KORLOY TECH-NEWS

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ISO9001
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May 1, 2009
No. 218-M

NEW Concept, Economical Multi Functional Tool

Innovative Multi Functional Tool
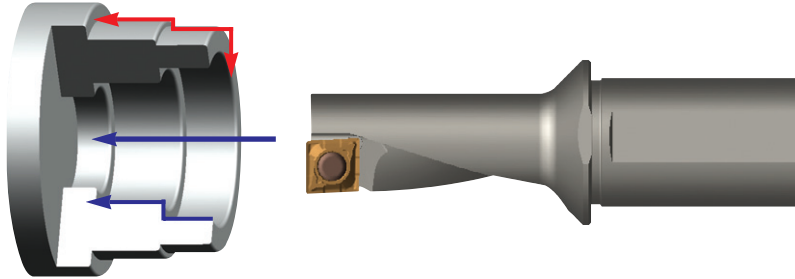
Multi Turn

Features

- Improved surface roughness and reduced cutting load by inclined cutting edge.
- Stepping designed cutting edge enables stable machining by minimizing cutting edge part on workpiece when drilling starts.
- Excellent cutting performance by giving curves onto chips while drilling.
- Helix-angled flute design enables smooth chip evacuation and excellent drilling.
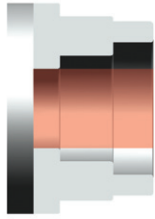- Through coolant system leads longer tool life and smooth chip evacuation.
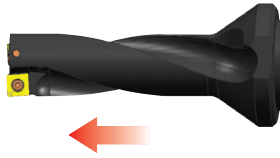
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Application

➡ Internal, External, Face Turning, Drilling by only one tool

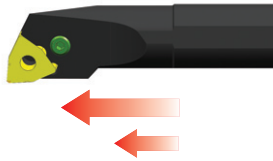### General Tooling

Muli Turn

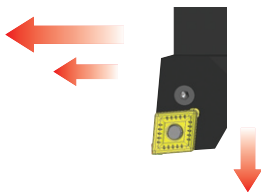
Drilling

Drill

+

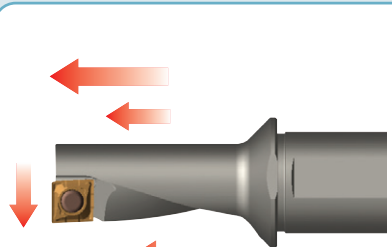
Internal machining

Internal holder
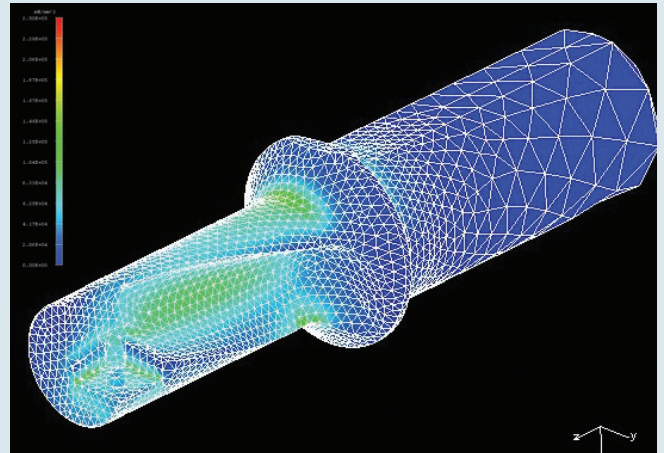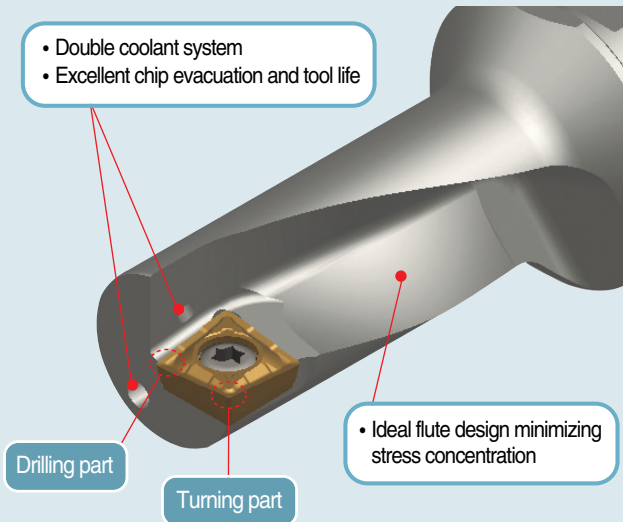
+

