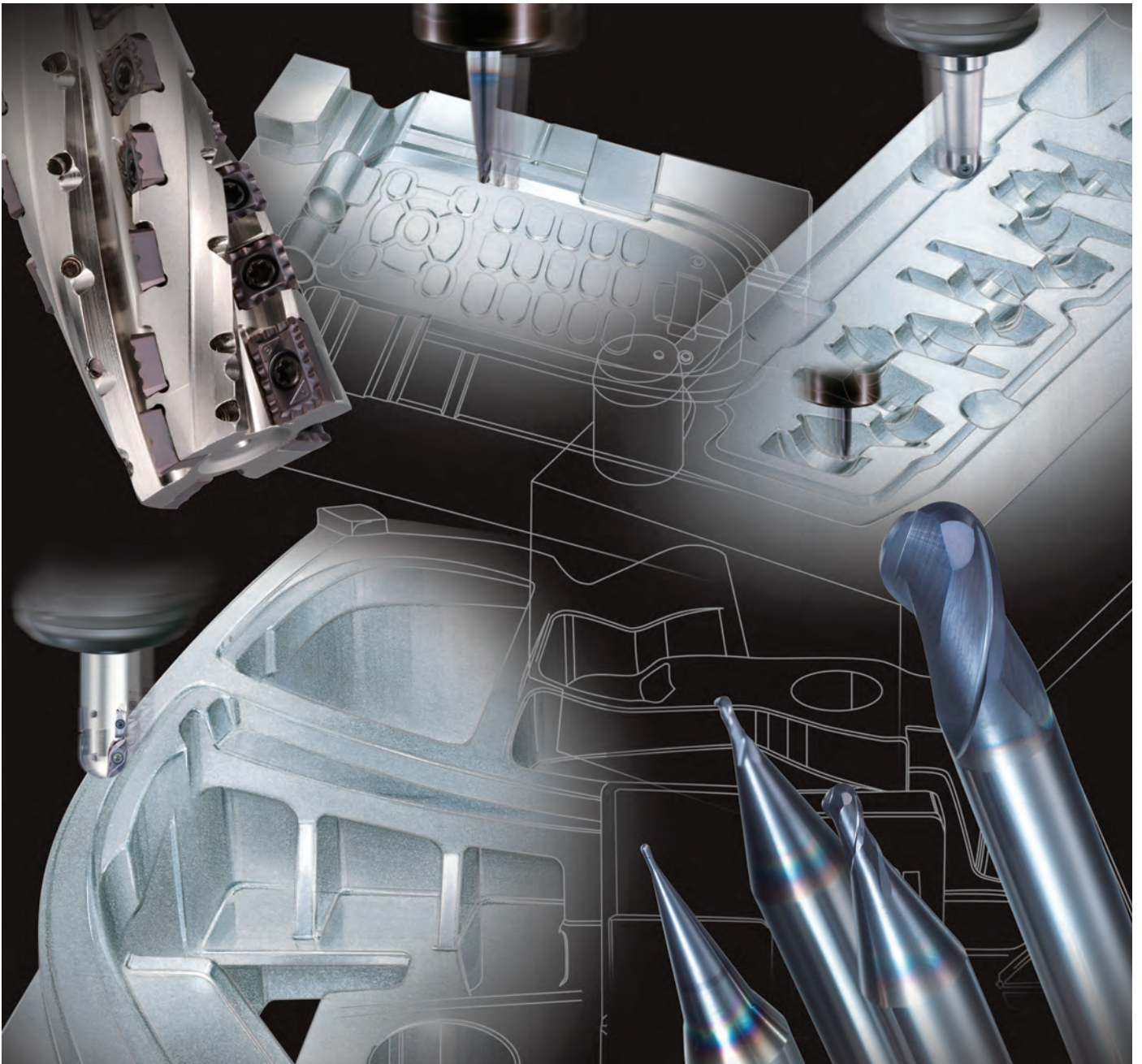


MOULD AND DIE INDUSTRY



Ball Nose End Mill

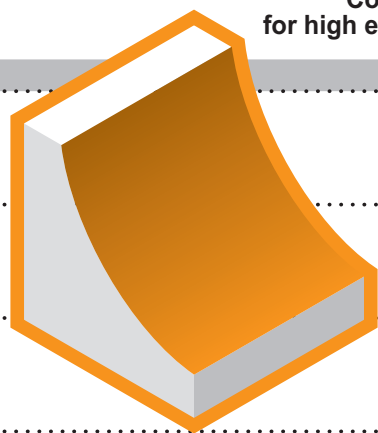


SRM2
Ø40, Ø50
Ball nose end mill
for heavy roughing

SRM2
Ball nose end mill
for high efficiency
machining

Roughing

Radius End Mill



AJX
Corner radius end mill
for high efficiency machining

RRD
Small diameter radius end mill
for high efficiency and accuracy machining

Roughing

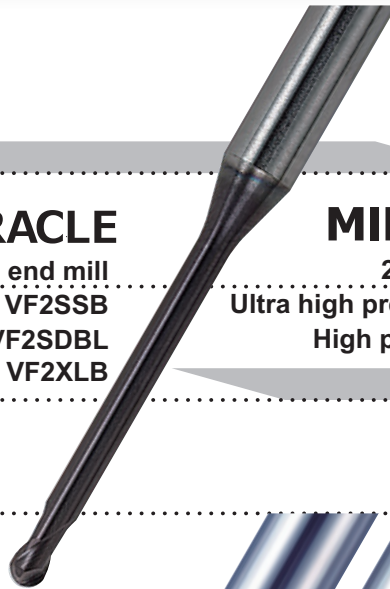


IMPACT MIRACLE

2 flute ball nose end mill
Precision type : VF2SB, VF2SSB
Strong type : VF2SDB, VF2SDBL
Long neck type : VF2XLB

SRF,SRB

Ball nose end mill
for high efficiency machining



MIRACLE NOVA

2 flute ball nose end mill
Ultra high precision type : VC2PSBP
High precision type : VC2PSB

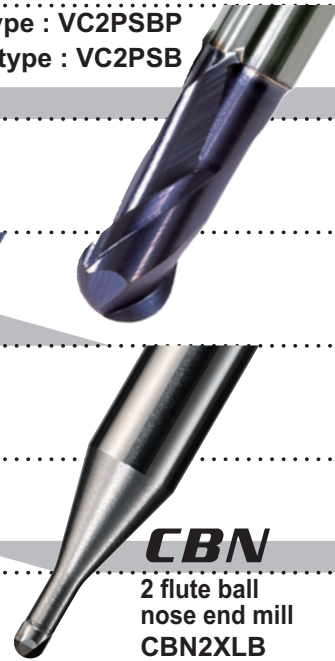
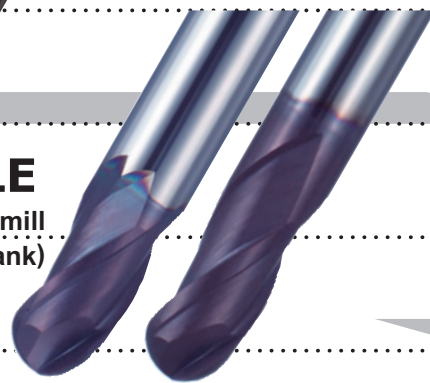


MSTAR

Long neck ball nose end mill

MIRACLE

3 flute ball nose end mill
VC3MB, VC3LB(Long shank)



