

The Right

Choice



Technical Guide Book

Rotating

Non-Rotating



TaeguTec
Member IMC Group

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Milling



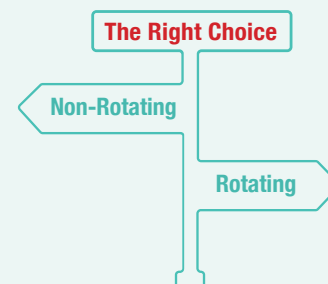
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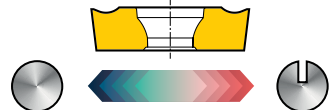


Turning



Turning E-Catalog >>>

POSITIVE



FINISHING MEDIUM ROUGHING

FA (0.05-0.25)

FG (0.07-0.25)

FM (0.08-0.25)

PC (0.08-0.25)

MT (0.10-0.25)

TT8105B

TT8115B

TT8125B

```

graph TD
    FA["FA (0.05-0.25)"] --> FG["FG (0.07-0.25)"]
    FA --> PC["PC (0.08-0.25)"]
    FG --> TT5080["TT5080"]
    FG --> TT9215["TT9215"]
    PC --> TT9225["TT9225"]
    PC --> TT9235["TT9235"]
    TT9235 --> TT9080["TT9080"]
  
```

FA (0.05-0.25)

FG (0.07-0.25)

PC (0.08-0.25)

TT5080

TT9215

TT9225

TT9235

TT9080

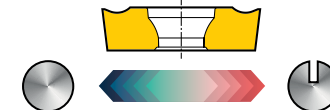
```

graph TD
    TB610[TB610] --- TB2015[TB2015]
    TB610 --- TB650[TB650]
    TB2015 --- TB670[TB670]
    TB650 --- TB670[TB670]
    TB610 --- TB670[TB670]

```

(Feed rate: mm/rev)

POSITIVE



FINISHING MEDIUM ROUGHING

FG (0.07-0.25)

MT (0.10-0.25)

TB7015 KB95A

AS500

TT7005

TT7015

```

graph TD
    A["GT FGS (0.05-0.20)"] --> B["FG (0.07-0.25)"]
    A --> C["PC (0.08-0.25)"]
    B --> D["MT (0.10-0.25)"]
    B --> E["TC430"]
    E --> F["TC3020, TC3030"]
    F --> G["TT3005"]
    F --> H["TT3010"]
    H --> I["TT3020"]
  
```

Diagram illustrating a sequence of moves on a 4x4 grid (Columns A, B, C, D; Rows 1, 2, 3, 4):

- Move 1: -GW CB (Grey box, Column A, Row 1)
- Move 2: -GT FL (Green box, Column B, Row 2)
- Move 3: KP300 TD810 (Grey box, Column A, Row 3)
- Move 4: K10 (Green box, Column C, Row 4)

(Feed rate: mm/rev)



Steel (HB 200-220)

FINISHING

FS
CNMG 090404 FS TT8115B
Vc : 300-250
fn : 0.10-0.20
ap : 0.3-1.5

FM
CNMG 090408 FM TT8115B
Vc : 300-230
fn : 0.15-0.30
ap : 0.3-2.0

FT
CNMG 090408 FT TT8115B
Vc : 280-220
fn : 0.20-0.40
ap : 0.5-3.0

ROUGHING

FLP
CNMG 120404 FLP TT8115B
Vc : 300-250
fn : 0.10-0.20
ap : 0.2-3.0

MLP
CNMG 120408 MLP TT8115B
Vc : 300-230
fn : 0.15-0.25
ap : 0.5-4.0

MGP
CNMG 120408 MGP TT8115B
Vc : 280-220
fn : 0.20-0.40
ap : 0.8-5.0

RGP
CNMG 120412 RGP TT8125B
Vc : 250-200
fn : 0.25-0.70
ap : 2.5-6.0

Ni Nickel based Super alloys

FINISHING

EA
CNMG 120408 EA TT3010 / TT3020
Vc : 90-30 85-30
fn : 0.07-0.40 0.07-0.40
ap : 0.15-1.5 0.15-1.5

MGS
CNMG 120408 MGS TT3020
Vc : 40-20
fn : 0.12-0.30
ap : 1.0-4.0

ET
CNMG 120412 ET TT9080
Vc : 40-20
fn : 0.17-0.45
ap : 1.2-5.5

ROUGHING

GX- GN-
RCGX & RGN 1207 TC3020 / TC3030
Vc : 350-200 250-150
fn : 0.12-0.30 0.12-0.30
ap : 1.0-4.0 1.0-4.0

High temp. alloys (HB 300-350)

Ti Titanium alloys

MK
CNMG 090408 MK TT3010
Vc : 90-30
fn : 0.15-0.40
ap : 1.0-3.0

MGS
CNMG 120408 MGS TT3010
Vc : 80-50
fn : 0.12-0.30
ap : 1.0-4.0

MGS
CNMG 120412 MGS K10
Vc : 70-45
fn : 0.12-0.30
ap : 1.0-4.0

Stainless steel (HB 160-180)

FINISHING

EA
CNMG 090404 EA TT5080 / TT9215
Vc : 200-130
fn : 0.07-0.25
ap : 0.3-1.5

MK
CNMG 090408 MK TT9225
Vc : 170-130
fn : 0.13-0.30
ap : 0.5-3.0

EM
CNMG 090408 EM TT9225
Vc : 120-60
fn : 0.13-0.30
ap : 0.5-3.0

ROUGHING

EA
CNMG 120404 EA TT5080 / TT9215
Vc : 200-130
fn : 0.05-0.30
ap : 0.15-1.5

MP
CNMG 120408 MP TT9225
Vc : 170-130
fn : 0.13-0.40
ap : 0.5-4.0

EM
CNMG 120408 EM TT9080 / TT9225
Vc : 120-60
fn : 0.13-0.40
ap : 0.5-4.0

ET
CNMG 120412 ET TT8080 / TT9235
Vc : 120-60
fn : 0.20-0.40
ap : 1.5-4.0

Small Parts Turning

LOW DEPTH

FS-F
VNGX 130402M FS-F TT4430
For medical parts

FU-F
DNNG 130502M FU-F TT4430
Vc : 120-100
fn : 0.05-0.15
ap : 0.05-2.0

SL-F
DCGT 11T302M SL-F TT4410/TT4430
Vc : 120-100
fn : 0.02-0.08
ap : 0.02-0.2

SA
DCGT 11T302 SA TT9020
Vc : 120-100
fn : 0.07-0.10
ap : 0.25-2.0

SM-F
DCGT 11T302M SM-F TT4430
Vc : 120-100
fn : 0.05-0.10
ap : 0.25-2.0

SH-F
DCGT 11T304M SH-F TT4430
Vc : 120-100
fn : 0.05-0.10
ap : 0.5-4.0

High DEPTH

1ST Recommendation

Vc cutting speed : m/min • fn feed rate : mm/rev • ap depth of cut : mm

1ST Recommendation

Vc cutting speed : m/min • fn feed rate : mm/rev • ap depth of cut : mm



Cast iron (HB 220-250)

Carbide Grade

LOW SPEED **HIGH SPEED**

MA-	KT	MT
CNMA 120412 TT7025	CNMG 120408 KT TT7015	CNMG 120408 MT TT7005
Vc : 280-220 fn : 0.15-0.40 ap : 1.0-5.0	Vc : 300-250 fn : 0.19-0.43 ap : 0.38-5.0	Vc : 330-280 fn : 0.17-0.55 ap : 1.2-5.0

CBN & Ceramic Grade

CNGA 120412 AS10	CNGX-CH 120712 T7 AS500	RNGN 120400 SD KB95A	CNGX 120412 DA TB7020
Vc : 800-250 fn : 0.05-0.25 ap : 0.1-3.0	1000-300 0.05-0.30 0.1-3.5	Vc : 1200-200 fn : 0.05-0.30 ap : 0.1-3.0	Vc : 1200-300 fn : 0.05-0.30 ap : 0.1-4.0

Hardened steel

Ceramic Grade (HRC 40-50)

LOW SPEED **HIGH SPEED**

CNGA 120408 AB30	CNGA 120408 AB20 / AB2010
Vc : 170-120 fn : 0.10-0.20 ap : 0.5-1.5	Vc : 200-150 fn : 0.10-0.18 ap : 0.4-1.2

CBN Grade (HRC ≥ 50)

CNGA 120408 TB670	CNGA 120408 TB2015	CNGA 120412 TB650	CNGA 120412 TB610
Vc : 200-150 fn : 0.10-0.20 ap : 0.1-0.7	Vc : 220-180 fn : 0.08-0.15 ap : 0.1-0.6	Vc : 230-180 fn : 0.08-0.15 ap : 0.1-0.6	Vc : 250-200 fn : 0.10-0.20 ap : 0.1-0.5