Face Turning & external machining

External holder
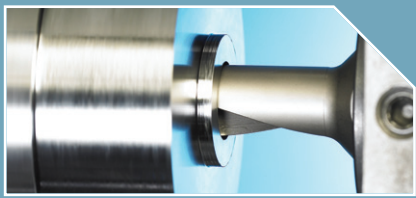
Multi Turn

Tool design by FEM analysis

- Double coolant system
- Excellent chip evacuation and tool life

Drilling part

Turning part

- Ideal flute design minimizing stress concentration

- Minimized stress during cutting, prevented damage from vibration and longer tool life.
➡ Optimized design

Creative stepping cutting edge

Drilling edge

(Drilling)

Turning edge

(Internal, external and face turning)

L1

L2
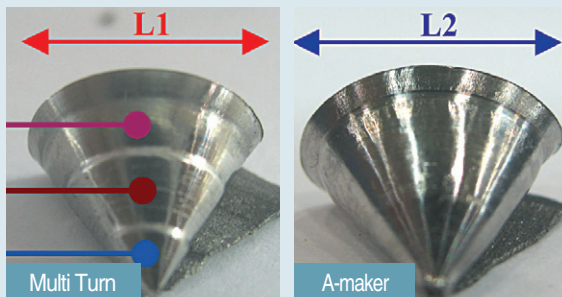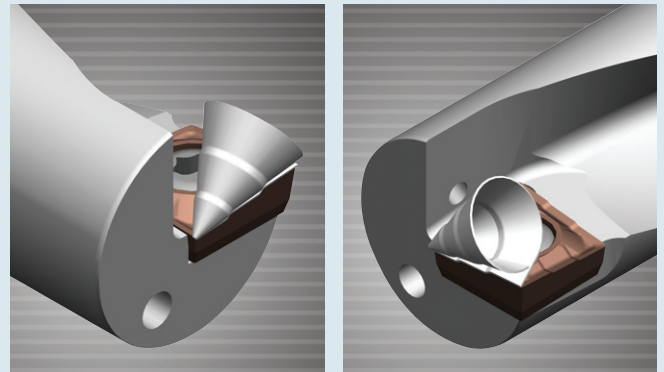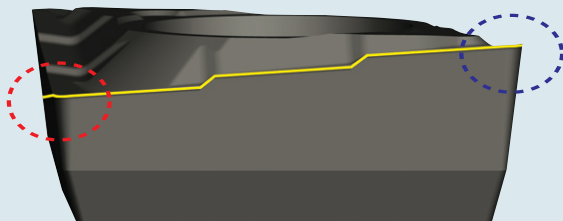
Multi Turn

A-maker

- Special chip forming by edge geometry
- Better chip evacuation due to small radius width of chip curl

Comparison	Multi turn	A-maker	B-maker
fn 0.08 (mm/rev)			
fn 0.10 (mm/rev)			
Chip width(rate)	80%	100%	120%

➡ Excellent chip evacuation and tool life guaranteed.

Multi Turn

Insert code system

Q	C	M	T	08	03	04	-	CM
Insert shape	Relief angle	Tolerance	Cross Section Type	Cutting Edge Length	Height of Cutting Edge	Nose Radius		Chip Breaker

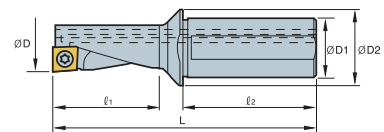| Designation		l	d	t	r	Grades		
						P	M	K
						NC3120	PC9030	NC6110
QCMT	050204-CM	5.0	5.4	2.10	0.4	●	○	●
	060204-CM	6.0	6.4	2.38	0.4	●	○	●
	070304-CM	7.0	7.4	3.18	0.4	●	○	●
	080304-CM	8.0	8.4	3.18	0.4	●	○	●
	10T304-CM	10.0	10.4	3.97	0.4	●	○	●

● : Stock item, ○ : Under preparing for stock

Holder code system

M	T	2	0	R	2.	25	-	D
Brand Name		Tool Diameter		Hand of Tool		Aspect ratio		

Designation	Stock		ØD	ØD1	ØD2	ℓ1	ℓ2	L	Inserts	Screws	Wrench
	R	L									
MT 10R/L-2.25D	●		10	12	16	22.5	42.0	69.5	QC..050204	FTNA0204S	TW06P
MT 12R/L-2.25D	●		12	16	20	27.0	45.0	78.0	QC..060204	FTNA02205S	TW06P
MT 14R/L-2.25D	●		14	16	20	31.5	45.0	83.5	QC..070304	FTKA02555	TW07P
MT 16R/L-2.25D	●		16	20	25	36.0	50.0	94.0	QC..080304	FTNA0306	TW09P
MT 20R/L-2.25D	●		20	25	32	45.0	56.0	111.0	QC..10T304	FTNA03508	TW15P

