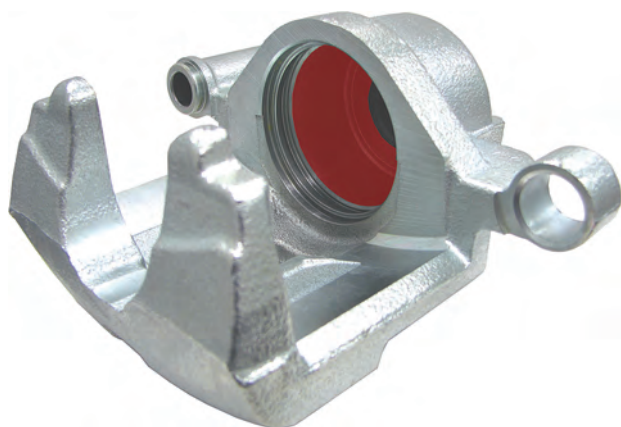
Machining methods

Milling

Drilling

Work material : FCD400 equivalent

OP.10 T1 (Roughing of the piston bore) For machining centres



TPGX160304 HTi10
TPGX110308 HTi10

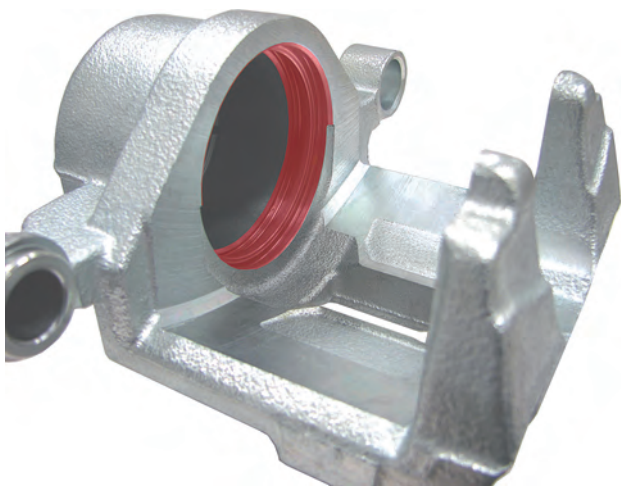
Tool features

Special boring cutter with HTi10 inserts.
Employs a solid drill at the point.
The cutting edge at the shank portion enables half-round machining of the outer pad face.

Cutting conditions

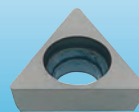
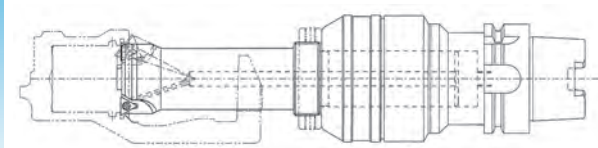
vc=80m/min fr=0.16mm/rev
ap=0.8mm Wet

OP.10 T2 (Rough chamfering of the piston bore) For machining centres



Tool features

Special boring cutter with HTi10 inserts.
Combination boring bar to perform roughing and chamfering in one process.



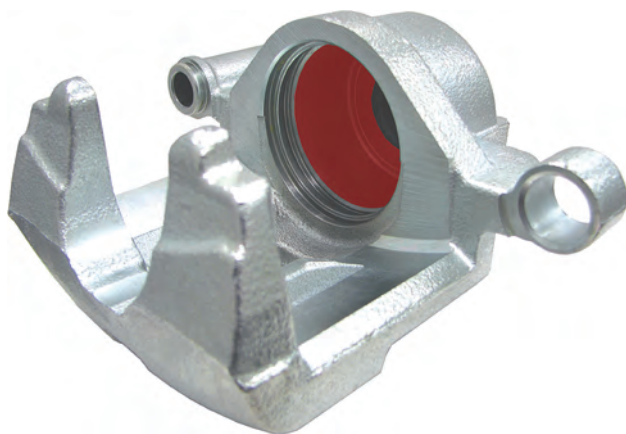
TPGX160304 HTi10
TPGX110308 HTi10

Cutting conditions

$vc=80\text{m/min}$ $fr=0.2\text{mm/rev}$
Wet

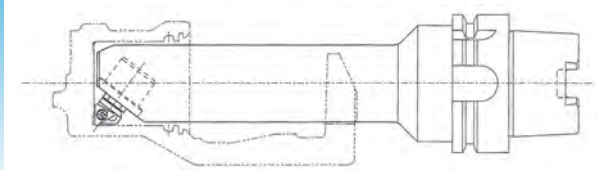
Tooling Sheet 2

OP.10 T3 (Finishing of the piston bore) For machining centres



Tool features

Special boring cutter with HTi10 inserts.
Use of micro-boring units enables high precision machining.



TPGX110308
HTi10

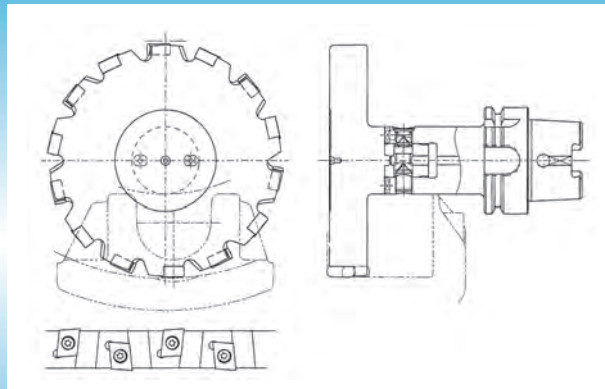
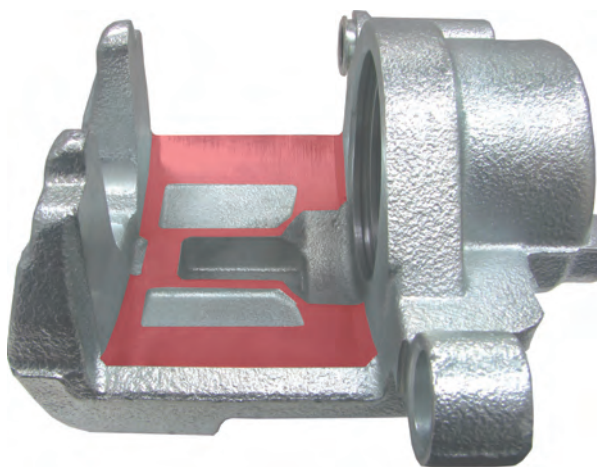
Cutting conditions