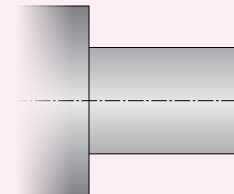
1ST Recommendation

Vc cutting speed : m/min fn feed rate : mm/rev ap depth of cut : mm

Trouble



Productivity



Burr

Solutions

1 Use high-speed grades

TT81xxB CVD grades **SPEEDRUSH**

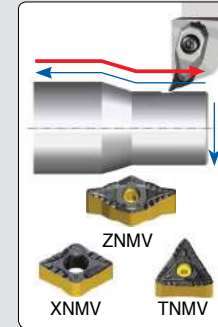


2 Use high feed and high productivity inserts

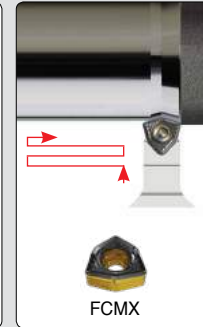
POSTTURN

TURN SPEED

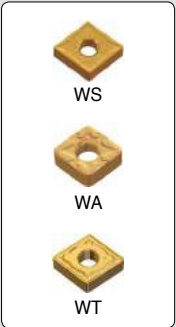
High feed insert



Multidirectional and high feed back turning



Bi-directional high feed turning



Double-feed at the same surface finish

3 Use high-pressure coolant (Max. 70bar)

-TB Holder (2x speed up) **COOLBURST**



4 Use high stability holder

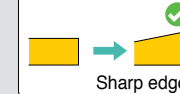
QH- / QS- Head and Shank



7xD, 10xD

1 Change insert geometry

Cutting edge



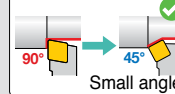
Sharp edge

Nose radius



Small R

Entering angle

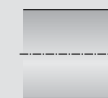


Small angle

2 Use PVD grade or ground insert at low feed

TT5080, TT8020, TT9080, TT3010, TT3020... PVD grade

3 Pre-machine of chamfer or round at start / end of workpiece



Chamfer



Radius



Trouble

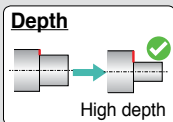
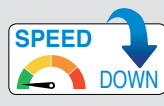


Tangled Chip

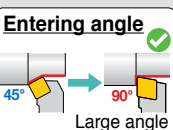
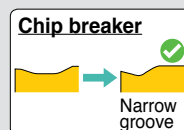
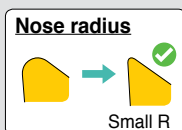
Solutions



1 Change cutting conditions



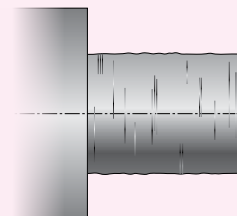
2 Change insert geometry



3 Use high-pressure coolant (Max. 70bar)

-TB Holder **COOLBURST**

Trouble

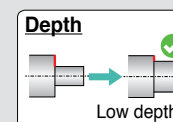
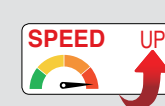


Bad Surface Finish

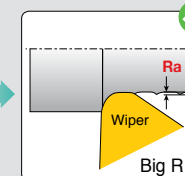
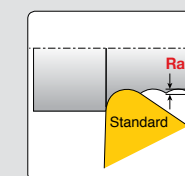
Solutions



1 Change cutting conditions



2 Use wiper or bigger nose radius insert

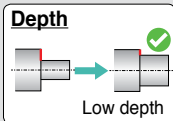


3 Use high-pressure coolant (Max. 70bar)

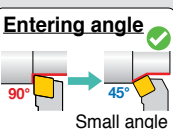
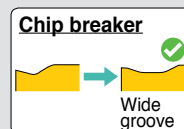
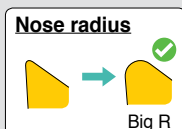
-TB Holder **COOLBURST**

Over Breaking Chip

1 Change cutting conditions



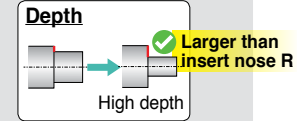
2 Change insert geometry



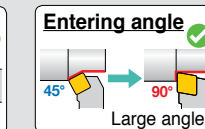
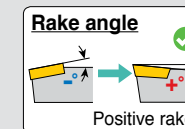
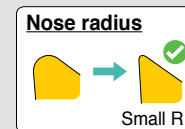
3 Use external coolant

Vibration

1 Change cutting conditions



2 Change insert geometry



3 Use strong holder and anti-vibration bar

T-holder



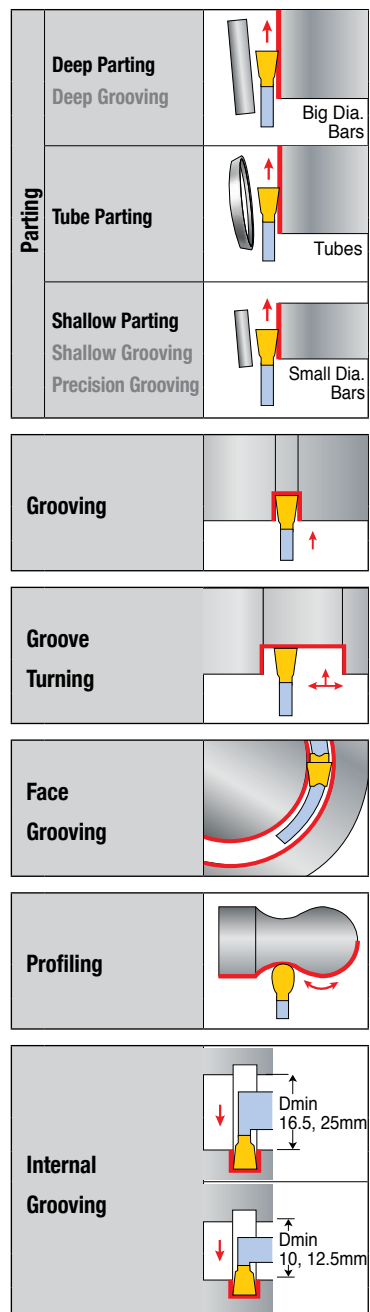
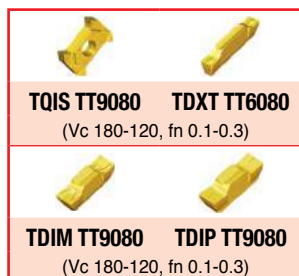
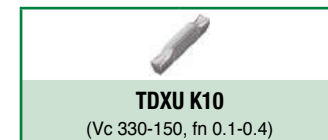
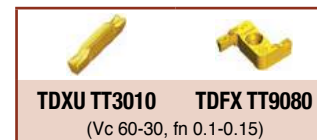
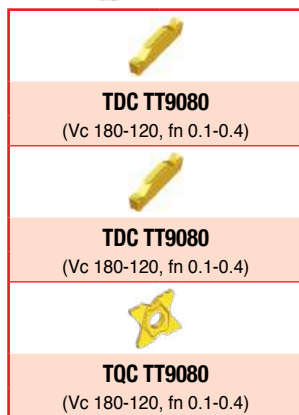
HUSH-BORE and Carbide shank



7xD, 10xD

Parting & Grooving



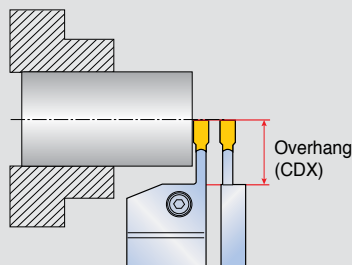
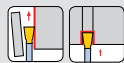
**Steel**
(HB 200-220)**Cast iron**
(HB 220-250)**Stainless steel**
(HB 180-200)**High temp. alloys**
(HB 300-350)**Non-ferrous**

(Vc cutting speed: m/min, fn feed rate: mm/rev)

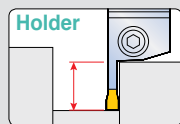


Holder and Blade Size Selection

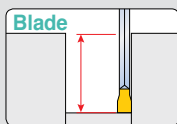
: To minimize vibration and deflection



- Blade or tool holder with the smallest possible overhang (CDX)
- Tool holder with the maximum shank size
- Blade or tool holder with the maximum width of insert seat size



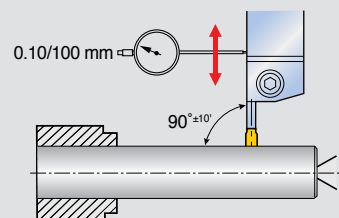
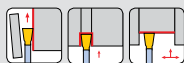
Holder
For short overhang



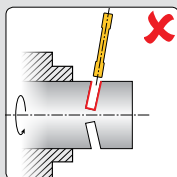
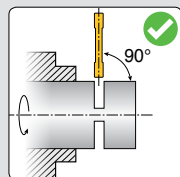
Blade
For long overhang

90° Mounting of Tool Holder

: To get perpendicular surface and minimize vibration

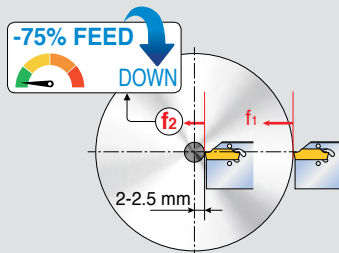


- Insert must be mounted **90°** to the workpiece
- Mounting the holder as close to the chuck as possible

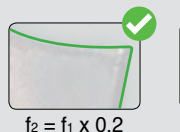


Recommended Feed Rate for Parting-off

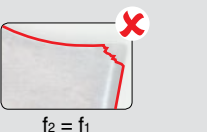
: To increase tool life and productivity



- Reduce feed up to **70-80%** before 2.0-2.5 mm from the center
- Recommended feed rate $f_2 = f_1 \times 0.2 \sim 0.3$ (mm/rev)



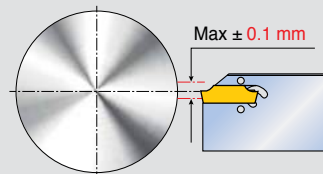
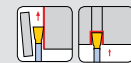
$$f_2 = f_1 \times 0.2$$



$$f_2 = f_1$$

Cutting Edge Height Set-up

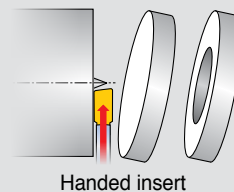
: To prevent over wear and breakage of insert and short tool life



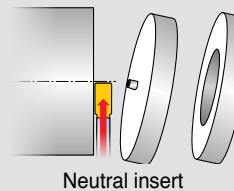
- Cutting edge height set-up within maximum **± 0.1 mm**
- Parting-off should be as close to the chuck as possible
- When machining long overhang, set the cutting edge height **+0.1 mm** higher to compensate for tool deflection