● : Stock item, ○ : Under preparing for stock

Recommended tool by drill diameter

Tool diameter	Holder	Inserts
10mm	MT10R/L-2.25D	QCMT050204-CM
12mm	MT12R/L-2.25D	QCMT060204-CM
14mm	MT14R/L-2.25D	QCMT070304-CM
16mm	MT16R/L-2.25D	QCMT080304-CM
20mm	MT20R/L-2.25D	QCMT10T304-CM
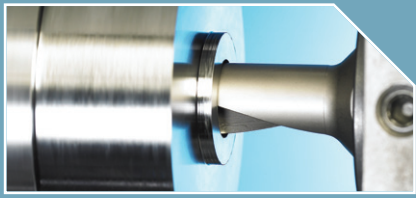
Multi Turn

Comparison of Chip Controls(Drill)

● **Cutting condition**
- Holder : MT12R / MT16R-2.25D
- Insert : QCMT060204/080304 – CM NC3120
- Workpiece : Low alloy steel(DIN 42CrMo4, SCM440)
- Cutting Speed(100m/min)
- Feed(0.04~0.12mm/rev)
- Drilling length(24~36mm), wet

➡ Superior chip chopping
➡ Stable chip breaker

Multi turn	A-maker	Multi turn	A-maker
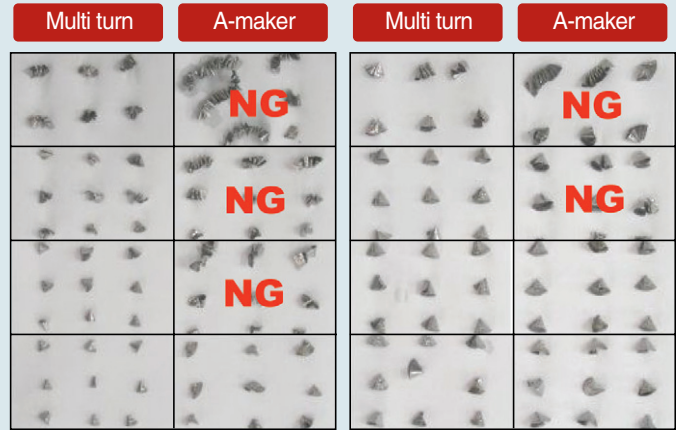
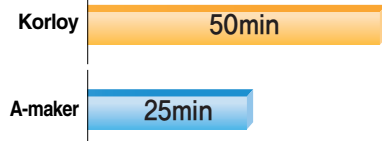Diameter(12mm)　　Diameter(16mm)

Tool life comparison

● Turning(Carbon steel: DIN C45, SM45C)

- Holder : MT14R-2.25D
- Insert : QCMT070304-CM NC3120
- Application : External turning, Facing (Roughing, Finishing)

■ Cutting condition
- vc : 180m/min
- fn : 0.1~0.2mm/rev
- ap : 0.5~1.2mm, wet

■ Result

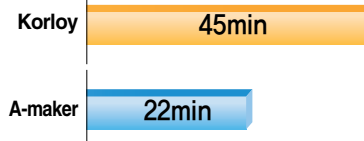| Korloy	50min
A-maker	25min

● Turning (Low alloy steel)

- Holder : MT12R-2.25D
- Insert : QCMT060204-CM NC3120
- Application : External turning, Facing (Roughing, Finishing)

■ Cutting condition
- vc : 180m/min
- fn : 0.1~0.2mm/rev
- ap : 0.5~1.2mm, wet

■ Result

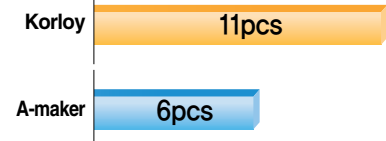| Korloy	45min
A-maker	22min

● Drilling+Turning(Low alloy steel)

- Holder : MT16R-2.25D
- Insert : QCMT080304-CM NC3120
- Application (Cutter body) : Drilling, External turning, Facing, Internal turning (Roughing, Finishing)

■ Cutting condition
- vc : 100~180m/min
- fn : 0.05~0.2mm/rev
- ap : 0.5~2.0mm, wet

■ Result

Korloy	11pcs
A-maker	6pcs

Comparison on surface roughness

Multi turn			■ Visible roughness • Glossy surface ➡ Superior ■ Measurement • Ra : 0.47μm　• Ry : 4.56μm
A-maker			■ Visible roughness • Hazy surface ➡ Inferior ■ Measurement • Ra : 0.70μm　• Ry : 5.92μm