$vc=120\text{m/min}$ $fr=0.1\text{mm/rev}$
 $ap=0.3\text{mm}$ Wet

Tooling Sheet 3

OP.20 T1 (Outer pad face)

For machining centres



Special inserts
12x16x6.4x80° HTi10

Tool features

Special side cutter with HTi10 inserts.
Use of quick change system for easy tool change.
Shorten tool change time and increase efficiency in machining lines.

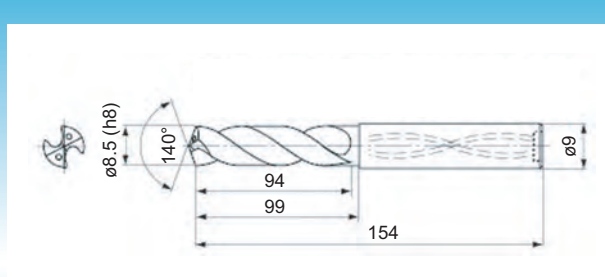
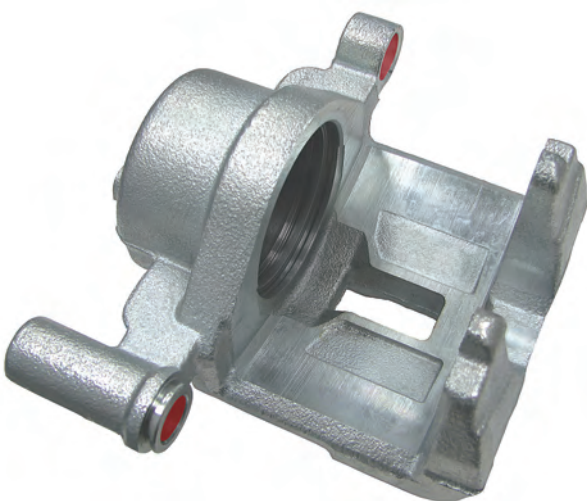
Cutting conditions

vc=100m/min fz=0.9mm/rev
ap=0.25mm Wet

Tooling Sheet 4

OP.30 T1 (Slide pin holes)

For machining centres



MWS0850X8DB
VP15TF

Tool features

Standard WSTAR drill.
Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces cutting resistance.
High precision, stable machining.

Cutting conditions

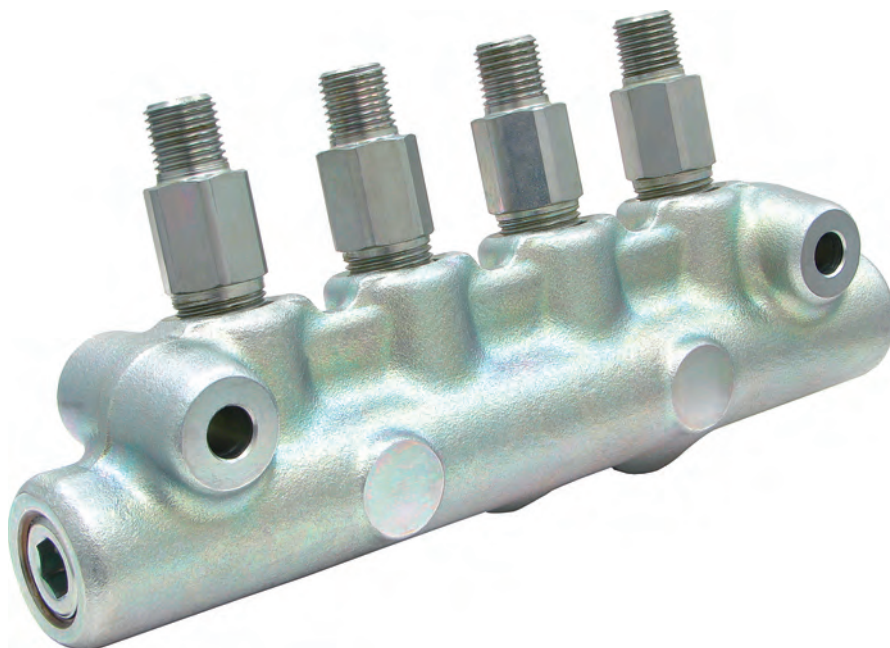
vc=70m/min fr=0.2mm/rev
Wet

Tooling Sheet 5

MITSUBISHI AUTOMOTIVE TOOLING



Common rail



Main machining

- ① External turning
- ② Boring
- ③ Bolt hole

Machining methods

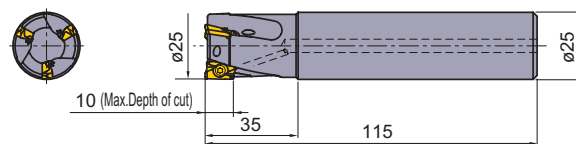
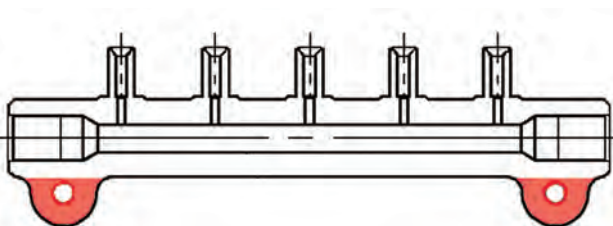
Milling