Handed Type Insert with Lead Angle

: To minimize pips or burrs



Handed insert



Neutral insert

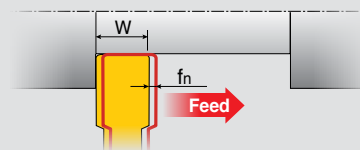
- Use lead angle insert only to reduce burrs
- Recommended lead angle by application
 - 4°: Tube and hollow bar
 - 6°: Tube and solid bar
 - 8°: Solid bar
 - 15°: Small diameter solid bar
- Neutral type inserts are recommended for parts that allow burrs

	Tool Life	Burr Size	Straightness	Surface Finish	Chip Flow
Neutral	✓		✓	✓	✓
Handed		✓			

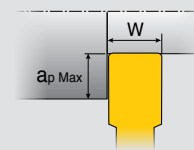
Maximum Feed and Depth in Turning

- Max. feed rate and depth of cut depends on insert width W in turning

$$\text{Max. Feed rate} \\ f_n = W \times 0.075 \text{ (mm/rev)}$$



$$\text{Max. Depth of cut} \\ a_p = W \times 0.8 \text{ (mm)}$$

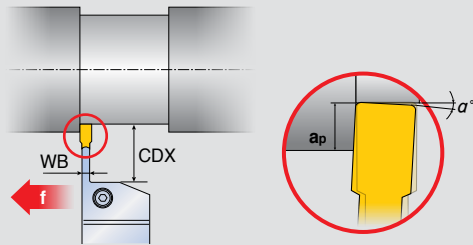




Principles of Turning with Groove-Turn Tools



The basic principle in turning with groove-turn tools is the deflection of the cutting tool, which results in a frontal clearance angle α° between the insert and the workpiece. The clearance angle α° is a function of the side cutting forces and is not constant, as is the case with ISO inserts.



Influenced factors of deflection:

- ✓ Feed f
- ✓ Depth of Cut a_p
- ✓ Overhang of Insert Support CDX
- ✓ Width of Insert Support WB
- ✓ Cutting Speed V_c
- ✓ Workpiece Materials

When all of the above factors remain constant during turning, a high degree of accuracy with a tolerance up to ± 0.01 mm can be achieved.

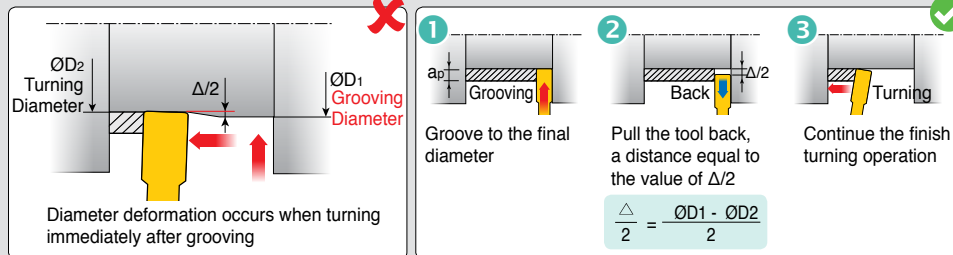
* In very light machining, such as super finishing, there is not enough deflection, which can cause chatter and vibration.

Groove-Turning with Compensation Factor



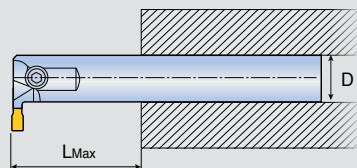
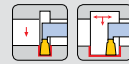
: To eliminate the difference in the workpiece diameter when groove-turning

- Compensation factor must be used in the final finishing groove-turn operation



Recommended Overhang for Internal Machining

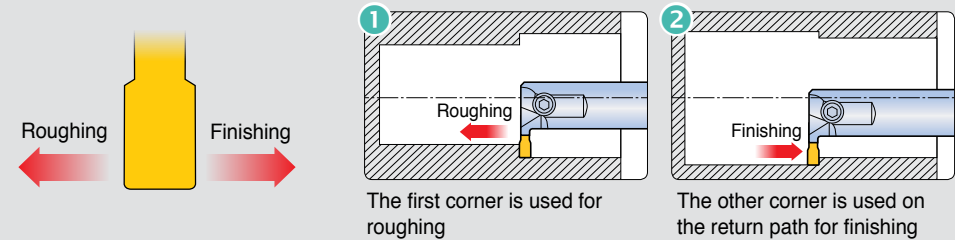
: To minimize vibration and good surface finish



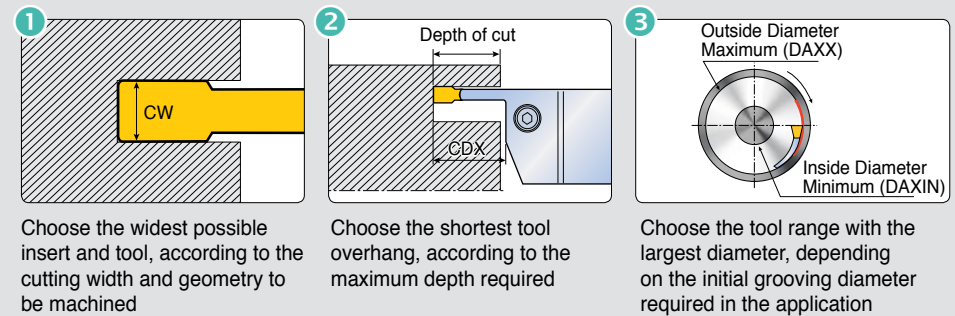
Shank Type	Recommended Overhang (L _{Max})
Steel Shank	$L_{Max} \leq 3D$
Tungsten Carbide Shank	$L_{Max} \leq 5D$
Anti-vibration bar	$L_{Max} \leq 7D$

Efficient Use of Insert Corner

: To reduce machining time and improve tool life

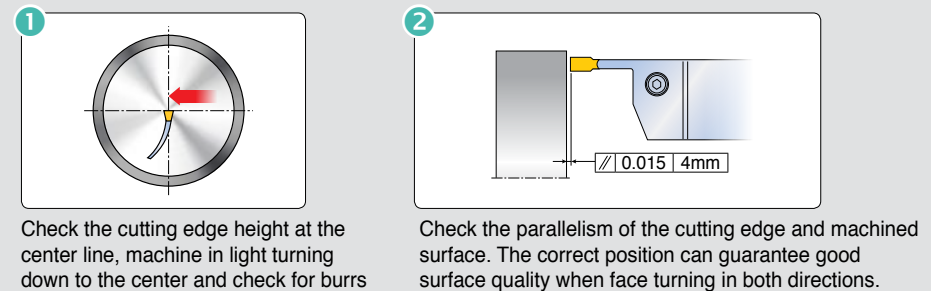


Tool Selection for Face Turning and Face Grooving



Facing Tool Adjustment

: Prior to machining, check and adjust the following tool positions





Trouble

Solutions



1 Use high feed and high productivity inserts

CUTSPEED



For parting & deep grooving

High feed and extraordinarily stable machining

FACERUSH



For face grooving

High feed machining. Reinforced insert geometry

T-CLAMP



For turning

CBN insert for high feed finish turning on hardened steel

2 Use high-pressure coolant (Max. 70bar)

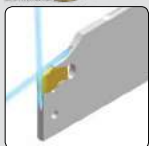
-TB Holder (2x speed up) COOLBURST

CUTSPEED

FACERUSH

QUADRUSH

T-CLAMP



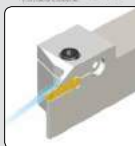
Parting



Face grooving



Shallow grooving



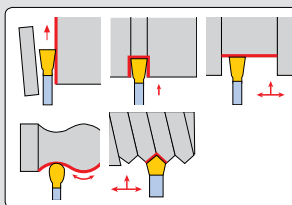
Turn-grooving

3 Use of multiple application tools with multiple cutting edges

QUADRUSH



Strong 4-cutting edges



Various applications



Productivity

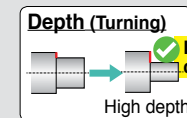
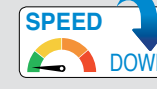
Trouble

Solutions



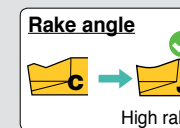
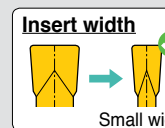
Tangled Chip

1 Change cutting conditions



Larger than corner R

2 Change insert geometry



3 Use pecking (dwelling)

4 Use high-pressure coolant (Max. 70bar)

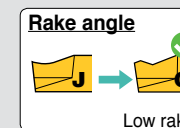
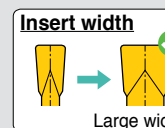
-TB Holder COOLBURST



1 Change cutting conditions

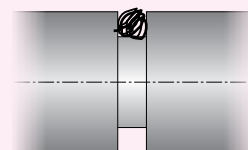


2 Change insert geometry



3 Use high-pressure coolant (Max. 70bar)

-TB Holder COOLBURST

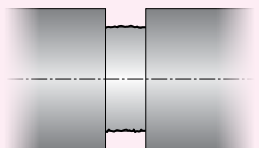


Chip Jamming



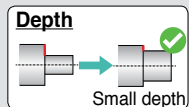
Trouble

Solutions

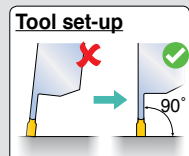
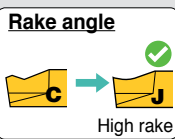
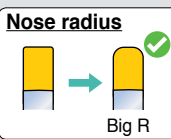


Bad Surface Finish

1 Change cutting conditions



2 Change insert geometry



3 Improve stability of the tool and workpiece

4 Use high-pressure coolant (Max. 70bar)

-TB Holder **COOLBURST**

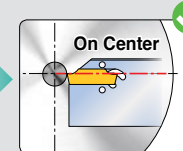
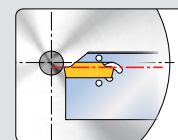
Trouble