Advantages of Multi Turn

Standard Tool		Multi Turn

Using tool – Single

Three kinds of tools
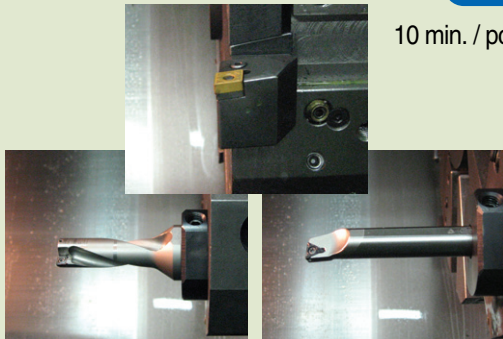External/Drill/Internal → Multi turn

Preparatory time of work-Reduced

20 min. → 5 min.

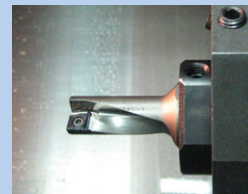**Operatinig time-Reduced**

10 min. / pcs → 8 min. / pcs

● Productivity comparison(Lot : 50 pcs)

Item	Standard tool
Preparatory time of work	20 min.
Operating time(50 pcs)	(50 * 10) 500 min.
Total production time	520 min.
Reduced production time (Productivity improved)	~ ~

● Productivity comparison(Lot : 50 pcs)

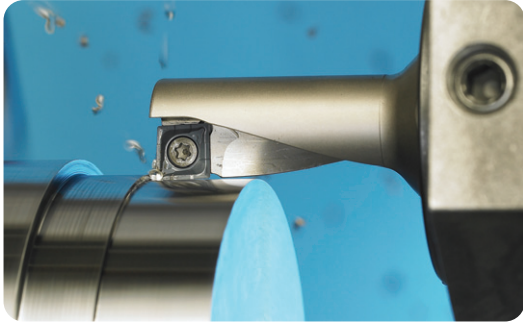| Item	Multi Turn
Preparatory time of work	5 min.
Operating time(50 pcs)	(50 * 8) 400 min.
Total production time	405 min.
Reduced production time (Productivity improved)	22% up (22%)

Finished goods

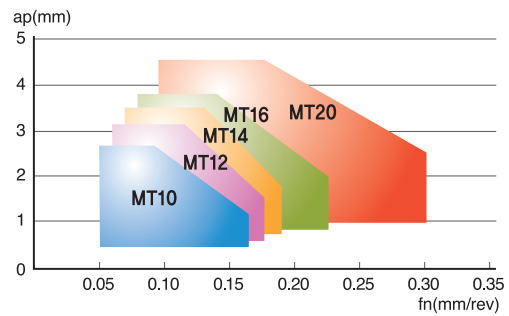→ Superior productivity and cost reduction achieved.
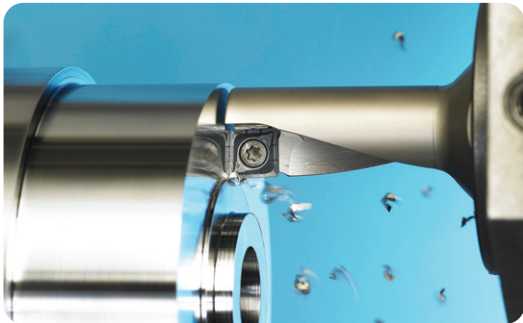
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User's guide

● External / Internal turning

● Range

● Face turning

● Range
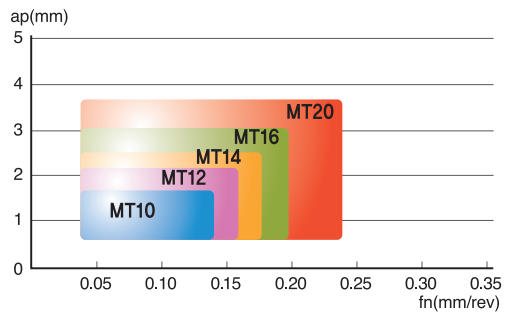
● Drilling
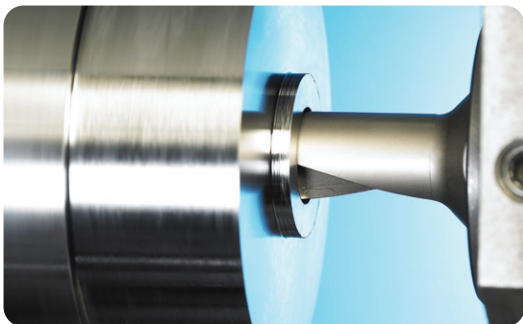
● Drilling feed range by designation
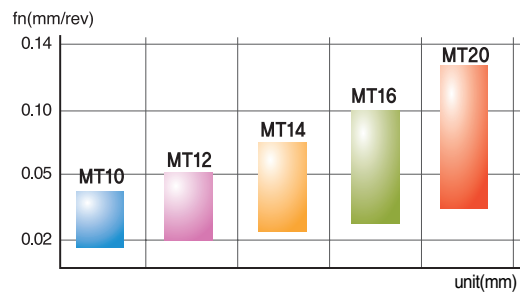
■ Offset(Diameter revision)

unit(mm)