Drilling

Boring

Work material : SCM435 equivalent

OP.10 T1 (Mounting bolt seat face) For machining centres



APX3000R254SA25SA
AOMT123608PEER-M
VP15TF

Tool features

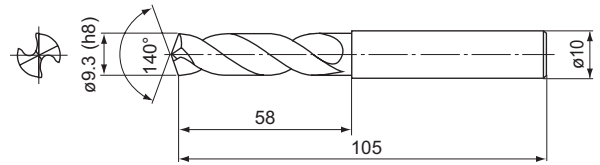
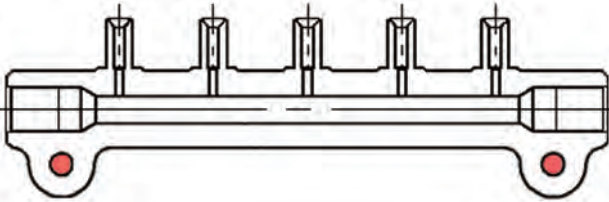
Standard APX3000 type cutter with VP15TF inserts.
Use of a general-purpose low resistance M type breaker.
Can be used in the machining of low clamp rigidity workpiece and thin wall applications.

Cutting conditions

vc=120m/min fz=0.12mm/tooth
ap=1.2mm Wet

OP.10 T2 (Bolt hole)

For machining centres



MWE0930MB
VP15TF

Tool features

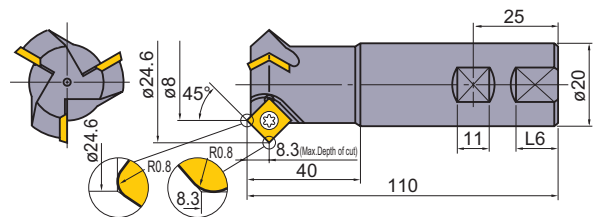
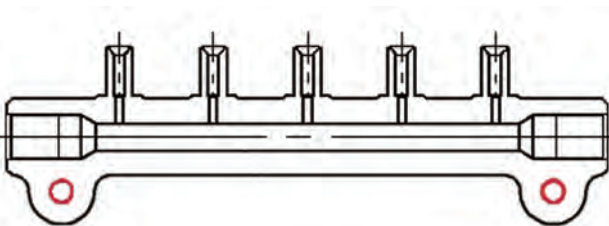
Standard WSTAR drill.
Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces cutting resistance, resulting in high precision, stable machining.

Cutting conditions

$vc=65\text{m/min}$ $fr=0.20\text{mm/rev}$
 $ld=12.0\text{mm}$ Wet

Tooling Sheet 2

OP.10 T3 (Chamfering of bolt holes) For machining centres



CFSPR081S20
SPMW120304 NX2525

Tool features

Standard CFSPR type cutter with NX2525 inserts.
For chamfering.
30°, 45° and 60° chamfer series.

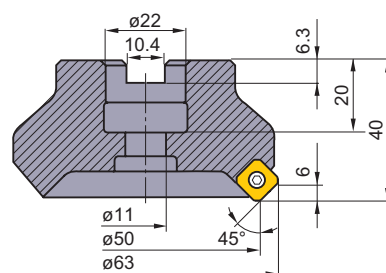
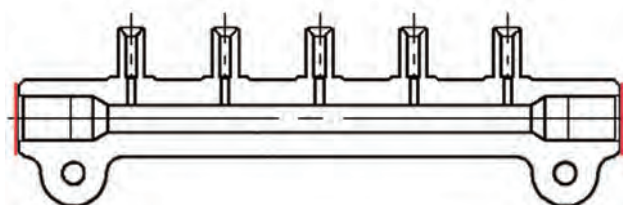
Cutting conditions

$vc=70\text{m/min}$ $fz=0.25\text{mm/tooth}$
Wet

Tooling Sheet 3

OP.20 T1 (End holes)

For machining centres



ASX445-050A04R
SEMT13T3AGSN-JM F7030

Tool features

Standard ASX445 type cutter with F7030 inserts.
The body is made from a special alloy steel that provides high heat resistance and excellent durability.
Use of screw-on type inserts for easy and high accuracy clamping.
Use of a general-purpose JM breaker.

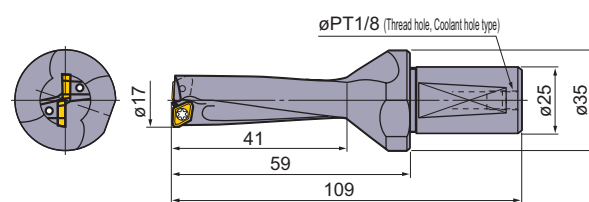
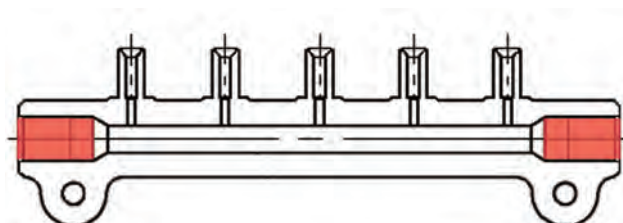
Cutting conditions

vc=180m/min fz=0.05mm/tooth
ap=1.8mm Wet

Tooling Sheet 4

OP.20 T2 (End holes)

For machining centres



TAFS1700F25
GPMT060204-U2 UE6020

Tool features

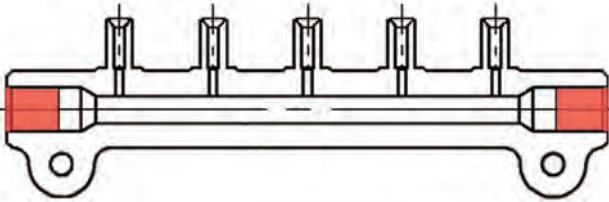
Standard TAF drill with UE6020 inserts.
Highly durable body with high insert seat rigidity.
Economical 4 cutting edge type inserts.