Solutions

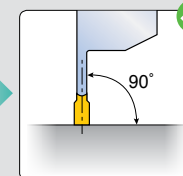
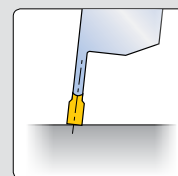


Shorter Tool Life

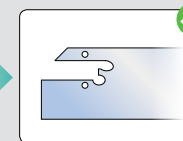
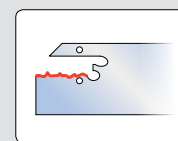
1 Check the cutting edge height



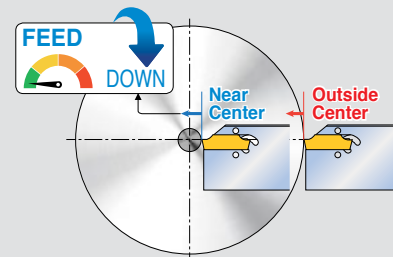
2 Check the angle between tool and workpiece



3 Check the damage of the insert seat located in the tool

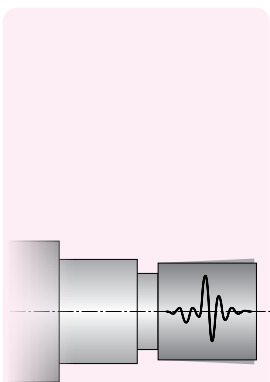


4 Decrease the feed rate near the center in parting operations



5 Machining with recommended speed and feed

6 Increase the coolant volume or use high-pressure coolant

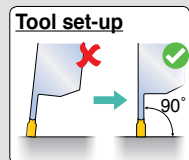
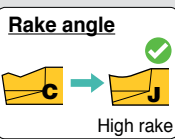
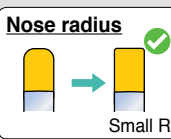


Vibration

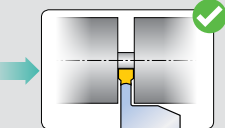
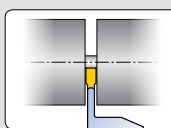
1 Change cutting conditions



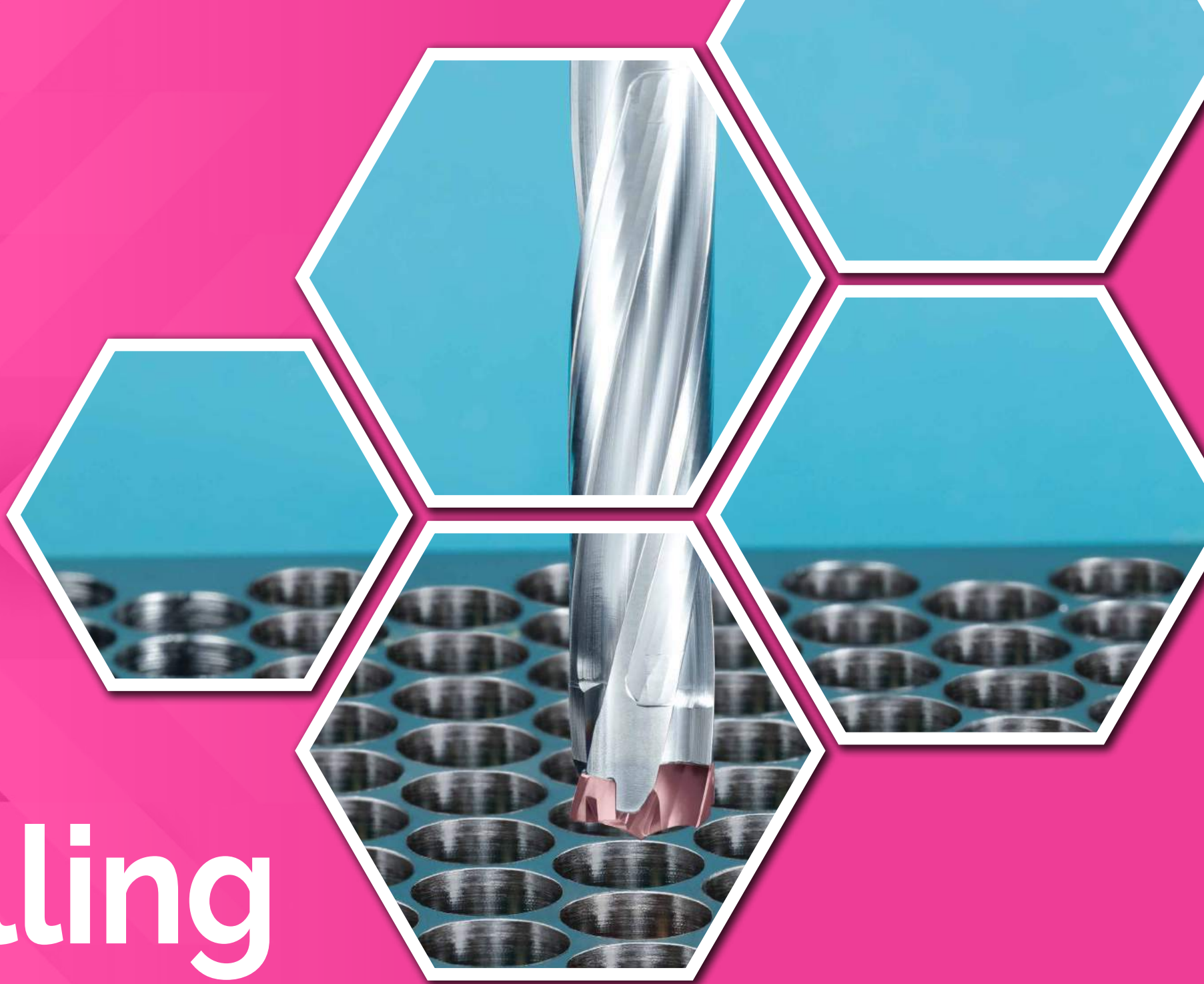
2 Change insert geometry



3 Use strong holder and short overhang tool



Drilling





	Hole tolerance	Application	Recommended drill series	Diameter range (DC)
Rough Hole Machining		 Medium to large hole drilling	 TOP 2 TOP 3 TOP 4 TOP 5	Direct mounting Ø12.0 - Ø50.0 mm Cartridge type Ø51.0 - Ø80.0 mm
		 Medium to large hole drilling	 TNDH... MDB-3 MDB-5	Ø26.0 - Ø50.0 mm
General Hole Machining		 Medium to large hole drilling	 LCD-3D LCD-5D LCD-8D	Ø20.0 - Ø41.0 mm
		 Small to medium hole drilling	 TCD-1.5D TCD-3D TCD-5D TCD-8D TCD-12D	Ø6.0 - Ø25.9 mm
Precise Hole Machining		 Small to medium hole drilling	 3ED-3D 3ED-5D	Ø15.0 - Ø20.9 mm
		 Small hole drilling	 3HD-PI3 3HD-PI5	Ø4.0 - Ø12.0 mm



ISO materials			
	 for Alloy steel SOMT-DP TT9080 Vc 180 - 160 - 140 fn 0.08 - 0.12 - 0.14	 for Low carbon steel SOMT-DP TT9080 Vc 220 - 180 - 160 fn 0.06 - 0.08 - 0.10	 SOMT-DK TT9080 Vc 200 - 160 - 140 fn 0.10 - 0.15 - 0.20
	 TCD-P-CO+ Vc 180 - 140 - 100 fn 0.20 - 0.25 - 0.35	 SPGX-DW TT9080	 TCD-P-CO+ Vc 200 - 160 - 120 fn 0.20 - 0.30 - 0.50
	 LCD-P TT9080 Vc 200 - 100 - 80 fn 0.20 - 0.25 - 0.30	 LCD-P TT9080 Vc 80 - 60 - 70 fn 0.12 - 0.20 - 0.25	 LCD-P TT9080 Vc 150 - 120 - 100 fn 0.20 - 0.35 - 0.50
	 TCD-P/P+ TT9080 Vc 200 - 100 - 70 fn 0.20 - 0.25 - 0.30	 TCD-M TT9080 Vc 70 - 60 - 50 fn 0.12 - 0.18 - 0.25	 TCD-K TT9080 Vc 150 - 120 - 100 fn 0.20 - 0.27 - 0.35
	 3ED-P+ TT5130 Vc 140 - 100 - 70 fn 0.30 - 0.40 - 0.55	-	 3ED-P+ TT5130 Vc 160 - 120 - 80 fn 0.40 - 0.50 - 0.60
	 3HD TT5130 Vc 140 - 100 - 70 fn 0.20 - 0.35 - 0.55	-	 3HD TT5130 Vc 140 - 100 - 80 fn 0.25 - 0.45 - 0.60

(Vc cutting speed: m/min, fn feed rate: mm/rev)

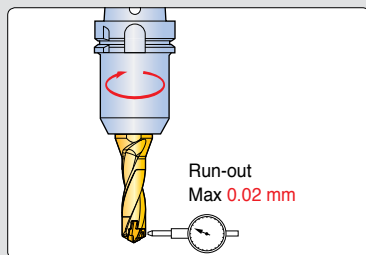


Solid Carbide Drill and Head Changeable Drill Set-up

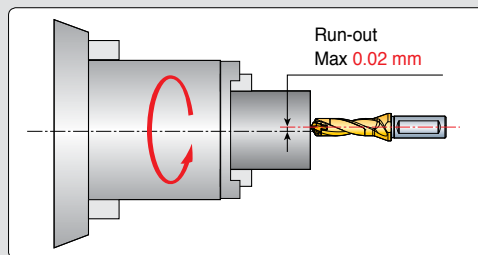


- The drilling run-out should not exceed **0.02 mm**
- Use a drill with as short an overhang as possible

Rotating drill: for machining center



Stationary drill: for lathe

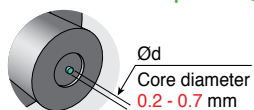


Indexable Drill Set-up on the Lathe

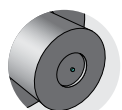
- On first hole
 - Retract the drill after drilling to a depth of **3-6 mm**
 - Check if it has produced a small core within **0.2-0.7 mm**



Correct set-up

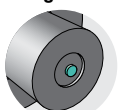


No core or small



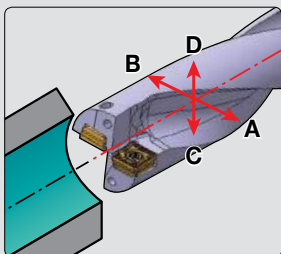
Causes insert breakage and vibration. Adjust the drill body after rotating 180 degrees.