CBN

2 flute ball
nose end mill
CBN2XLB



Finishing



MSTAR

Corner radius
end mill

IMPACT MIRACLE

Corner radius end mill
VFSDRB, VFMDRB

MIRACLE

High power
corner radius end mill
VCMHDB

MIRACLE

High feed corner radius end mill
VCHFRB

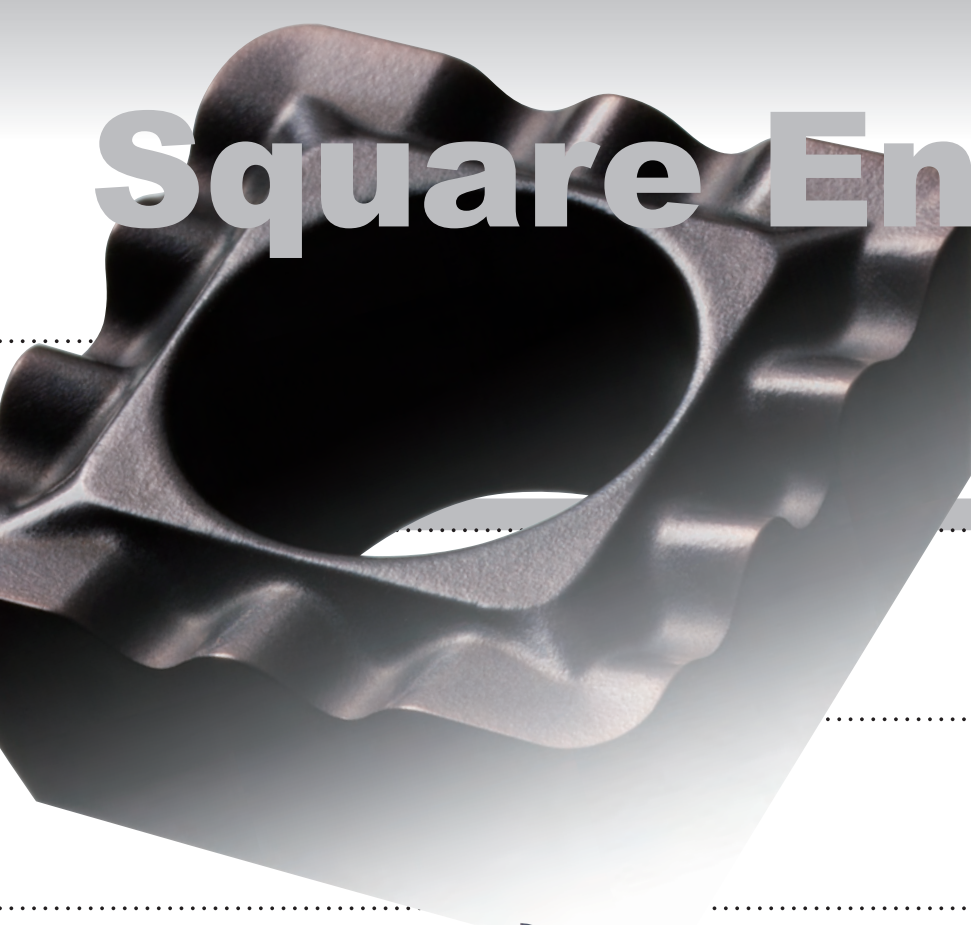
MIRACLE ORBIT

Corner radius end mill
VCPSRB



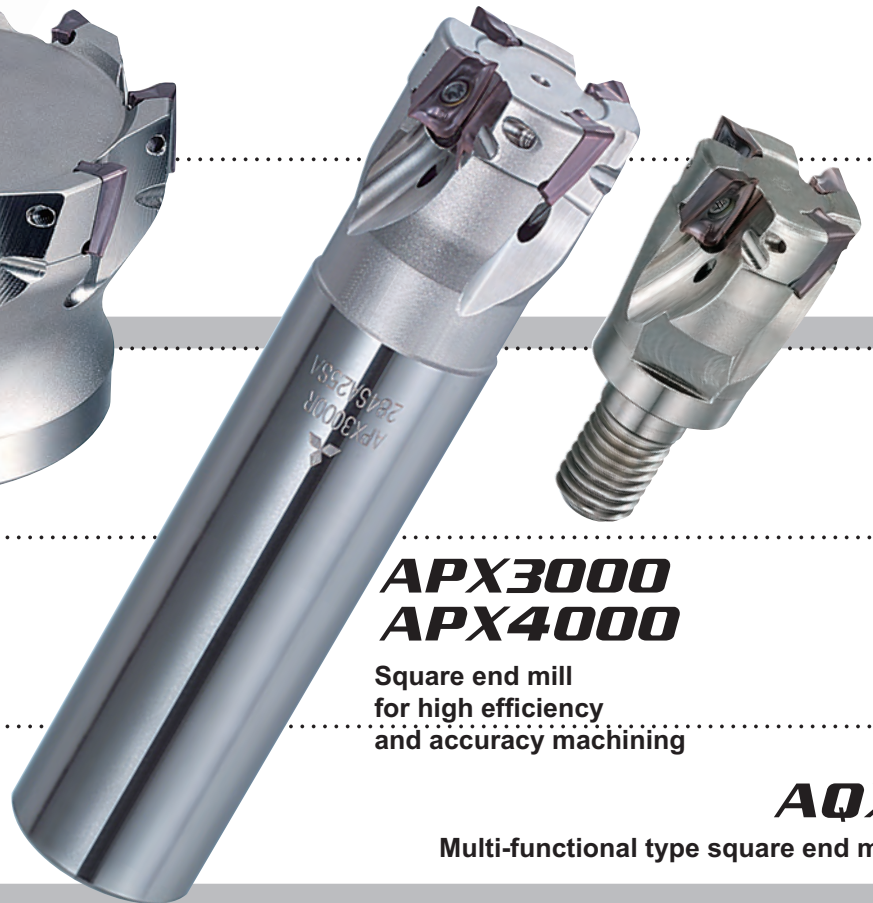
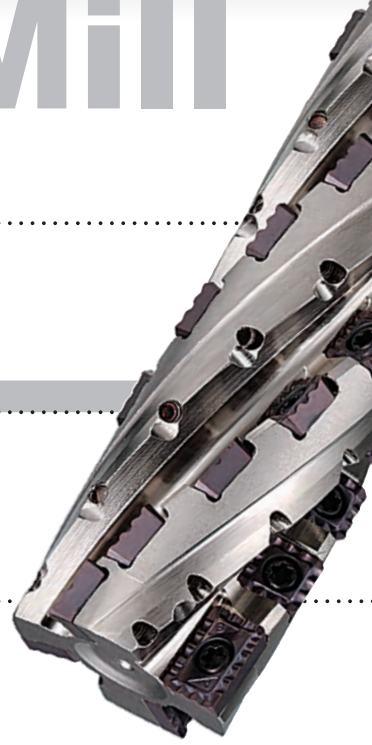
Finishing