Cutting conditions

vc=105m/min fr=0.10mm/rev
Wet

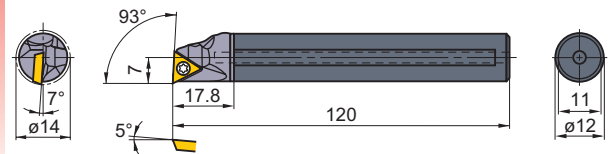
Tooling Sheet 5

OP.20 T3 (Tap drilling and chamfering of end holes) For machining centres



Tool features

Standard boring bar with UP20M inserts.
Highly rigid & light head configuration prevents deflection and vibration.



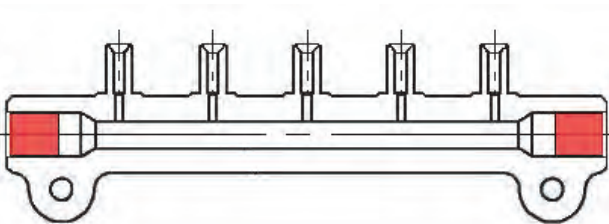
FSTUP1412R-09E-2/3
TPGX090204 UP20M

Cutting conditions

vc=80m/min fr=0.14mm/rev
ap=0.12mm Wet

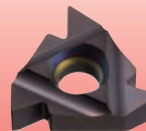
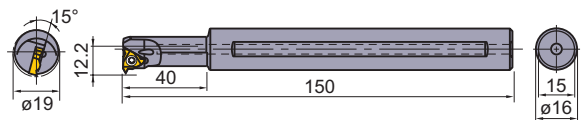
Tooling Sheet 6

OP.20 T4 (Threading of end holes) For machining centres



Tool features

Standard boring bar with VP10MF inserts.
G-class ground inserts ensures high precision threading.
3-D chip breaker available to provide good chip control.



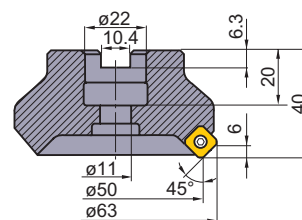
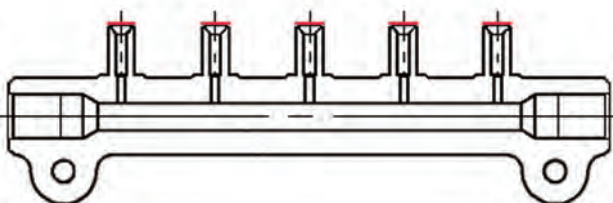
MMTIR1916AM16-SP15
MMT16IRAG60 VP10MF

Cutting conditions

vc=80m/min
Wet

Tooling Sheet 7

OP.30 T1 (Top face of branching holes) For machining centres



ASX445-050A04R
SEMT13T3AGSN-JM F7030

Tool features

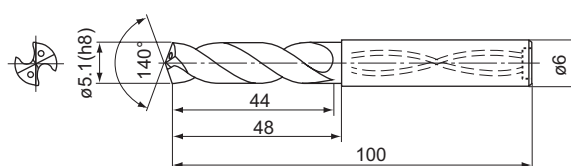
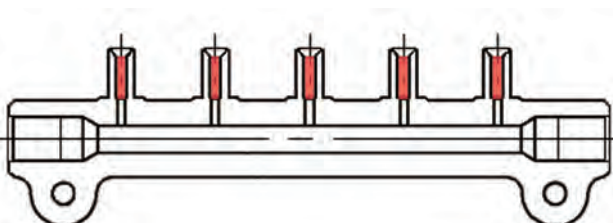
Standard ASX445 type cutter with F7030 inserts.
The body is made from a special alloy steel that provides high heat resistance and excellent durability.
Use of screw-on type inserts for easy and high accuracy clamping.
Use of a general-purpose JM breaker.

Cutting conditions

$vc=90\text{m/min}$ $fz=0.12\text{mm/tooth}$
 $ap=0.8\text{mm}$ Wet

Tooling Sheet 8

OP.30 T2 (Branching hole 1) For machining centres



MWS0510LB
VP15TF

Tool features

Standard WSTAR drill.
Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces cutting resistance, resulting in high precision, stable machining.

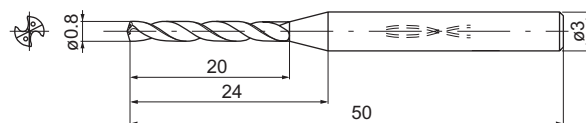
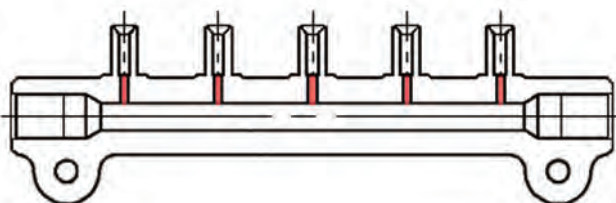
Cutting conditions

$vc=70\text{m/min}$ $fr=0.15\text{mm/rev}$
Wet

Tooling Sheet 9

OP.30 T3 (Branching hole 2)

For machining centres



MWS0080XB
VP15TF

Tool features

Standard WSTAR drill.

Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces the cutting resistance. Use of ultra micro grain carbide substrate enables stable performance even when micro hole drilling that may cause possible tool breakage.

Cutting conditions

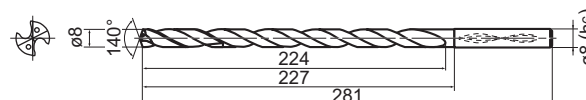
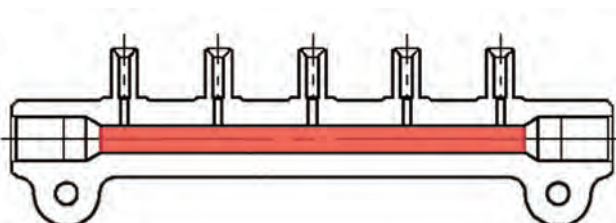
$vc=40\text{m/min}$ $fr=0.08\text{mm/rev}$

Wet

Tooling Sheet 10

OP.30 T4 (Centre hole)

For machining centres



MWS0800X25DB
VP15TF

Tool features

Standard WSTAR super long drill.

Wave type cutting edge and flute geometry with good chip discharge properties reduces cutting resistance and enables deep hole drilling with a single tool.

By replacing the reaming, drastic reduction of machining time is achieved.

Cutting conditions

$vc=80\text{m/min}$ $fr=0.15\text{mm/rev}$

Wet

Tooling Sheet 11

Injector



Main machining

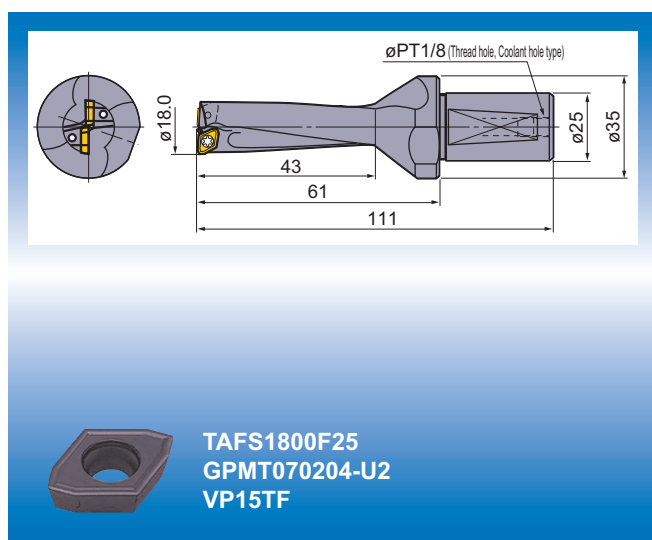
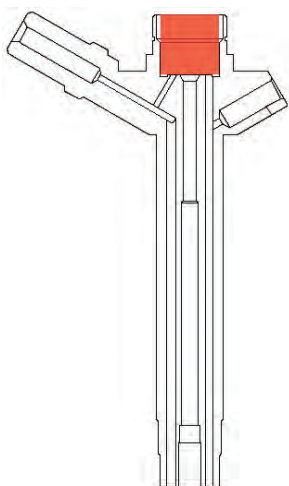
- ① External turning
- ② Boring
- ③ Various holes

Machining methods

Turning
Drilling

Work material : SCM420 equivalent

OP.10 T1 (Rough boring of the lower body) For CNC lathes



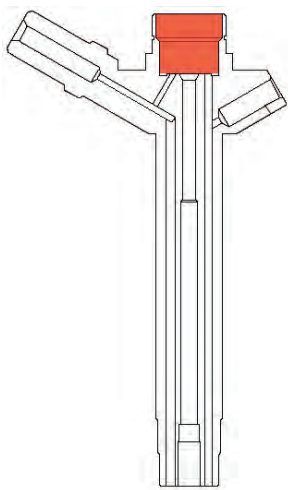
Tool features

Standard TAF drill with VP15TF inserts.
Highly durable body with high insert seat rigidity.
Economical 4 cutting edge type inserts.

Cutting conditions

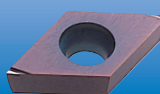
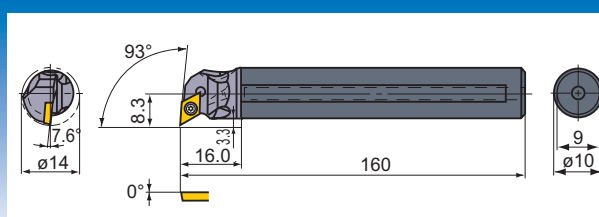
vc=85m/min fz=0.1mm/rev
Wet

OP.10 T2 (Finish boring of the lower body) For CNC lathes



Tool features

Standard boring bar with VP15TF inserts.
Highly rigid & light head configuration prevents deflection and vibration.