Disignation	Diameter	ØDmin	ØDmax
MT10R/L-2.25D	10	9.85	10.35
MT12R/L-2.25D	12	11.85	12.35
MT14R/L-2.25D	14	13.85	14.35
MT16R/L-2.25D	16	15.85	16.35
MT20R/L-2.25D	20	19.85	20.35
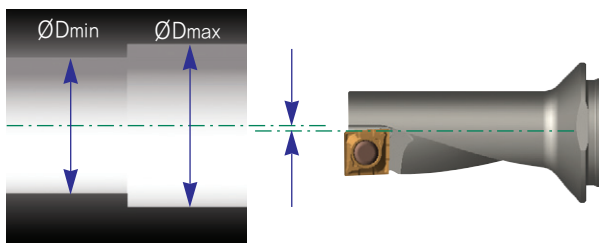
Drill diameter adjustable by offset revision.

Multi Turn

Recommended cutting condition

Workpiece		Hardness(HB)	NC3120		PC9030		NC6110	
			Turning	Drilling	Turning	Drilling	Turning	Drilling
P	Low-carbon steel(≤0.25%C)	80~180	150~300	100~150	-	-	-	-
	High-carbon steel(>0.25%C)	180~280	100~180	70~120	-	-	-	-
	Low alloy steel	140~260	100~180	70~120	-	-	-	-
	Highalloy steel	200~350	80~150	60~100	-	-	-	-
M	Austenite line	135~275	-	-	140~210	100~150	-	-
	Martensite line	135~275	-	-	150~230	100~150	-	-
K	Gray cast iron	150~220	-	-	-	-	100~200	70~140
	Ductile cast iron	130~240	-	-	-	-	100~180	70~120