Square End Mill



SPX

Square end mill
for deep
shoulder milling



APX3000
APX4000

Square end mill
for high efficiency
and accuracy machining

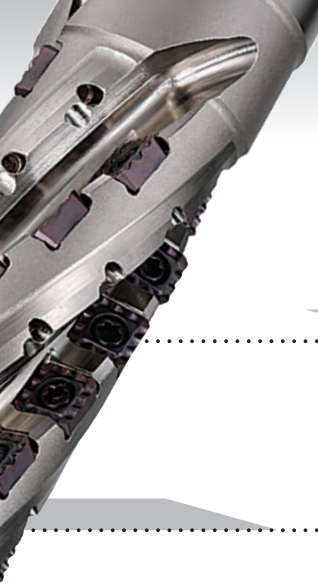
AQX

Multi-functional type square end mill



Roughing



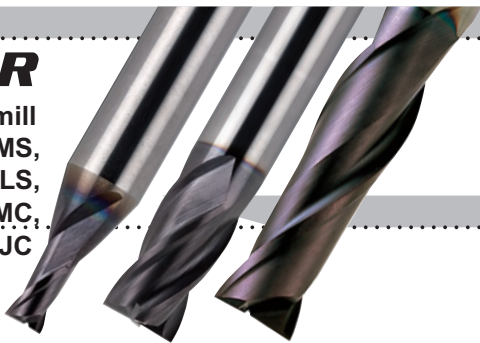


IMPACT MIRACLE

Square end mill
VFSD, VFMD

MSTAR

Square end mill
MS2SS, MS2MS,
MS2JS, MS2LS,
MS4SC, MS4MC,
MS4JC



MSTAR

Long neck end mill
MS2XL, MS2XL6, MS4XL



MIRACLE

Roughing end mill
VCSFPR



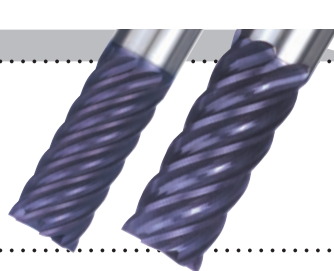
MSTAR

High power end mill
MSSH, MSMHD, MSJHD



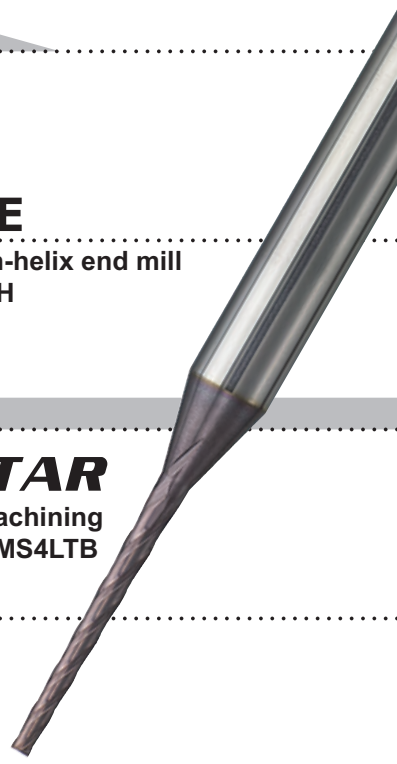
MIRACLE

Multi-flute high-helix end mill
VC6MH, VC8MH



MSTAR

Taper end mill for rib machining
MS4LT, MS4LTB



Finishing



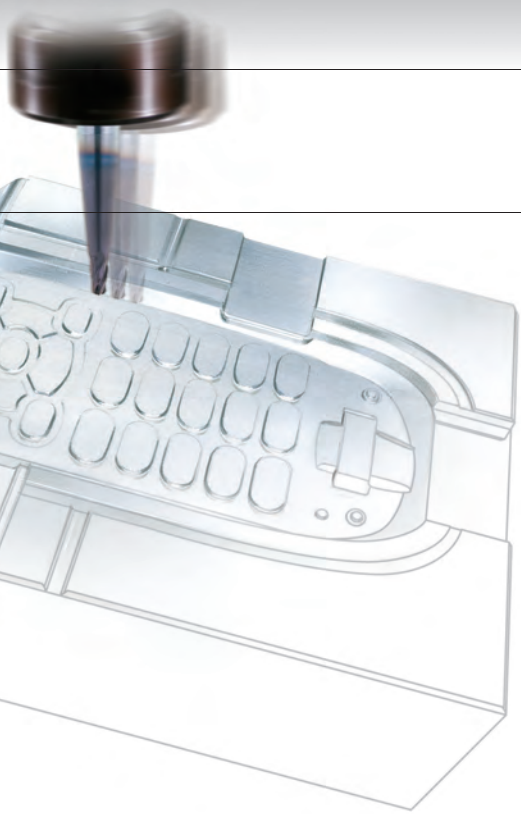
15

cutting tools
CONNECTING ROD
Forge tool



cutting tools
AUTOMOBILE BODY

11
Press tool

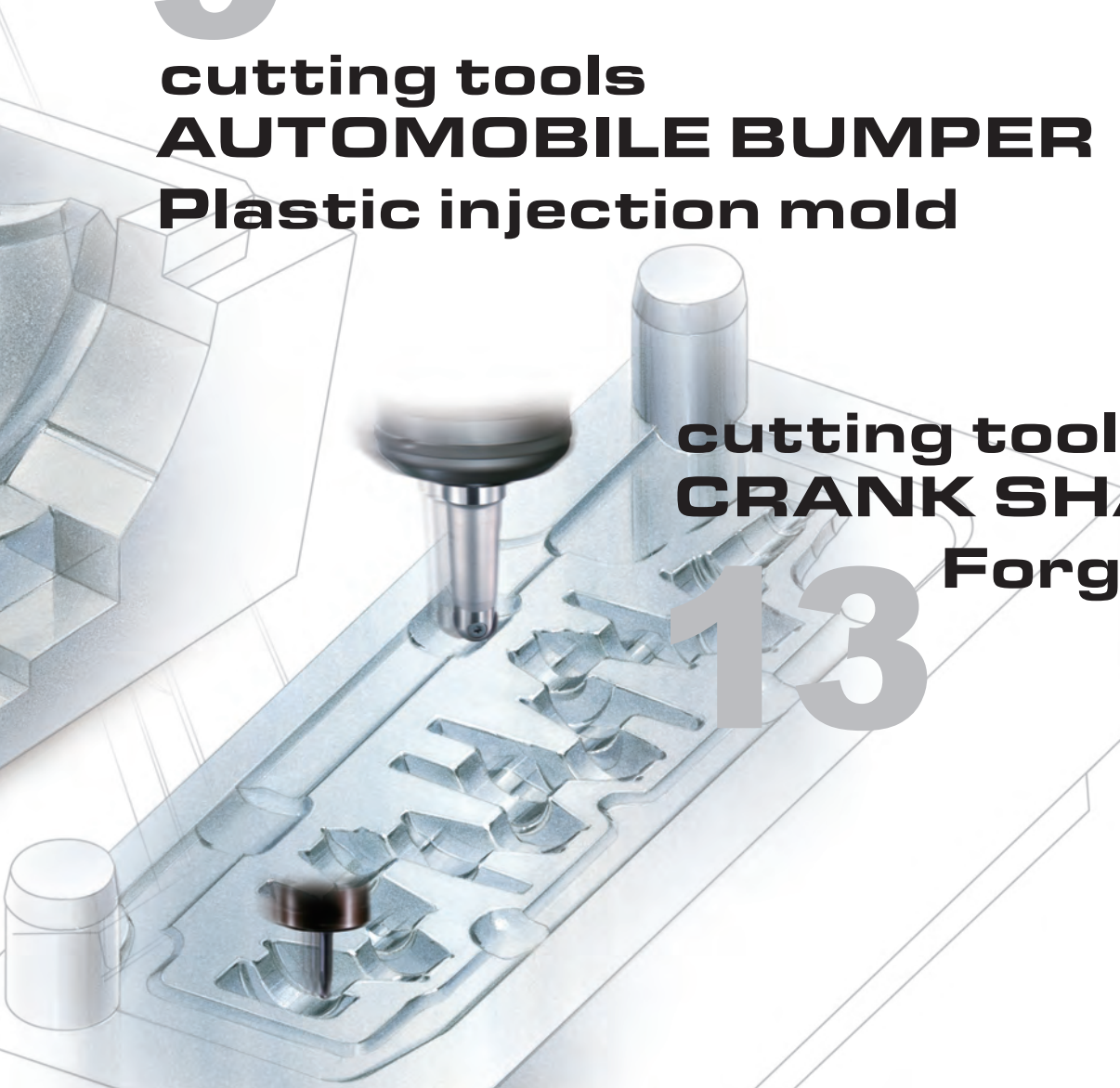


cutting tools
MOBILE PHONE
Plastic injection mold

7

9

cutting tools
AUTOMOBILE BUMPER
Plastic injection mold



cutting tools
CRANK SHAFT
Forge tool

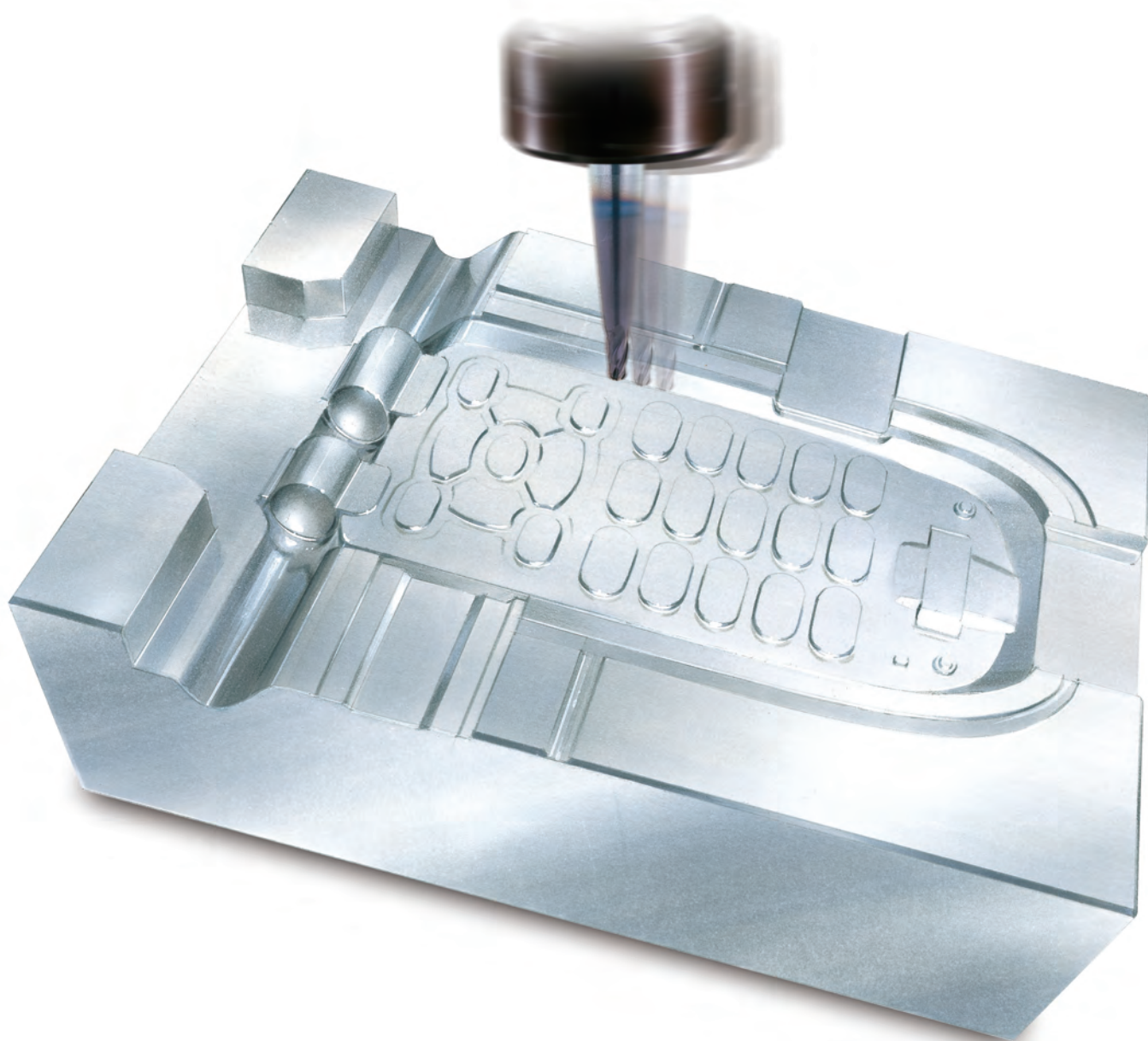
13

cutting tools

MOBILE PHON

Plastic injection mould

Material : 1.2344, BH13, X40CrMoUS1 (1130-1600 N/mm²)



vc : Cutting speed
 n : Revolution
 vf : Feed rate
 ap : Depth of cut
 ae : Width of cut

Roughing

Tool ■ VCMDRBD0600R0050
 (ø6-R0.5)

Cutting conditions ■ vc=300m/min (n=16000min⁻¹)
 vf=5800mm/min
 ap=3~7mm
 ae=0.3mm
 Semi dry (Mist)