Big core



Causes overload and vibration. Adjust offsets to bring core to correct size.

- Tool eccentric position by machined hole condition (Ø47 TOP-DRILL)



Tool Position	Core Size	Hole Diameter	Problem
Correct	0.2 mm	47 mm	Correct performance and diameter
A	0.2 mm	48 mm	Hole diameter incorrect
B	0.2 mm	46 mm	Holder interferes with work piece
C	1.2 mm	47.2 mm	Vibration
D	None	46.8 mm	Insert breakage and vibration

Recommended Drill Holder

Indexable drill



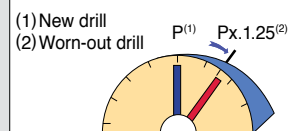
Solid carbide drill & head changeable drill



Indication of Tool Life

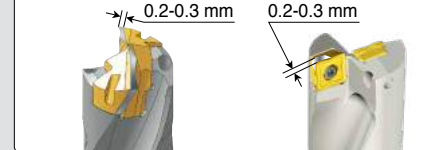
Tool life is judged based on the following

Power restriction



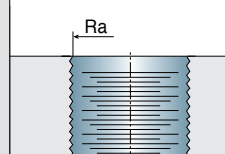
25% more cutting load than initial

Wear limit



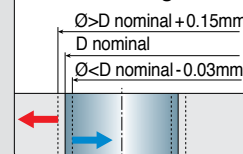
Frank wear on the head or insert cutting edge 0.2-0.3 mm

Surface finish declines



Poor hole surface roughness

Diameter change



Unstable hole diameter

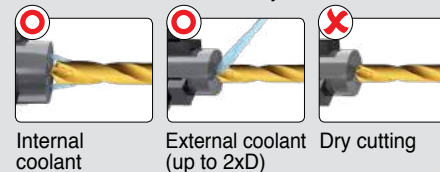
Vibration noise



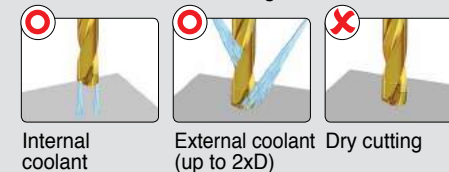
Vibration noise drastically increases

Coolant Supply

For Stationary Drill



For Rotating Drill





Trouble



Productivity

Solutions



1 Use high productivity drill

DRILLSPEED



Head changeable
3-flute drill

SOLID3DRILL



Solid carbide
3-flute drill

2 Use self-centering drill head (no-pilot drill)

DRILLRUSH



TCD-P+

MODURDRILL

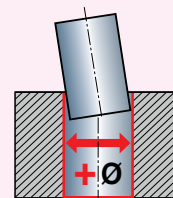


TNDH-TP

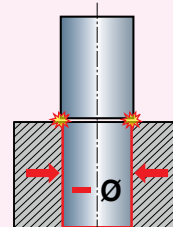
3 Use high-pressure internal coolant



Trouble



Oversized Hole



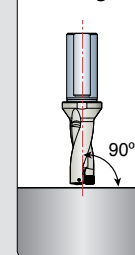
Undersized Hole

Solutions

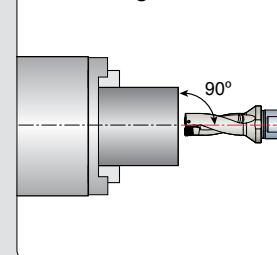


1 Check alignment and drill runout

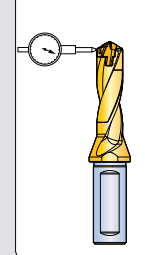
Rotating



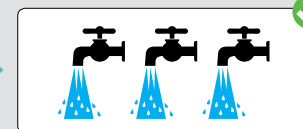
Non-rotating



Runout



2 Increase coolant pressure and volume



3 Change to tougher grade



TT6080 → TT9300 → TT7400 → TT5130 → TT9080

Tougher

TT8020

↑

TT9030

↑

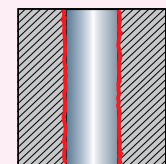
4 Change cutting conditions



Overhang

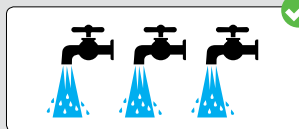


Short overhang



Bad
Surface Finish

1 Increase coolant pressure and volume



2 Change cutting conditions



Overhang



Short overhang



Trouble

Solutions



Chip Jamming

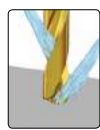
1 Check the cutting conditions and geometry

FEED & SPEED



2 Change coolant conditions

Supply method



Internal

Pressure and Volume



Increase coolant

3 Change cutting conditions



Overhang



Short overhang

Trouble

Solutions



Insert Breakage

1 Change to tougher grade



Tougher

TT8020

↑

TT9030

↑

TT9080

TT6080

→ TT9300

→ TT7400

→ TT5130

→ TT9080

2 Change cutting conditions



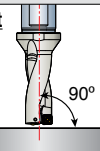
Overhang



Short overhang

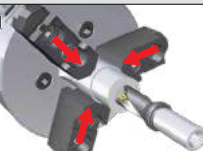
3 Check alignment and clamping

Alignment



90°

Clamping



Vibration

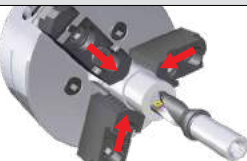
1 Improve rigidity and stability

Overhang



Short overhang

Clamping



2 Check the cutting conditions and geometry

FEED & SPEED

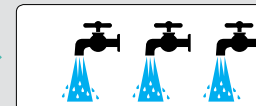


3 Change cutting conditions



Shorter Tool Life

1 Increase coolant pressure and volume



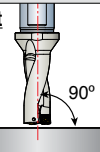
2 Check the cutting conditions and insert grade

FEED & SPEED



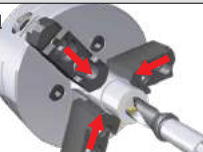
3 Check alignment and clamping

Alignment



90°

Clamping





Milling



Tool Selection by Application

		TT9080 (TT8080)	TT8080 (TT8020)	TT6080 (TT7515)	K10 (PCD)	TT8080 (TT8020)	TT2510 (CBN)
	End mill	^{1st} 					
		^{2nd} 					
	Face mill	^{1st} 					
		^{2nd} 					
	Slotting	^{1st} 					
		^{2nd} 					
	Roughing	^{1st} 					
		^{2nd} 					
	Finishing	^{1st} 					

^{1st} : First recommendation
^{2nd} : Second recommendation



Tool Selection by Application

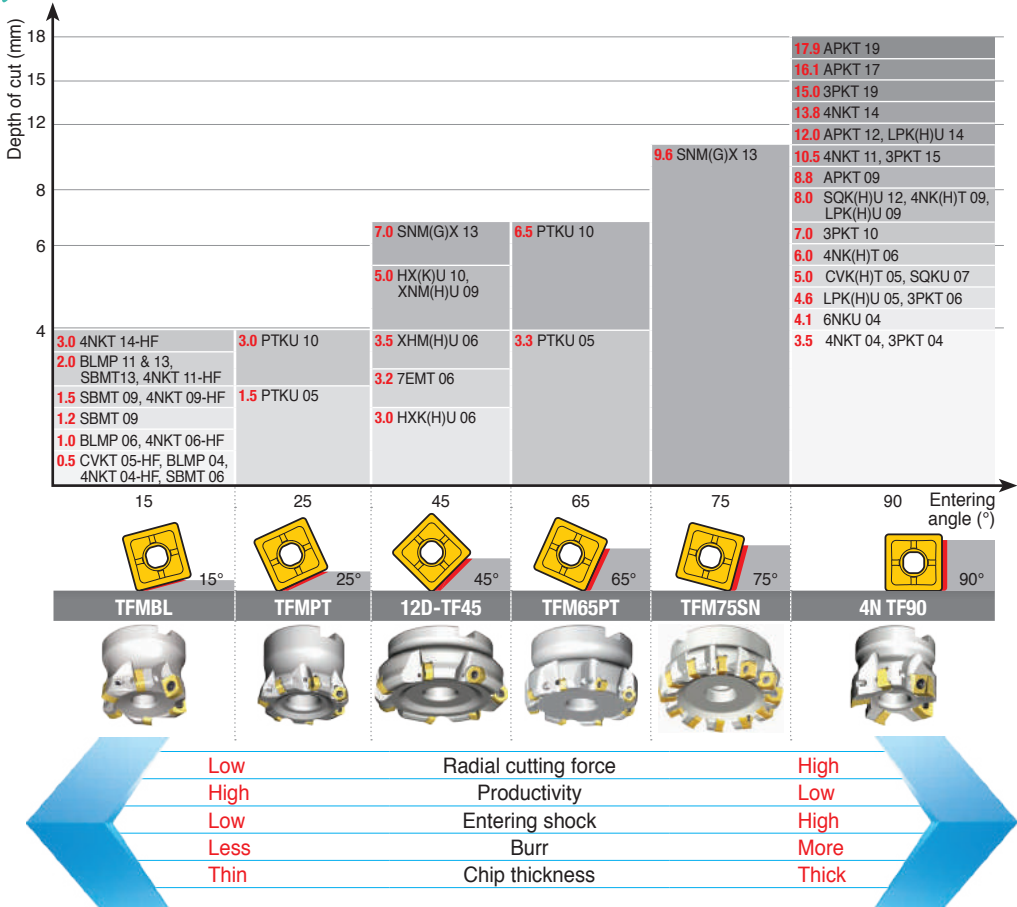
		TT9080 (TT8080)	TT8080 (TT8020)	TT6080 (TT9080, TT2510)	K10 (PCD)	TT8080 (TT8020)	TT2510 (CBN)
	End mill	^{1st} 					
		^{2nd} 			-		
	Face mill	^{1st} 					
		^{2nd} 			-		