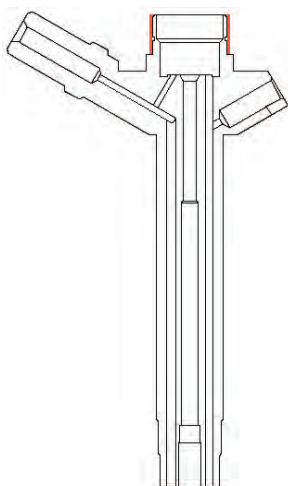
FSDUC1410R-07E
DCGT070204L-F
VP15TF

Cutting conditions

vc=70m/min fr=0.1mm/rev
ap=0.5mm Wet

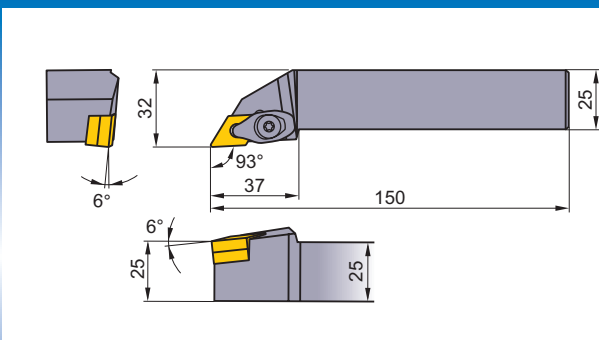
Tooling Sheet 2

OP.20 T1 (External turning of the lower body) For CNC lathes



Tool features

Standard holder with UE6110 inserts.
The UE6110 steel turning grade with a nano-texture coating provides excellent balance of wear and fracture resistance.
Use of the finishing type FH breaker.



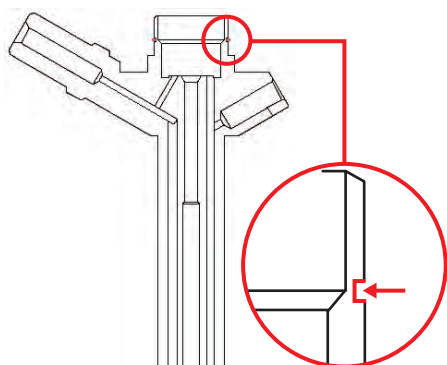
DDJNR2525M15
DNMG150404-FH
UE6110

Cutting conditions

vc=150m/min fr=0.15mm/rev
ap=0.7mm Wet

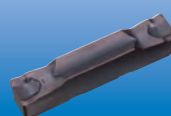
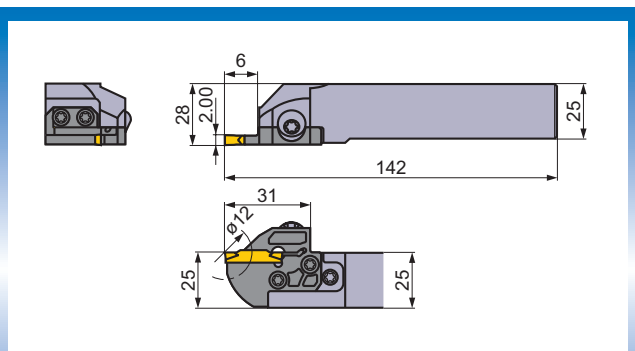
Tooling Sheet 3

OP.20 T2 (External grooving of the lower body) For CNC lathes



Tool features

Standard holder with VP20MF inserts.
The holder can be used with several different modular blades for variable groove depths, offering high cost performance.
VP20MF employs micro-grain cemented carbide substrate to deliver excellent wear and fracture resistance and longer tool life.



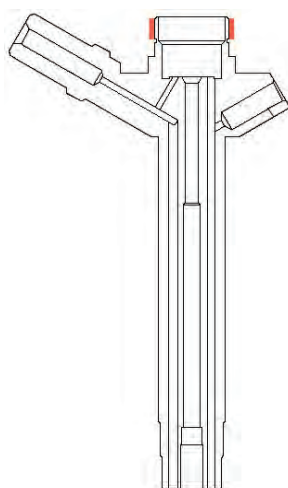
GYM25RA-D06 / GYHR2525M00-M25R
GY2M0200D020N-GM
VP20MF

Cutting conditions

vc=80m/min fr=0.08mm/rev
Wet

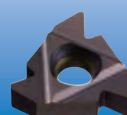
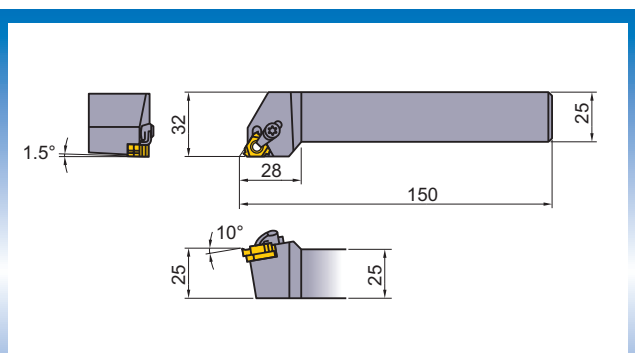
Tooling Sheet 4

OP.20 T3 (External threading of the lower body) For CNC lathes



Tool features

Standard holder with VP10MF inserts.
G-class ground inserts ensures high precision threading.
3-D chip breaker available to provide good chip control.