Features ■ Multi flute corner radius end mill for higher efficiency than ball nose types on even surfaces.



VCMDRB

High feed, rigid, corner radius end mill for efficient roughing.

Roughing ~ Semi finishing

Tool ■ VCMDRBD0300R0030
 (ø3-R0.3)

Cutting conditions ■ vc=250m/min (n=27000min⁻¹)
 vf=3200mm/min
 ap=3~5mm
 ae=0.1mm
 Semi dry (Mist)

Features ■ Multi flute corner radius end mill for higher efficiency than ball nose types on even surfaces.



VCMDRB

Small diameter, rigid, corner radius end mill.

Semi finishing 2

Tool ■ VC4STBR0100T0130N10
 (R1-1°30')

Cutting conditions ■ vc=190m/min (n=30000min⁻¹)
 vf=1800mm/min
 ap=0.1mm
 ae=0.3mm
 Semi dry (Mist)

Features ■ 4 flute ball nose end mill for high efficiency machining.



VC4STB

4 flute taper neck ball nose end mill.

Finishing 1

Tool ■ VC2PSBR0050
 (R0.5)

Cutting conditions ■ vc=95m/min (n=30000min⁻¹)
 vf=1300mm/min
 ap=0.1mm
 ae=0.1mm
 Semi dry (Mist)

Features ■ Ultra high accuracy ball nose type reduces 50% of polishing time.



VC2PSB

High accuracy radius, ball end mill.

Finishing 2

Tool ■ VC2XLBR0030N060
 (R0.3-6)

Cutting conditions ■ vc=57m/min (n=30000min⁻¹)
 vf=450mm/min
 ap=0.02mm
 ae=0.02mm
 Semi dry (Mist)

Features ■ High precision and efficiency with accurate and rigid ball nose end mills.



VC2XLB

Long neck ball end mill.

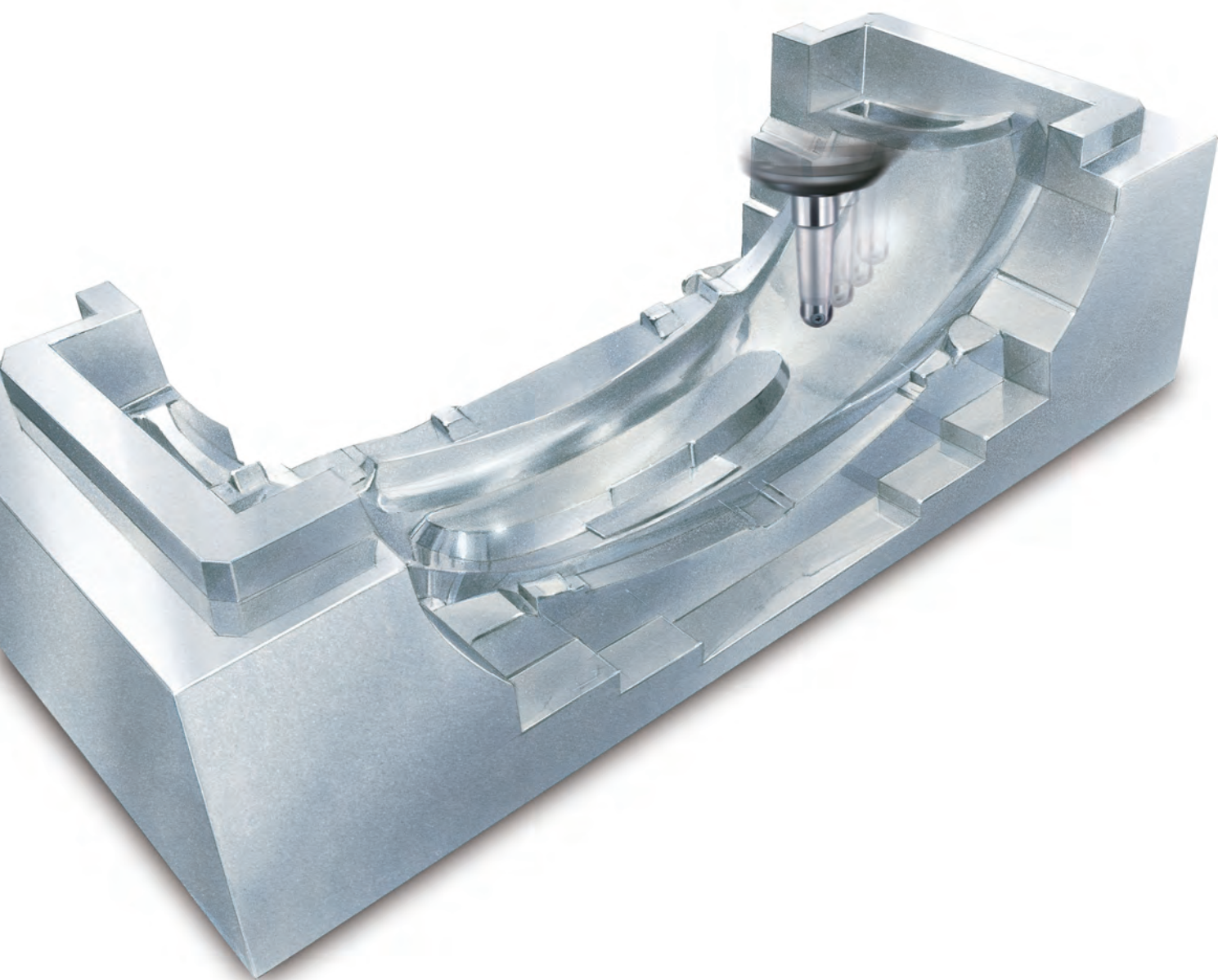
● Effective machining achieved by combining tool rigidity and accurate ball nose radii.