^{1st} : First recommendation
^{2nd} : Second recommendation

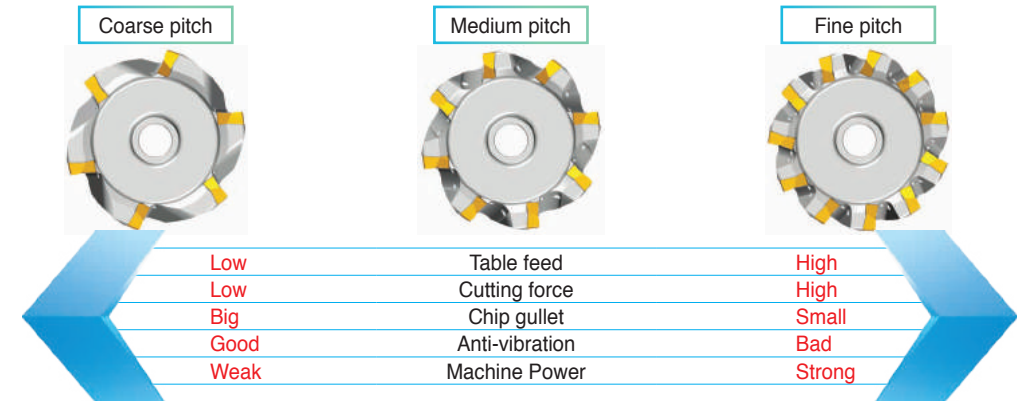
		TT9080	TT8080	TT9080 (TT2510)	TT8080	TT2510
	Roughing					
	Finishing					



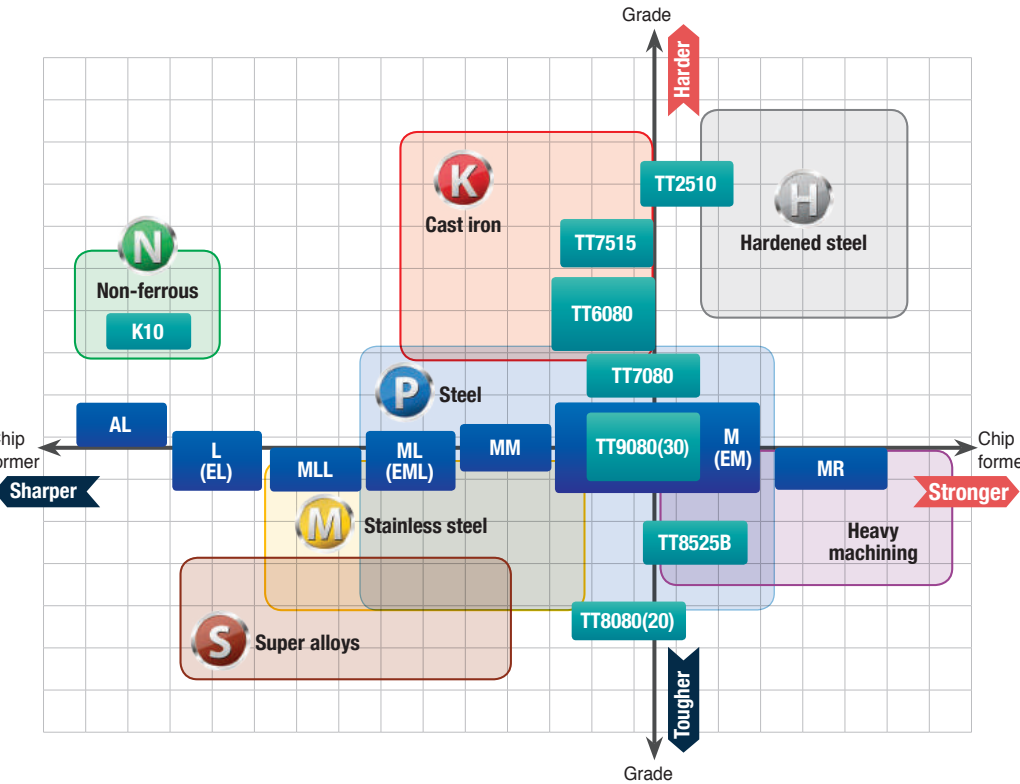
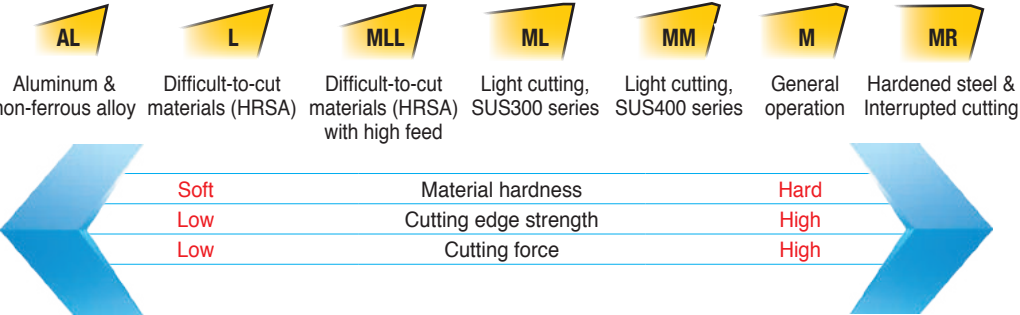
Tool Selection by Entering Angle and Depth of Cut



Properties by Cutter Pitch



Chip Former and Grade Selection Map





Trouble

Solutions



1 Use high feed and high productivity insert

CHASE4FEED

BLMP
Double-sided
4-corner

CHASEFEED

SBMT
Single-sided
4-corner

CHASE2FEED

BLMP 13
Double-sided
6-corner

CHASE10MILL

PTKU
Double-sided
10-corner

For high feed

NANRUSH

HFN
Ground insert
2-corner

CERAMICSPEED

BNGX
Ceramic insert
4/6-corner

For super alloys

MILLSPEED



CVKT -HF

CHASE4MILL



4NKT -HF

CHASEMILL



APKT -HF

2 Use chip splitter insert (-SM)

CHASEMILL



APKT -SM

CHASE2MILL



ANHX -SM

MILLRUSH



3PKT -SM

• More suitable for extended flute cutters

3 Use fine pitch cutter (more teeth, same diameter)

CHASE8MILL

Ø125 mm
Z=18 teeth

CHASE12MILL

Ø100 mm
Z=11 teeth

MILLSPEED

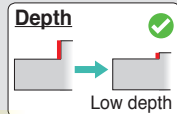
Ø10 mm
Z=3 teeth

Trouble

Solutions



1 Change cutting conditions

Apply feed with
optimum chip thickness

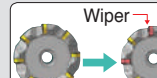
2 Change insert and holder geometry



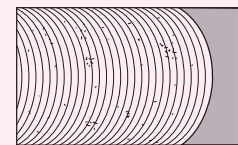
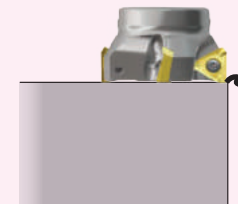
Precise insert



3 Use wiper insert and combination cutter



4 Use carbide shank or reinforced shank

Bad
Surface Finish

Burr

1 Change insert and holder geometry



Precise insert



Small angle

2 Use down milling



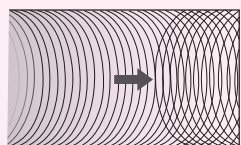
3 Chamfering at start/end of workpiece



Productivity



Trouble

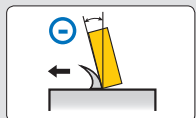


Back Cutting

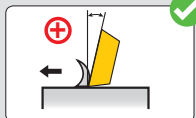
Solutions



1 Change axial rake angle



Negative Rake Angle

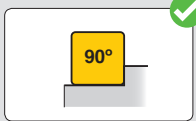


Positive Rake Angle

2 Change cutter entering angle

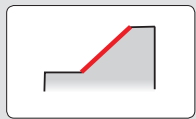


Small entering angle

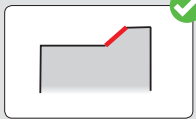


Large entering angle

3 Change depth of cut

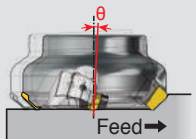


High depth

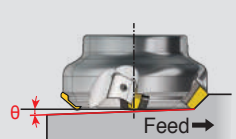


Low depth

4 Use tilting or inclined machining



Feed



Feed

1 Use internal coolant cutter

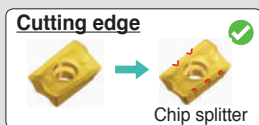


2 Change cutting conditions

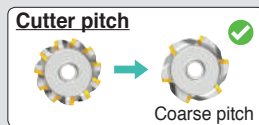


Apply feed with optimum chip thickness

3 Change insert and cutter geometry



Chip splitter



Coarse pitch

Chip Jamming
(full slotting or extended cutter)