Clampining tip

Correct : High cutting edge position

Wrong : Low cutting edge position
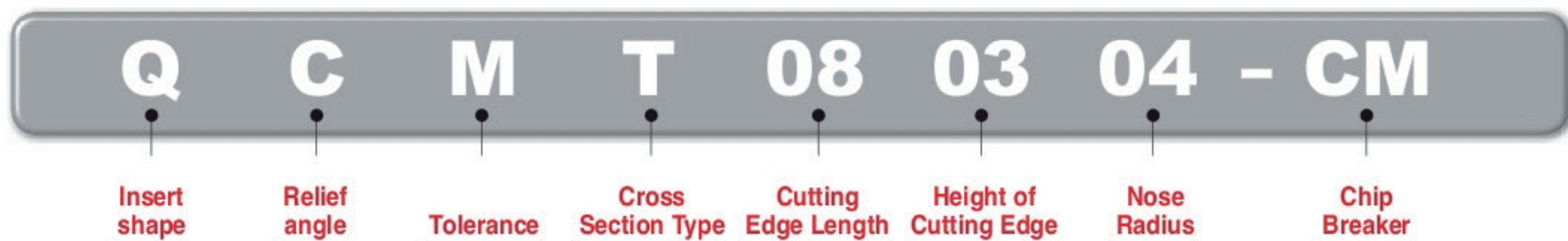
Warning
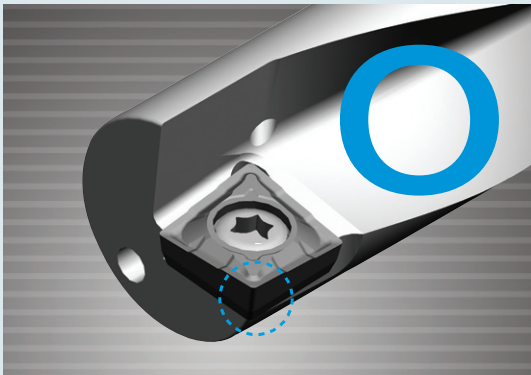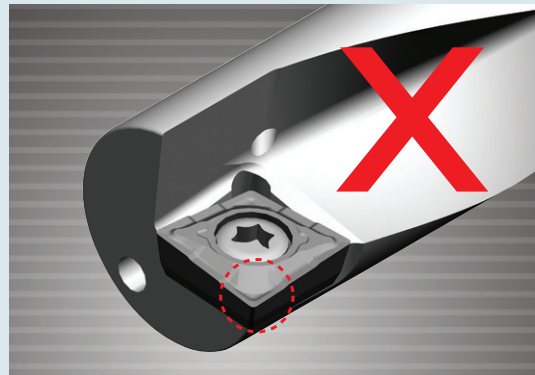
※ Safety instruction
- Use glasses safely and face cover with protective equipment. If cutting condition and use method
  are inaccurate, you may be injured by broken tools or scattered chips.
- Excessive cutting load may influence badly on both tool and machine.
  Make suitable tool replacement for preventing failure of machining.
- After machine stopped, clean remained chips from machine with special cleaning equipment.
- Keep safety distance from acute and hot chip during machining.
- Make precaution for prevention of fire in advance when you use insoluble cutting oil.
- Assembled parts may be scattered at high speed cutting. Please use protective equipment.
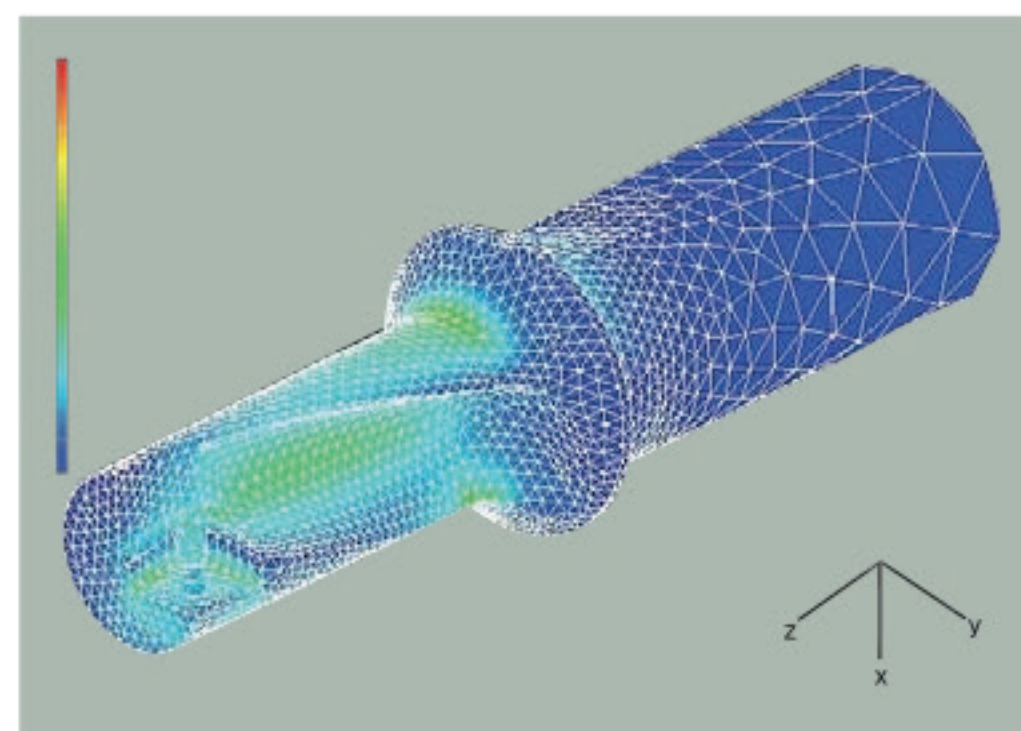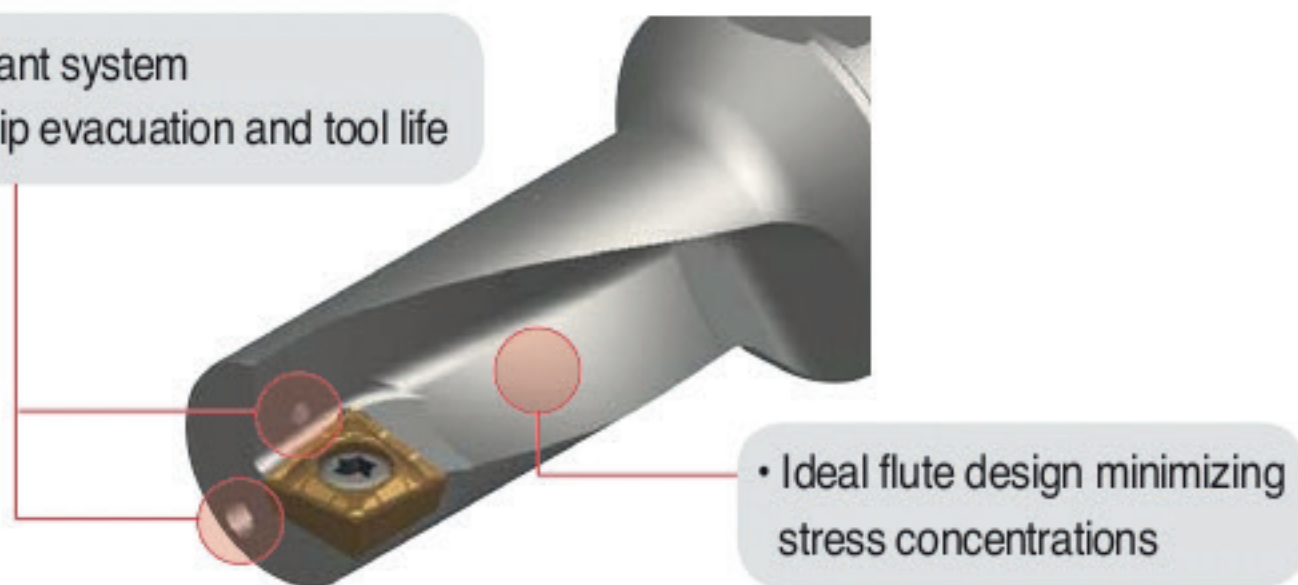
Multi Turn