cutting tools

AUTOMOBILE

Plastic injection mould

Material : 1.2311/1.2312, 40CrMnMoS8-6 (1100 N/mm²)

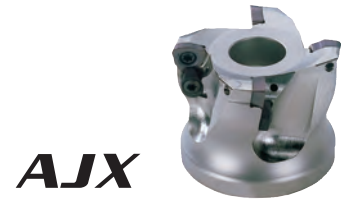


BUMPER

vc : Cutting speed
 n : Revolution
 vf : Feed rate
 ap : Depth of cut
 ae : Width of cut

Roughing

- Tool** ■ AJX14-080A05R (ø80–5 teeth)
 JDMW140520ZDSR-FT (FH7020)
- Cutting conditions** ■ vc=150m/min (n=600min⁻¹)
 vf=3600mm/min
 ap=1mm
 ae=60mm
 Dry (Air blow)
- Features** ■ High feed radius cutter for ultra high feed at low depths of cut for overall efficiency.



AJX

High feed, indexable, corner radius end mill.

Roughing ~ Semi finishing 1

- Tool** ■ BRP6P-050A04R (ø50–4 flute)
 RPMT1204MOE-JS (VP15TF)
- Cutting conditions** ■ vc=190m/min (n=1200min⁻¹)
 vf=2000mm/min
 ap=1mm
 ae=35mm
 Dry (Air blow)
- Features** ■ Round insert end mill for high feed and performance.



BRP

Round indexable insert end mill.

Roughing ~ Semi finishing 2

- Tool** ■ SRM2300SNF (R15)
 SRM30C/E-M (VP15TF)
- Cutting conditions** ■ vc=200m/min (n=2150min⁻¹)
 vf=700mm/min
 ap=~5mm
 ae=3mm
 Dry (Air blow)
- Features** ■ Accuracy comparable to solid type end mills but with higher metal removal rates.



SRM2

Ball nose, indexable insert end mill.

Finishing 1

- Tool** ■ SRFH30S32E (R15)
 SRFT30 (VP15TF)
- Cutting conditions** ■ vc~300m/min (n~3200min⁻¹)
 vf~3000mm/min
 ap=0.3mm
 ae=0.7mm
 Dry (Air blow)
- Features** ■ High accuracy indexable type for finishing, comparable to solid type end mills.



SRF

Ball nose, single insert, high accuracy end mill.

Finishing 2

- Tool** ■ VC3LBR0500 (R5)
- Cutting conditions** ■ vc=190m/min (n=6000min⁻¹)
 vf=1800mm/min
 ap=0.1mm
 ae=0.4~0.5mm
 Dry (Air blow)
- Features** ■ 3 flute long ball nose type for effective deep wall machining.



VC3LB

3 flute, long cut length, ball nose end mill.

Finishing 3

- Tool** ■ VC2PSBR0100 (R1)
- Cutting conditions** ■ vc=125m/min (n=20000min⁻¹)
 vf=1200mm/min
 ap=0.02mm
 ae=~-0.1mm
 Dry (Air blow)
- Features** ■ Precise machining with small diameter end mills.



VC2PSB

High accuracy radius, ball nose end mill.

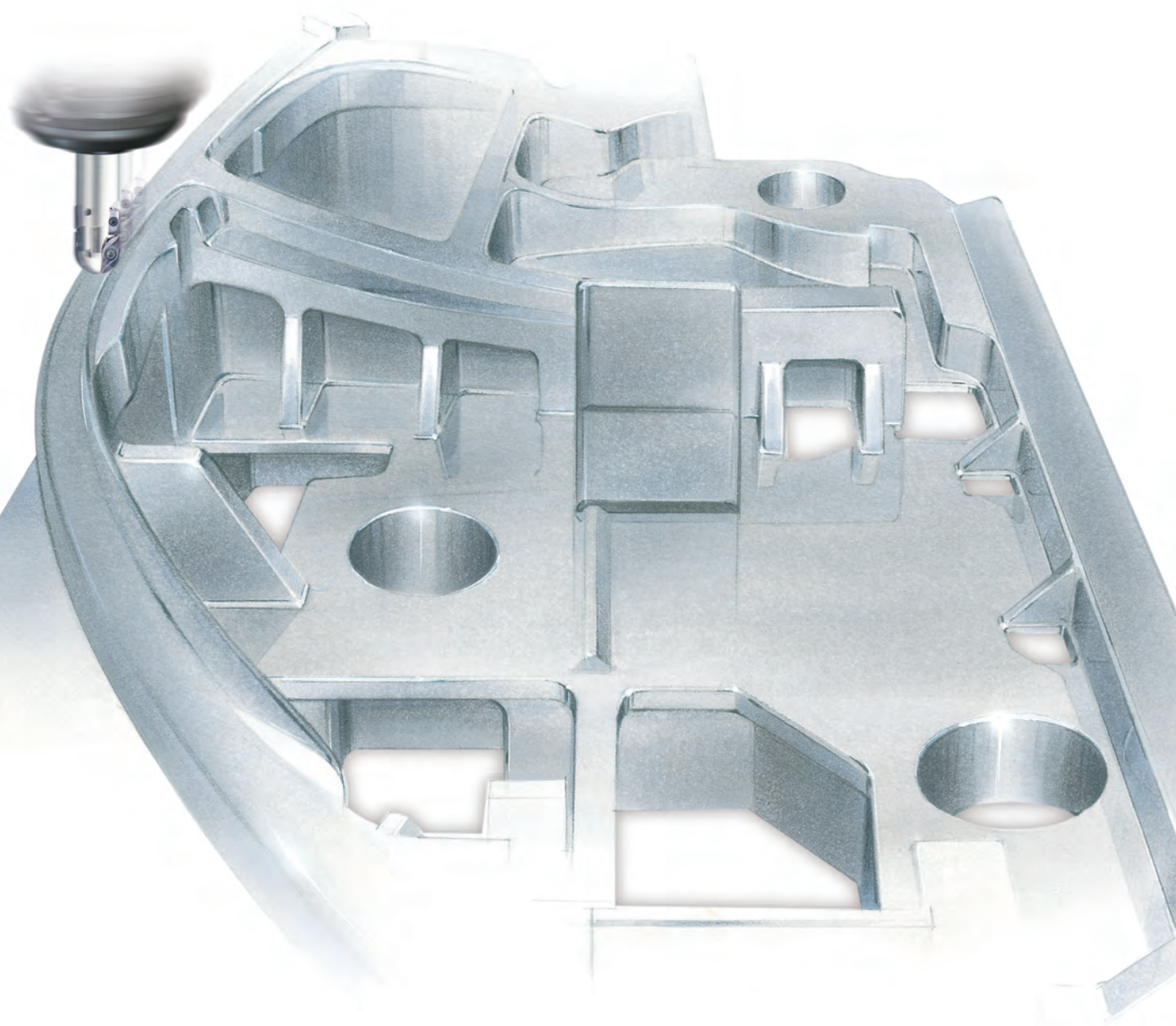
● Latest methods using a combination of high feed indexable insert radius end mills and small solid carbide end mills.