Trouble



Vibration

Solutions



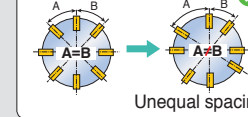
1 Reduce cutting forces

Cutter pitch



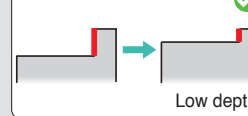
Coarse pitch

Pitch spacing



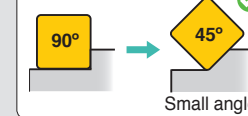
Unequal spacing

Depth of cut



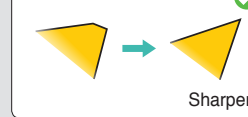
Low depth

Entering angle



Small angle

Chip former



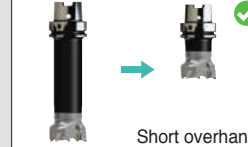
Sharper



Apply feed with optimum chip thickness

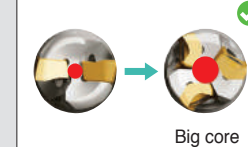
2 Improve rigidity and stability

Overhang



Short overhang

Core size



Big core

Rigidity



High rigidity

Tool holder type



C-ADAPTER

Solid End Mills





Tool Selection by Material

General Purpose			Special Purpose	
	Geometry	1 st Recommendation	Special purpose	1 st Recommendation
 TT5525	Flat 	TSE 2/4	High feed	HFM 2/4
	Corner R 	HES 2/4	Chamfering	CEM 2/4 ECEM 2/4
	Ball 	SBE 2/4	Roughing	REL 2/4
 TT5515	Flat Corner R 	SED 4	Roughing	SER
	Ball 	SBT		
 UF10	Flat Corner R 	AES 2/3	Waved cutting edge	AWE 3
	Ball 	AEB 2/3	Roughing	REA 3
 TT5505	Flat 	HSF	CBN Ball	HSB 2CBN
	Corner R 	HSR		
	Ball 	HSB		
For Trochoidal 			For Inconel	
	Corner R 	SED 7 TT5515	Ceramic end mill corner R	CRF 4/6 TC3030
			Ceramic end mill high feed	CRH 4 TC3030



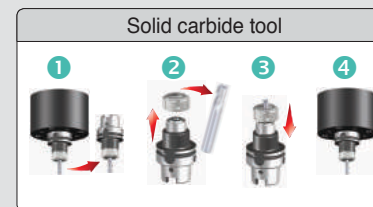
Tool Selection by Application

		 TT5525	 TT5515	 TT5505	 UF10
 Shouldering	Flat	TSE 4		HSF 4/6	
	Corner R	HES 4		HSR 4/6	
 Slotting	Flat	TSE 2	 Only for trochoidal	HSF 2	
	Corner R	HES 2		HSR 2	
 Profiling	Ball	SBE 2/4	SBT	HSB	AEB

Tool Selection by Application - **MAXIRUSH**

	 TT5523	 TT5523	 UF10	 TT5523
 Shouldering	 MXEE(D)-04/06	 MXED-08/10	 MXEE-A03	 High feed end milling MXFX-02
 Slotting	 MXEE-03	 MXEE-A02	 Chamfering	 MXCP-02
 Profiling (finishing)	 MXRD-06 / MXBD-BG-02	 MXBE-BGA02	 Center drilling	 MXDP
 Profiling (5-axis)	 barrel MXCSO / MXCSL	 Lens	 Side slotting	 (TT5543) TST/TTB

In case of many tool changes

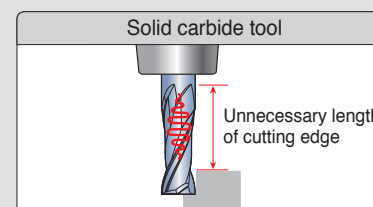


Long tool change time

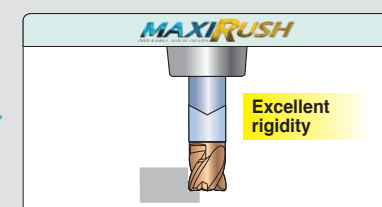


Quick head change on machine

In case of lower axial depth of cut with long overhang

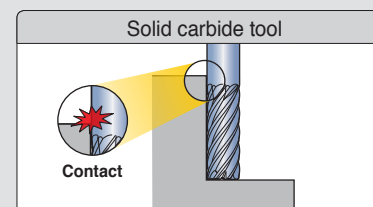


Long cutting edge

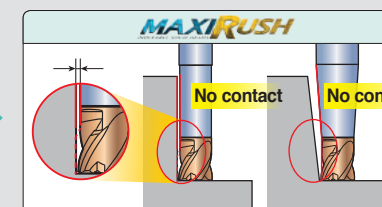


Short cutting edge

In case of deep cavity machining without interference

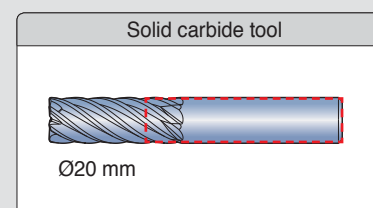


Tool and workpiece contact

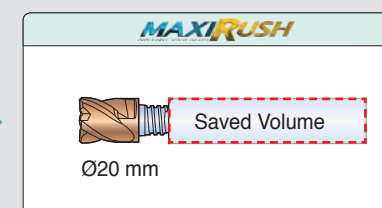


Optimized for cavity machining

In case of bigger cutter diameter with high tool cost



High tool material cost



Low tool material cost



Trouble

Solutions



Productivity

1 Use high productivity and high feed end mill

MAXIRUSH



Minimize tool change time and machine down time

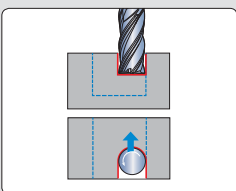
SOLIDFEED



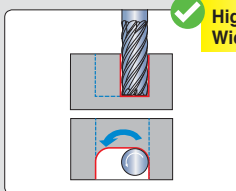
Solid end mill for high feed machining

2 Change machining method

: In case of hardened material or super alloys



Conventional slotting

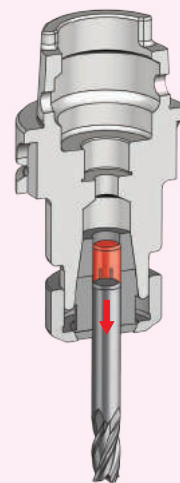


Trochoidal milling

High Depth
Wide Width

Trouble

Solutions



Pull out of the tool

1 Change the holder with strong gripping power

ER collet chuck

Hydraulic chuck



Normal gripping power

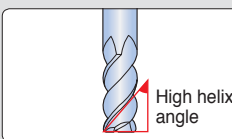
Milling chuck

Shrink chuck

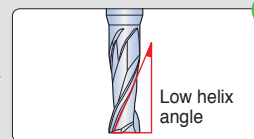


Strong gripping power

2 Change tool helix angle



High helix angle



Low helix angle

3 Change cutting conditions



Tool Breakage

1 Reduce number of flutes



Narrow chip space

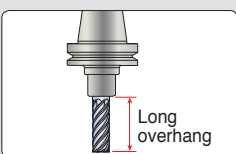


Less number of flute

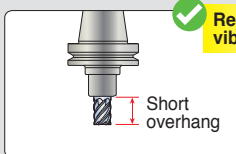


More space for chip evacuation

2 Minimize tool overhang

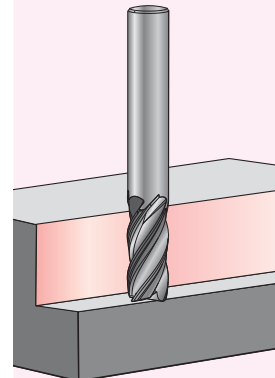


Long overhang



Reduced vibration

3 Change cutting conditions



Rough Surface Finish

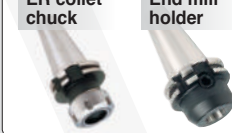
1 Change cutting conditions



2 Change tool holder

ER collet chuck

End mill holder



Normal run out accuracy

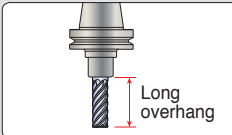
Hydraulic chuck

Shrink chuck

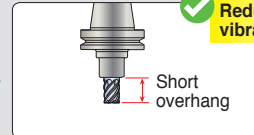


Excellent run out accuracy

3 Minimize tool overhang



Long overhang



Reduced vibration



TaeguTec Global Network

World Headquarters

TaeguTec Ltd.
1040 Gachang-ro, Gachang-myeon,
Dalseong-gun, Daegu, 42936, Korea
Tel: +82-53-760-7640
Web: <http://www.taegutec.com>

Argentina

TaeguTec Argentina SA
11 de septiembre 4237- Piso 7
(C1429BUC) Ciudad Autónoma
Buenos Aires, Argentina
Tel: +54-11-4702-2222
E-mail: ventas@taegutec.com.ar

Australia

TaeguTec Tools Pty Ltd.
42/77 Hoyle Avenue,
Castle Hill, NSW 2154, Australia
Tel: +61-2-8624-9678
E-mail: sales@taegutec.com.au

Belarus Rep.