⤵ Holder code system

MT	20	R	- 2.25D
Brand Name	Tool Dia.	Hand	Aspect ratio

⤵ Insert code system

Q	C	M	T	08	03	04	- CM
Insert shape	Relief angle	Tolerance	Cross Section Type	Cutting Edge Length	Height of Cutting Edge	Nose Radius	Chip Breaker

⤵ Tool design by FEM analysis

• Double coolant system
• Excellent chip evacuation and tool life

• Ideal flute design minimizing stress concentrations

※ Clamping tip

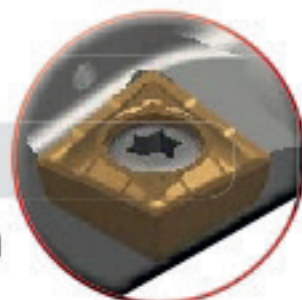Correct: High cutting edge position
Wrong: Low cutting edge position

• Minimized stress during cutting, prevented damage from vibration and longer tool life

Optimized design

⤵ Creative stepping cutting edge

Drilling edge (Drilling)

Turning edge (Internal, external and face turning)

L1

L2

• Special chip formed by edge geometry better chip
• evacuation due to small radius width of chip curl

Multi-Turn
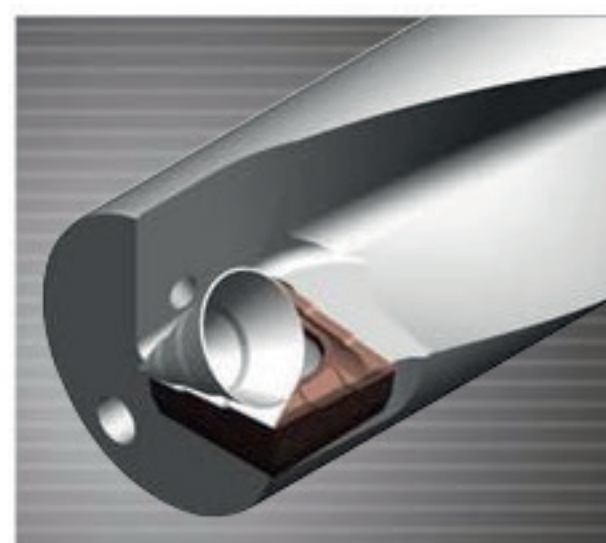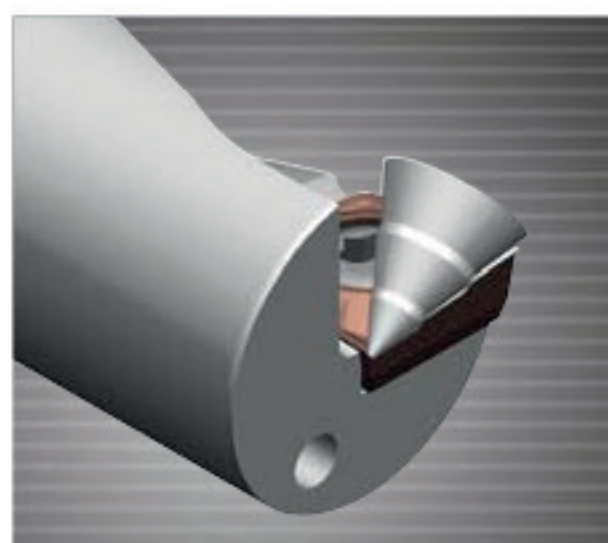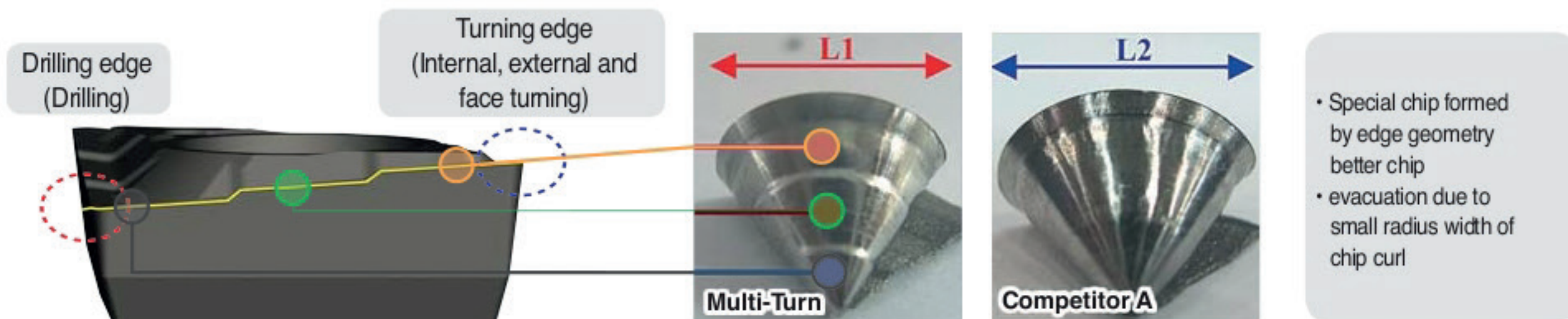
Competitor A