cutting tools

AUTOMOBILE

Press tool (for side panel)

Material : 1.2379, X155CrVMo121 (255HB)



BODY

vc : Cutting speed
n : Revolution
vf : Feed rate
ap : Depth of cut
ae : Width of cut

Roughing 1

- Tool** ■ SPX4R05034WNM (ø50-155L)
SPMX120408-WH (VP15TF)
JPMX190412-WH (VP15TF)
MPMX120412-WH (VP15TF)
- Cutting conditions** ■ vc=80m/min (n=500min⁻¹)
vf=400mm/min
ap=100~150mm
ae=5~10mm
Dry (Air blow), Down cut milling
- Features** ■ High efficiency deep shoulder milling is possible due to the low cutting resistance.



SPX

Square end mill for deep shoulder milling.

Roughing 2

- Tool** ■ AJX14-080A05R (ø80-5 teeth)
JDMW140520ZDSR-FT (VP15TF)
- Cutting conditions** ■ vc=125m/min (n=500min⁻¹)
vf=3000mm/min
ap=2mm
ae=50mm
Dry (Air blow)
- Features** ■ Radius type cutter for ultra high feed at low depths of cut for overall efficiency.



AJX

High feed, indexable, corner radius end mill.

Roughing 3

- Tool** ■ SRM2500WNLS (R25)
SRG50C/E (VP15TF)
- Cutting conditions** ■ vc=190m/min (n=1200min⁻¹)
vf=650mm/min
ap=~-5mm
ae=10mm
Dry (Air blow)
- Features** ■ Special insert geometry for reliability and high metal removal rates.



SRM2 Ø50

Ball nose, indexable insert end mill for heavy roughing.

Roughing ~ Semi finishing

- Tool** ■ SRM2300SAL (R15)
SRM30C/E-M (VP15TF)
- Cutting conditions** ■ vc=~380m/min (n=~4000min⁻¹)
vf=~3000mm/min
ap=~1mm
ae=~4mm
Dry (Air blow)
- Features** ■ Accuracy comparable to solid type end mills but with higher metal removal rates.



SRM2

Ball nose, indexable insert end mill.

Finishing 1

- Tool** ■ SRFH30S32E (R15)
SRFT30 (VP15TF)
- Cutting conditions** ■ vc=~280m/min (n=~3000min⁻¹)
vf=~3000mm/min
ap=0.3mm
ae=0.7mm
Dry (Air blow)
- Features** ■ High accuracy indexable type for finishing, comparable to solid type end mills.



SRF

Ball nose, single insert, high accuracy end mill.

Finishing 2

- Tool** ■ VC3LBR0500 (R5)
- Cutting conditions** ■ vc=190m/min (n=6000min⁻¹)
vf=1800mm/min
ap=0.2mm
ae=0.4~0.5mm
Dry (Air blow)
- Features** ■ Efficient cutting strategy by using high accuracy ball nose end mills.



VC3LB

3 flute, long cut length, ball nose end mill.

● Latest methods using a combination of high feed indexable insert radius end mills and solid carbide multi flute end mills.

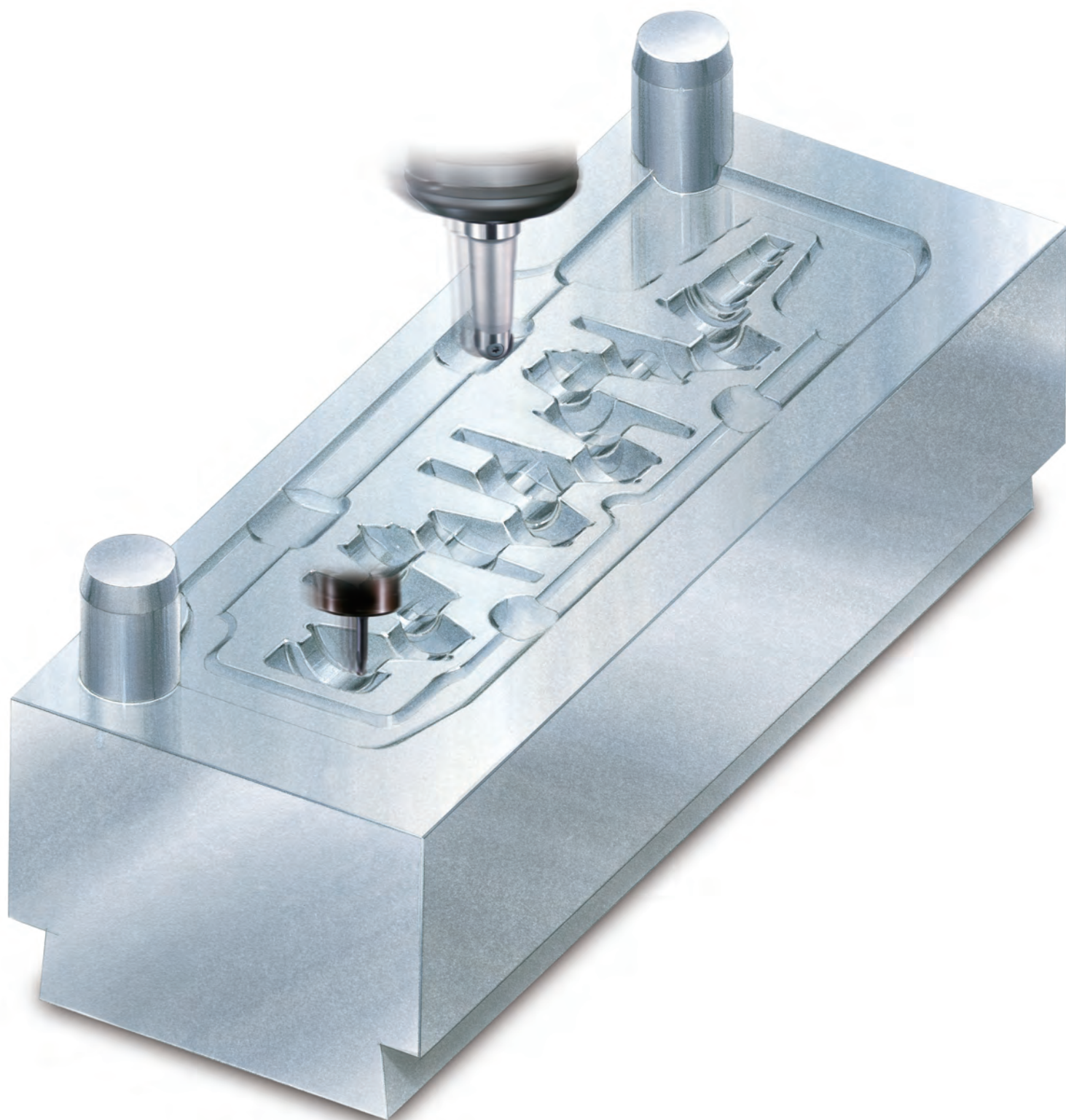
cutting tools

CRANK SHAFT

Forge tool

Material : 1.2367

(Finishing after heat treatment 52HRC)



vc : Cutting speed
 n : Revolution
 vf : Feed rate
 ap : Depth of cut
 ae : Width of cut

Roughing 1

- Tool** ■ RRD035R152S20Z (ø15-2 teeth)
 RDZX0702M0E (VP15TF)
- Cutting conditions** ■ vc=160m/min (n=3400min⁻¹)
 vf=1200mm/min
 ap=1mm
 ae=20mm
 Dry (Air blow)
- Features** ■ 2 flute radius end mill for high feed rates and efficiency.