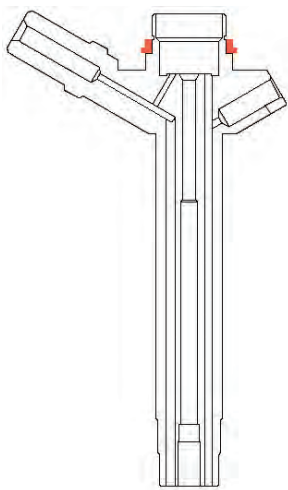
MMTER2525M16-C
MMT16ER050ISO
VP10MF

Cutting conditions

vc=100m/min
Wet

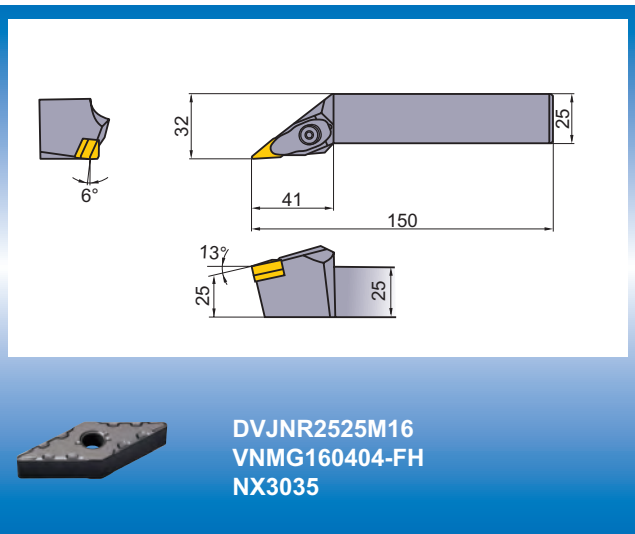
Tooling Sheet 5

OP.20 T4 (External finishing of the lower body) For CNC lathes



Tool features

Standard holder with NX3035 inserts.
NX3035 is a cermet grade with highly improved thermal shock resistance.
Offers highly stable cutting edge performance even during wet cutting conditions that usually cause instability in conventional grades.
Use of the finishing type FH breaker.

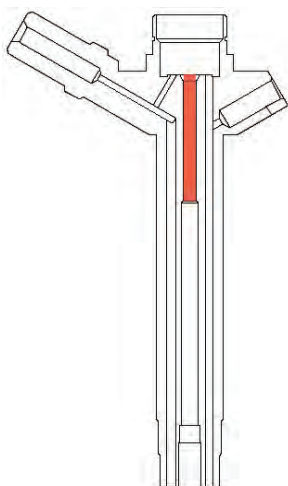


Cutting conditions

vc=240m/min fr=0.08mm/rev
ap=0.3mm Wet

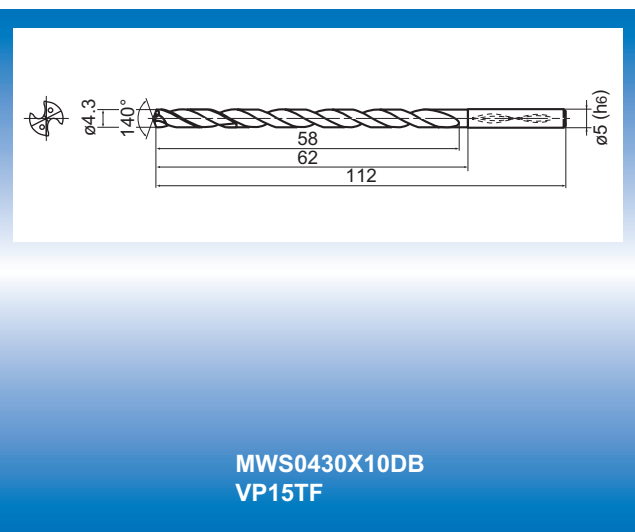
Tooling Sheet 6

OP.30 T1 (Lower body centre hole) For CNC lathes



Tool features

Standard WSTAR super long drill.
Wage type cutting edge and flute geometry with good chip discharge properties reduces cutting resistance and enables deep hole drilling with a single tool.
By replacing reaming, drastic reduction of machining time is achieved.

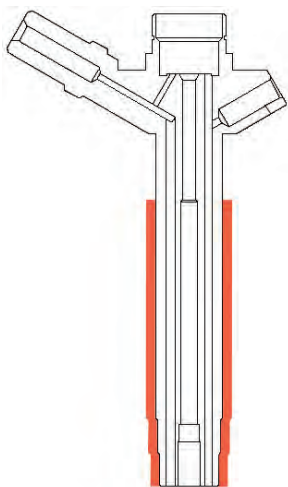


Cutting conditions

vc=75m/min fr=0.15mm/rev
Wet

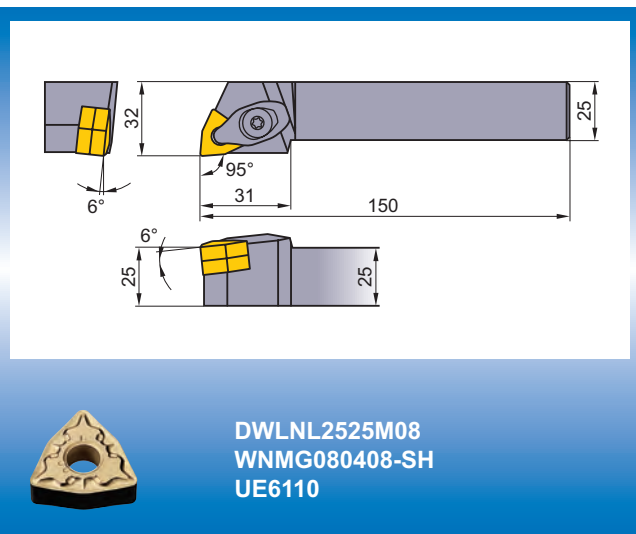
Tooling Sheet 7

OP.40 T1 (External roughing of the lower body nozzle) For CNC lathes



Tool features

Standard holder with NX3035 inserts.
NX3035 is a cermet grade with highly improved thermal shock resistance.
Offers highly stable cutting edge performance even during wet cutting conditions that usually cause instability in conventional grades.
Use of the finishing type FH breaker.