Twining ALC
Slutskaya str. 3, Minsk Area, 223056,
Village Senitsa, Republic of Belarus
Tel: +375-17-506-3238
E-mail: info@twing.by

Brazil

TaeguTec Do Brasil LTDA.
Rua Francisco Foga 500, 13288166
Dist Ind Benedito Storani, Vinhedo, Brazil
Tel: +55-11-3868-6032
E-mail: ventas@taegubrasil.com.br

Bulgaria

Tekotek BG Ltd.
Alexander Stamboliyski No 31,
7700 Targovishte, Bulgaria
Tel: +359-878-05-1818
E-mail: tekotekbg@gmail.com

Chile

Cutting Tools Chile SpA
Alcaldé Pedro Alarcón N° 765,
San Miguel, Santiago - Chile
Tel: +56-2-553 6944
E-mail: ventas@cuttingtools.cl

China

**TaeguTec Cutting Tools Trading
(Shanghai) Co., Ltd.**
RM 1702, T1 Building, Global Creative
Center, No. 166 Minghong RD, Minhang
District, Shanghai, China
Zip Code : 201102
Tel: +86-21-5106-1260
E-mail: mail@taegutec.com.cn

Croatia

Intehna Zagreb D.O.O.
Samoborska cesta 265, 10090
Zagreb-Susedgrad, Croatia
Tel: +385-1-3436-919
E-mail: info@intehna.hr

Czech Rep.

TaeguTec CR S.R.O.
Domazlická 180a, CZ-31800 Plzeň,
Czech Rep.
Tel: +420-373-720-999
E-mail: tp@taegutec.cz

Denmark

TaeguTec Scandinavia A/S.
Hollandsvej 12, Room 206
DK-2800 Kgs. Lyngby, Denmark
Tel: +45-7022-0103
E-mail: ts@taegutec.dk

Finland

Knorrning OY AB
Mestariitie 4 FI-01730 Vantaa, Finland
Tel: +358-9-560-41
E-mail: knorrning@knorrning.fi

France

Ingersoll France
22 Rue Albert Einstein
77420 Champs Sur Marne, France
Tel: +33 (0)1-64-68-45-36
E-mail: info@ingersoll-imc.fr

Germany

TaeguTec Werkzeuge GmbH
Kaltelche Ring 21-25, D-35708
Haiger, Germany
Tel: +49-2773-742 148
E-mail: info@taegutec-IMC.de

Greece

Technotools-Fakitsas Georgios Co.
25th Mariou & Thrakis 15, 15235 Vrilissia,
Athens, Greece
Tel: +30-210-832-0752
E-mail: Giorgos@technotools.gr

Hungary

TaeguTec Hungary KFT.
1142 Budapest, Kassai u.151.
Tel: +36-1-273-29-55
E-mail: info@taegutec.hu

India

TaeguTec India Pvt. Ltd.
No.120, Bommasandra Industrial Area,
Phase IV, Bangalore-560 099, India
Tel: +91-80-4901-3000
E-mail: sales@taegutec-india.com

Indonesia

PT TaeguTec Indonesia
Easton Commercial Center
Jl. Gunung Panderman Blok B no. 12
Cikarang Selatan-Bekasi 17550, Indonesia
Tel: +62-21-29093176/78
E-mail: sales@taegutec.co.id

Ireland

Hardmetal Machine Tools Ireland Ltd.
Dargan House, Duncrain Terrace,
Bry Co. Wicklow, Ireland
Tel: +353-1-286-2466
E-mail: sales@hardmetal.ie

Italy

Ingersoll TaeguTec Italia S.R.L.
Via Monte grappa N.78, 20020 Arese (MI), Italy
Tel: +39 02 99 76 67 00
E-mail: taegutec@taegutec.it

Japan

TaeguTec Japan Ltd.
Senri Asahi Hankyu Bldg. 20F
1-5-3 Shinsenri-Higashimachi
Toyonaka-shi Osaka 560-0082, Japan
Tel: +81-6-6835-7731
E-mail: taegutec@taegutec.co.jp

Lithuania

UAB TMT
Paneriu Str. 5 LT-48337 Kaunas, Lithuania
Tel: +370-37-328487
E-mail: sigitas@tmt.lt

Malaysia

**TaeguTec Tooling Systems
Malaysia Sdn. Bhd**
No.23-182, Jalan Anggerik Vanilla
BF 31/BF Kota Kemuning, Seksyen 31
40460 Shah Alam Selangor D.E., Malaysia
Tel: +603-5131-7514
E-mail: info@taegutec.com.my

The Netherlands

TTC Tools
Kennedylaan 14, 5466 AA, Veghel,
The Netherlands
Tel: +31 (413) 38 83 10
E-mail: info@tcc-tools.nl

New Zealand

TaeguTec Pacific Ltd.
1601 Mt. Wellington Highway
Sylvia Park, Auckland, New Zealand 1060
Tel: +64-0800-808-477
E-mail: sales@iscar.co.nz

Norway

Svea Service AS
Grastaderveien 20 No-3036 Drammen,
Norway
Tel: +47-32-277-750
E-mail: per.martin.bakken@svea.no

Pakistan

Dynamic Tooling Services
Office No. 304, 3rd Floor, Azeem
Mansion, Faza-ul-Haque Road,
Blue Area, Islamabad-44000, Pakistan
Tel: +92-51-2150882/383
E-mail: info@dtls.com.pk

Peru

Trade Tools Cia. S.A.C.
Av. Guillermo Dansey No 774
Urb. Lima Industrial, Lima Peru 4000.
Tel: +51-01-433-6999
E-mail: purchases@tradetoolscia.com.pe

Philippines

Coil Commercial Inc.
Suite 508 Padilla delos Reyes Bldg.
232 Juan Luna St., Binondo, Manila
Philippines
Tel: +63-2-8244-9757
E-mail: cyrus@coil.com.ph

Poland

TaeguTec Polska Sp. z o.o.
Ul.Nienkiewicza 136
52-223 Wrocław, Poland
Tel: +48 71 785 40 85
E-mail: sales@taegutec.pl

Portugal

Hexatool, S.A.
Rua Casal Galego, N°70A
2430-084 Casal Galego
Marinha Grande, Portugal
Tel: +351-244-550424/5
E-mail: hexatool@hexatool.com

Romania

SC TaeguTec Tools SRL
Splaiul Unirii, nr. 4, Bl. B3, 5th Floor,
Office 5.1, District 4, Bucharest,
Romania, 040031
Tel: +4021 210 3108
E-mail: marian.luca@taegutec.ro

Russia

TaeguTec Russia
12390, Russia, Moscow,
2nd Magistralnaya str. 8A, building 5
Tel: +7-495-269-7917
E-mail: sales@taegutec.ru

Saudi Arabia

Khushelm Co.
Building -A, Al Nakheel Tower, Al Khaleej
Road, Al Shateea Area, Dammam 31411,
Kingdom of Saudi Arabia
Tel: +966-13-8333574 Ext : 1500
E-mail: bd@khushelm.com

Serbia

Intehna Beo D.O.O.
Autoput 22, 11080 Zemun, Serbia
Tel: +381-11-3149-092
E-mail: info@intehna.rs

Singapore

TT Tooling Systems
BK502, #03-823, Jurong West Avenue 1,
Singapore 640502
Tel: +65-6-4254918
E-mail: ktian@sinotool.com.sg

Slovakia

TaeguTec Slovakia, s.r.o.
Bytlická 244 010 01 Zilina Slovak Republic
Tel: +421 41 7000088
E-mail: info@taegutec.sk

Slovenia

Intehna D.O.O.
Spruha 40, SI-1236, Trzin, Slovenia
Tel: +386-1-580-9280
E-mail: info@intehna.si

South Africa

TaeguTec South Africa (Pty) Ltd.
Block F, Clearwater Office Park,
Corner of Atlas and Park Roads,
Parkhaven, Boksburg 1459, South Africa
Tel: +2711-362-1500
E-mail: info@taegutec.co.za

Spain

TaeguTec Spain S.L.U
Miquel Servet, 35 Pl.Buñavent
08243 Manresa (Barcelona), Spain
Tel: +34-93-878-7309/7310
E-mail: info@taegutec.es

Sweden

SMV Verktyg AB
Parkgatan 6
SE-333 31 Smalandsstenar, Sweden
Tel: +46-371-343-40
E-mail: verktyg@smv.se

Taiwan

Qunling International Trading Co.,Ltd.
RM B-7F, No. 801 of Zhongzheng Road,
Zhonghe District, New Taipei City 23552,
Taiwan
Tel: +886-2-2223-0851
E-mail: qunling.service@qunling.url.tw

Thailand

TaeguTec(Thailand) Co.,Ltd.
6177 M.7 Srinakarn Rd.
T.Bangmuang, A Muangsamutprakarn,
Samutprakarn 10270, Thailand
Tel: +66-2-759-9300
E-mail: info@taegutecthai.co.th

Turkey

TaeguTec Kesici Takimler A.S.
TOSB Otomotiv Yan Sanayi Intisaz
Organize Sanayi Bolgesi
1.Cad. 15 Sokak No:9 41420 Şekerpınar
Çayirova/KOCAELİ, Türkiye
Tel: +90-850-201-6900
E-mail: info@taegutec.com.tr

Ukraine

TaeguTec Ukraine LLC
40-b, Pushkina avenue, Dnepropetrovsk
Ukraine, 49006
Tel: +38-066-790-84-09
E-mail: td@taegutec.com.ua

United Kingdom

TaeguTec UK Ltd.
Waterside, Grange Park, Wetherby,
Leeds, LS22 5NB, United Kingdom
Tel: +44-1937-589-828
E-mail: info@taegutec.co.uk

U.S.A.

Ingersoll Cutting Tools
845 S Lyford Road Rockford,
IL 61108-2749, U.S.A.
Tel: +1-815-387-6600
E-mail: info@ingersoll-imc.com

Vietnam

TaeguTec Vietnam Limited Liability
3rd Floor, Intan Building, 97 Nguyen
Van Troi Street, Ward 12, Phu Nhuan Dist,
HCMC, Vietnam.
Tel: +84-28-3999-1835
E-mail: info@taegutec.vn



- Cat.No: 6239825
- English Version: CT 11/2021
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