RRD

Indexable round insert end mill.

Semi finishing

- Tool** ■ SRM2200SAL (R10)
 SRM20C/E-M (VP15TF)
- Cutting conditions** ■ vc=160m/min (n=2550min⁻¹)
 vf=700mm/min
 ap≈5mm
 ae≈5mm
 Dry (Air blow)
- Features** ■ Accuracy comparable to solid type end mills but with higher metal removal rates.

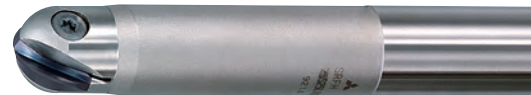


SRM2

Ball nose indexable insert end mill.

Finishing 1

- Tool** ■ SRFH16S20M (R8)
 SRFT16 (VP10MF)
- Cutting conditions** ■ vc=200m/min (n=4000min⁻¹)
 vf=1000mm/min
 ap=0.2mm
 ae=0.4mm
 Dry (Air blow)
- Features** ■ High accuracy indexable type for finishing, comparable to solid type end mills.



SRF

Ball nose, single insert, high accuracy end mill.

Finishing 2

- Tool** ■ VC4STBR0400T0300N22
 (R4-3°)
- Cutting conditions** ■ vc=190m/min (n=7500min⁻¹)
 vf=3000mm/min
 ap=0.3mm
 ae=0.3mm
 Dry (Air blow)
- Features** ■ 4 flute taper neck end mill for rigidity even with a long tool overhang.



VC-4STB

4 flute taper neck, ball nose end mill.

Finishing 3

- Tool** ■ VC2XLBR0100N200
 (R1-20)
- Cutting conditions** ■ vc=125m/min (n=20000min⁻¹)
 vf=1000mm/min
 ap=0.02mm
 ae≈-0.1mm
 Dry (Air blow)
- Features** ■ Accurate, small diameter machining.



VC-2XLB

Long neck ball end mill

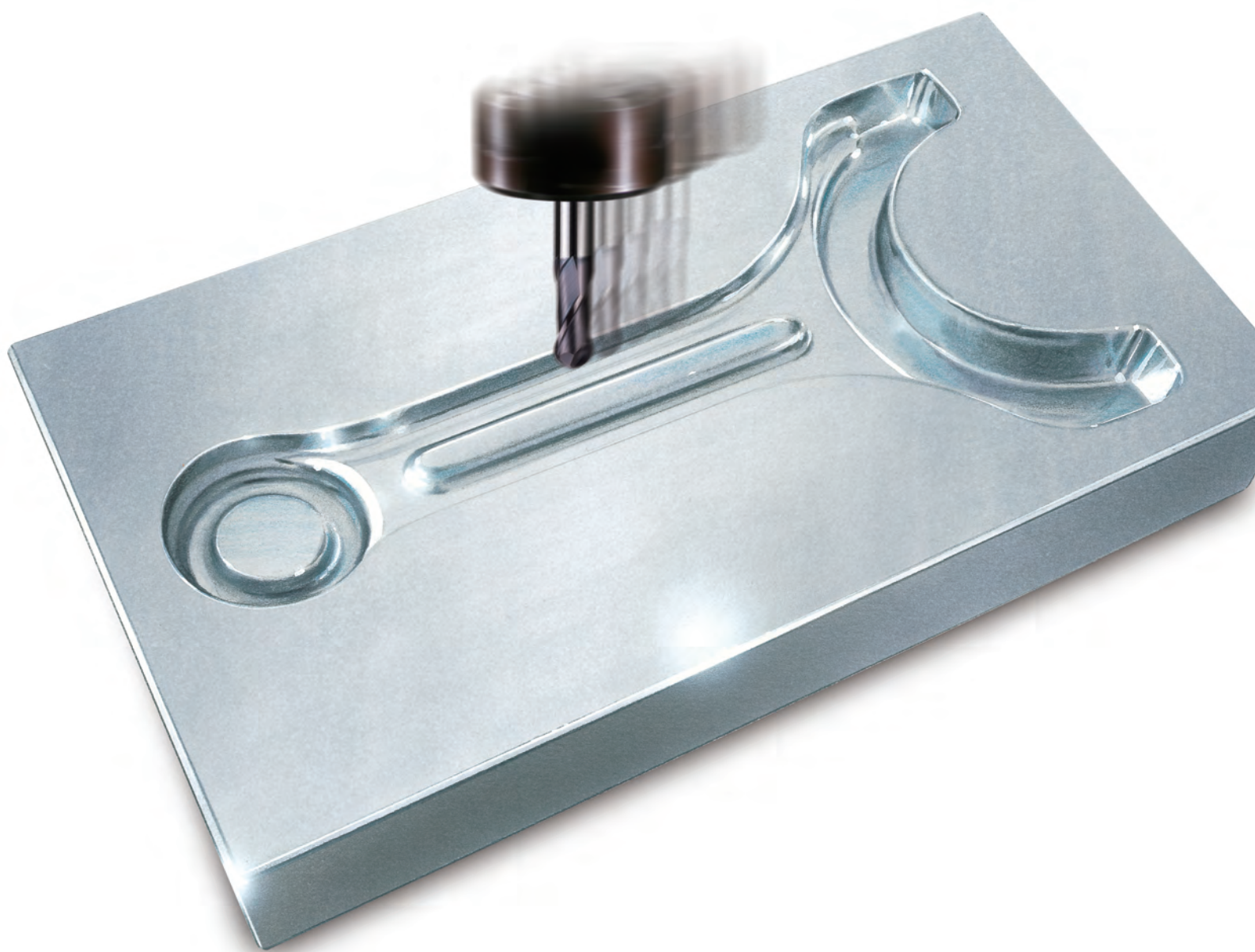
● Latest efficient machining methods by using a combination of high feed radius end mills and solid ball nose end mills.

cutting tools

CONNECTING

Forge tool

Material : 1.2367 (48-52HRC)



ROD

vc : Cutting speed
n : Revolution
vf : Feed rate
ap : Depth of cut
ae : Width of cut

Roughing - Semi finishing

- Tool** ■ RRD025R102S10Z (ø10-2 teeth)
RDZX0501M0E (VP15TF)
- Cutting conditions** ■ vc=80m/min (n=2550min⁻¹)
vf=800mm/min
ap=0.5mm
ae=~10mm
Dry (Air blow)
- Features** ■ Small diameter radius end mill for high efficiency and accuracy machining.



RRD

Indexable round insert end mill.

Semi finishing - Finishing 1

- Tool** ■ SRFH10S12M (R5)
SRFT10 (VP10MF)
- Cutting conditions** ■ vc=100m/min (n=3200min⁻¹)
vf=1200mm/min
ap=0.3mm
ae=~1mm
Dry (Air blow)
- Features** ■ High accuracy indexable type for finishing, comparable to solid type end mills.



SRF

Ball nose, single insert, high accuracy end mill.

Semi finishing- Finishing 2

- Tool** ■ VCPSRBD1200N36R40
(ø12-R4)
- Cutting conditions** ■ vc=250m/min (n=6600min⁻¹)
vf=2600mm/min
ap=0.3mm
ae=~3mm
Dry (Air blow)
- Features** ■ High accuracy corner radius tolerance for efficient machining and surface finish accuracy.



VC-PSRB

High accuracy corner radius end mill.