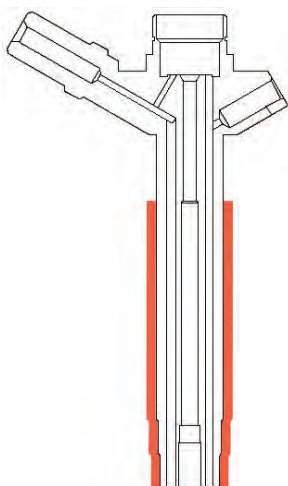


Cutting conditions

vc=120m/min fr=0.12mm/rev
ap=0.6mm Wet

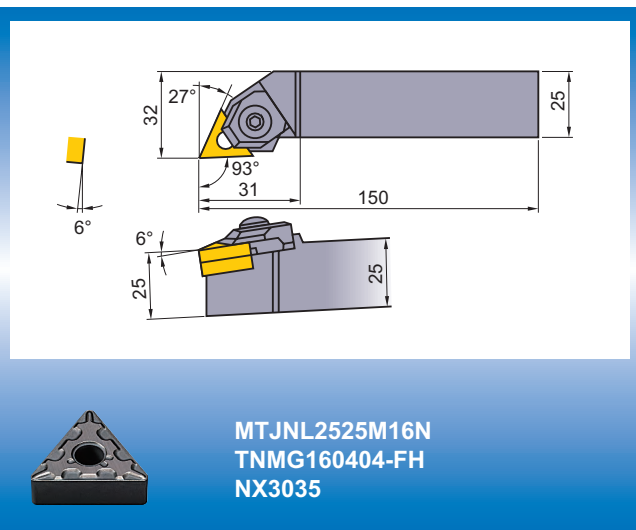
Tooling Sheet 8

OP.40 T2 (External finishing of the lower body nozzle) For CNC lathes



Tool features

Standard holder with NX3035 inserts.
NX3035 is a cermet grade with highly improved thermal shock resistance.
Offers highly stable cutting edge performance even during wet cutting conditions that usually cause instability in conventional grades.
Use of the finishing type FH breaker.



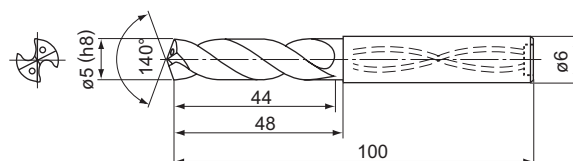
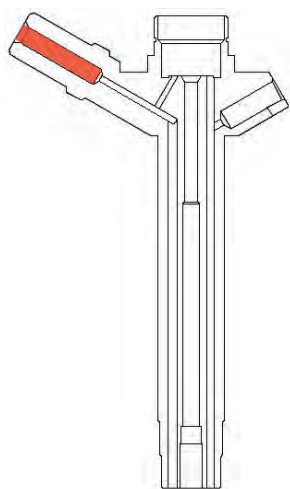
Cutting conditions

vc=120m/min fr=0.10mm/rev
ap=0.3mm Wet

Tooling Sheet 9

OP.50 T1 (Drilling of the lower body)

For machining centres



MWS0500LB
VP15TF

Tool features

Standard WSTAR drill.

Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces cutting resistance, resulting in high precision, stable machining.

Cutting conditions

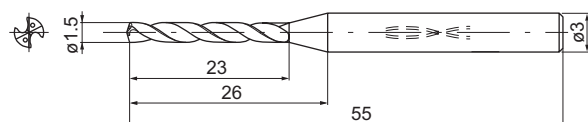
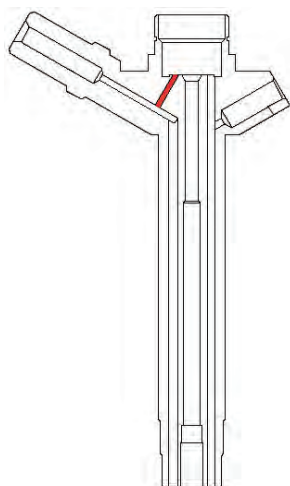
$vc=75\text{m/min}$ $fr=0.15\text{mm/rev}$

Wet

Tooling Sheet 10

OP.50 T2 (Drilling of the lower body inlet)

For machining centres



MWS0150XB
VP15TF

Tool features

Standard WSTAR drill.

Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces the cutting resistance. Use of ultra micro grain carbide substrate enables stable performance even when micro hole drilling that may cause possible tool breakage.

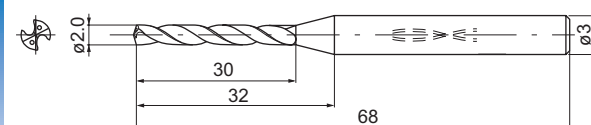
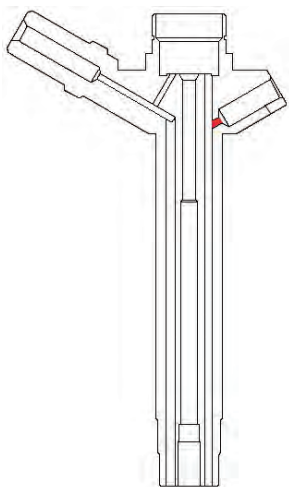
Cutting conditions

$vc=58\text{m/min}$ $fr=0.30\text{mm/rev}$

Wet

Tooling Sheet 11

OP.50 T3 (Drilling of the lower body outlet) For machining centres



MWS0200XB
VP15TF

Tool features

Standard WSTAR drill.

Use of a wavy cutting edge and special flute geometry with superior chip disposal properties reduces the cutting resistance. Use of ultra micro grain carbide substrate enables stable performance even when micro hole drilling that may cause possible tool breakage.

Cutting conditions

$vc=75\text{m/min}$ $fr=0.40\text{mm/rev}$

Wet