Finishing 2

- Tool** ■ VF2SBR0300S06
(R3)
- Cutting conditions** ■ vc=250m/min (n=13000min⁻¹)
vf=2600mm/min
ap=0.2mm
ae=0.3mm
Dry (Air blow)
- Features** ■ Reliability and accuracy when milling hardened materials.



VF-25B

Ball nose end mill for hardened steel.

Finishing 3

- Tool** ■ VF2SBR0100S06
(R1)
- Cutting conditions** ■ vc=200m/min (n=32000min⁻¹)
vf=3800mm/min
ap=0.1mm
ae=0.15mm
Dry (Air blow)
- Features** ■ Reliability and accuracy even with small diameters when milling hardened materials.

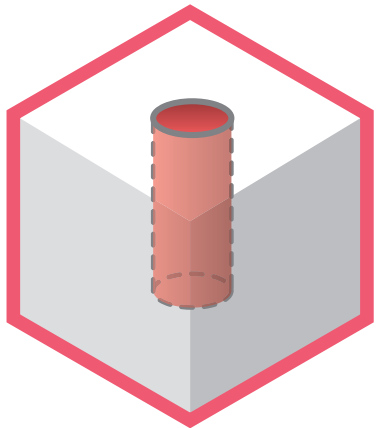


VF-25B

Small diameter ball nose end mill for hardened steel.

- Efficient, hardened material machining. Reliability and long tool life from the smaller diameter end mills.

DRILLS



MKE DRILL
(For high hardness materials)
● $\phi 2.5 - \phi 16$



TAW DRILL
● $\phi 14 - \phi 30.4$



TAF DRILL
● $\phi 12 - \phi 56$



MWS DRILL

● $\phi 3-\phi 25$



MWE DRILL

● $\phi 3-\phi 20$

MPS/MSL EXTRA LONG DRILLS

● $\phi 3-\phi 20$

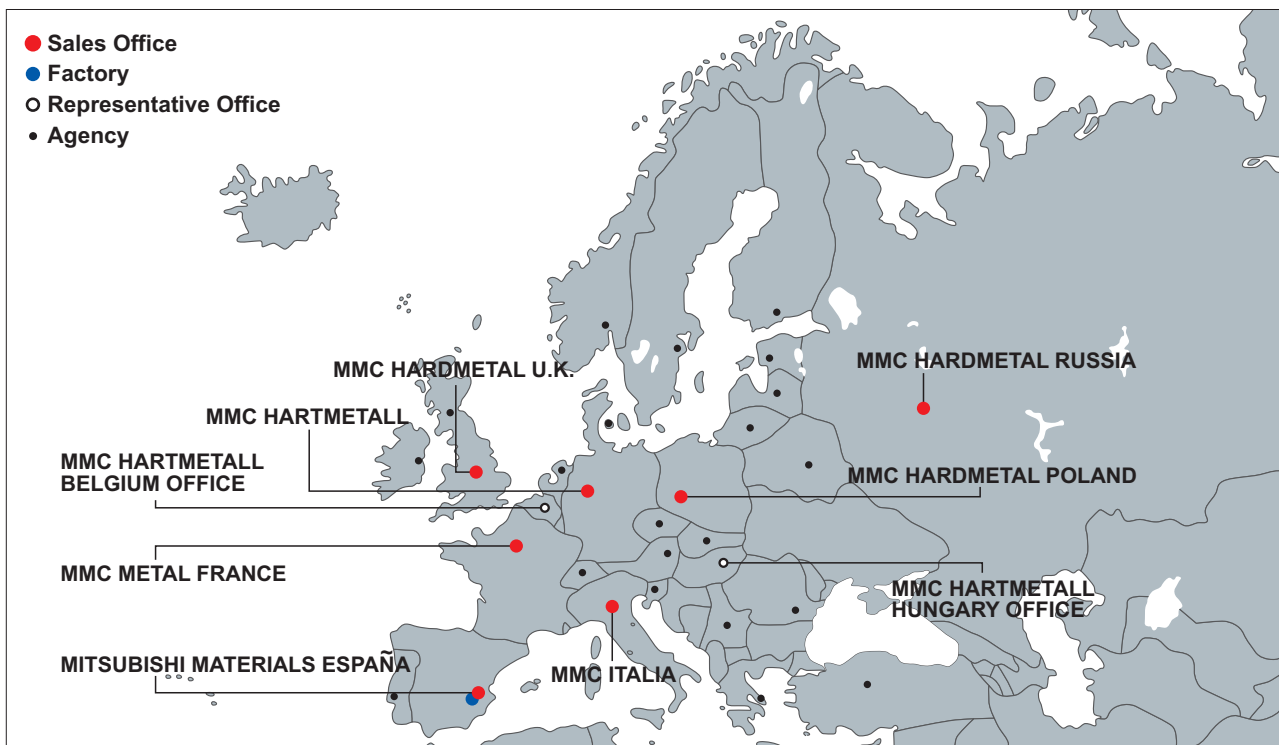
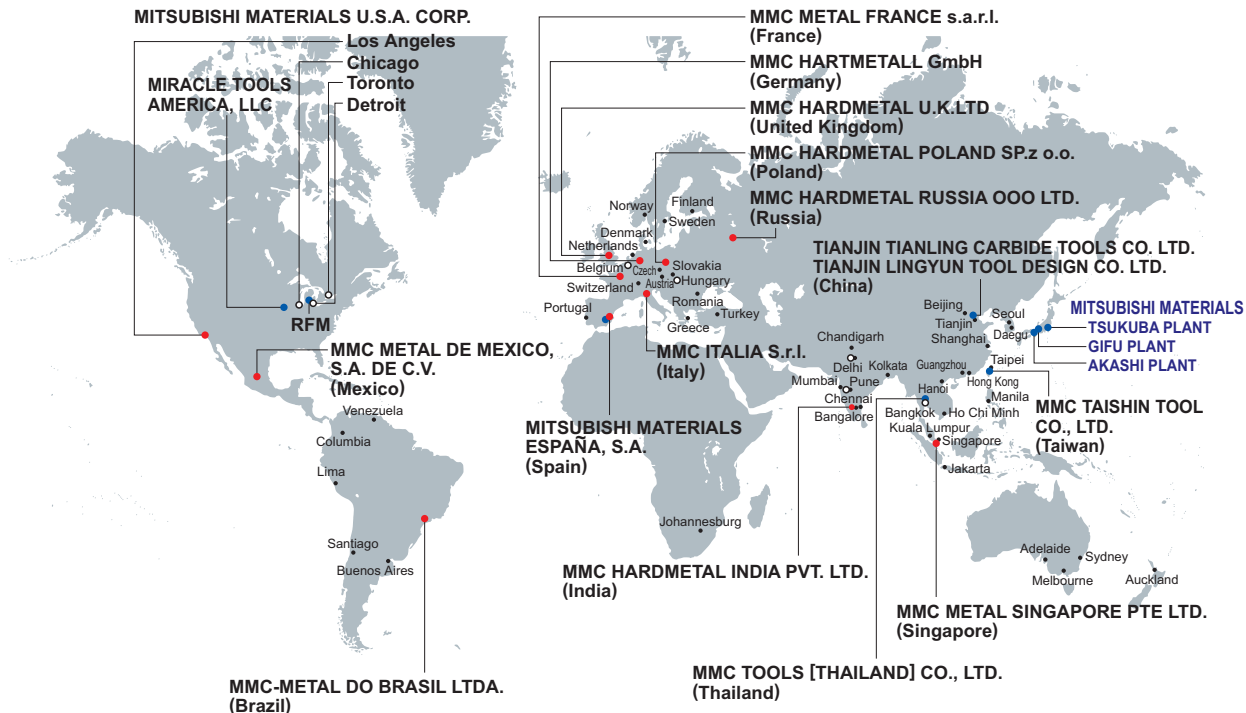
MSE DRILL (Small diameter)

● $\phi 0.1-\phi 3$



MINI-MWS DRILL

● $\phi 1-\phi 2.9$



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