Comparison	Multi turn	Competitor A	Competitor B
Feed fn (mm/rev) = 0.08			
Feed fn (mm/rev) = 0.10			
Chip width (rate)	80%	100%	120%

Technical Information for Multi Turn
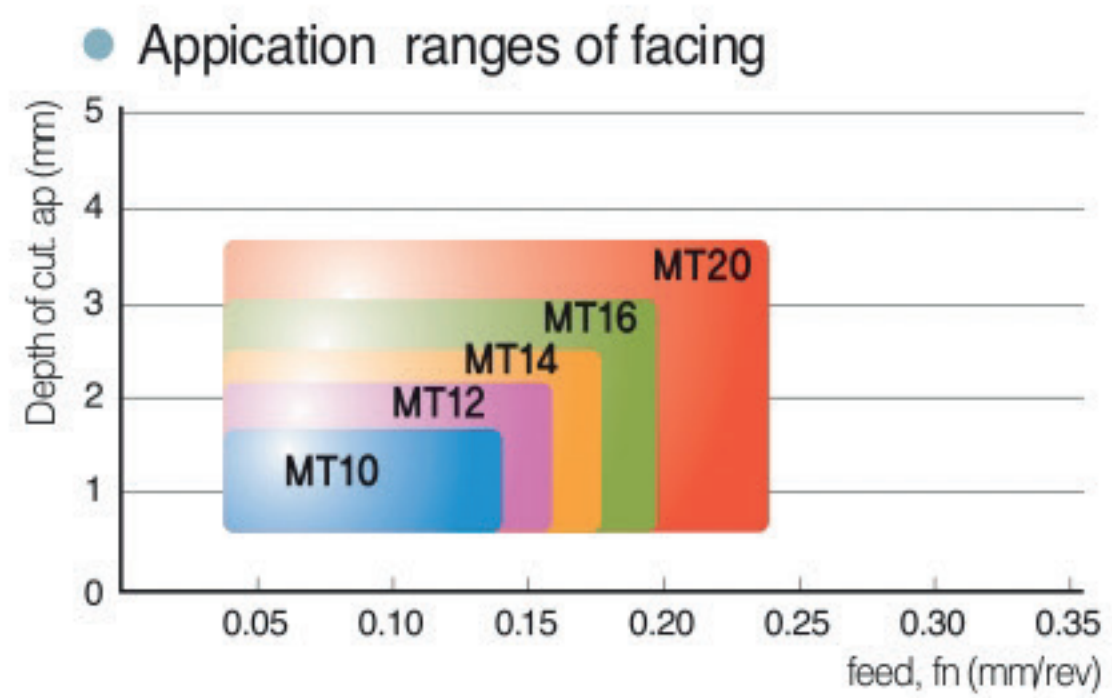
⟳ User's guide

External / Internal turning

● Application range

Facing

● Appication ranges of facing

Drilling

● Drilling feed range by designation
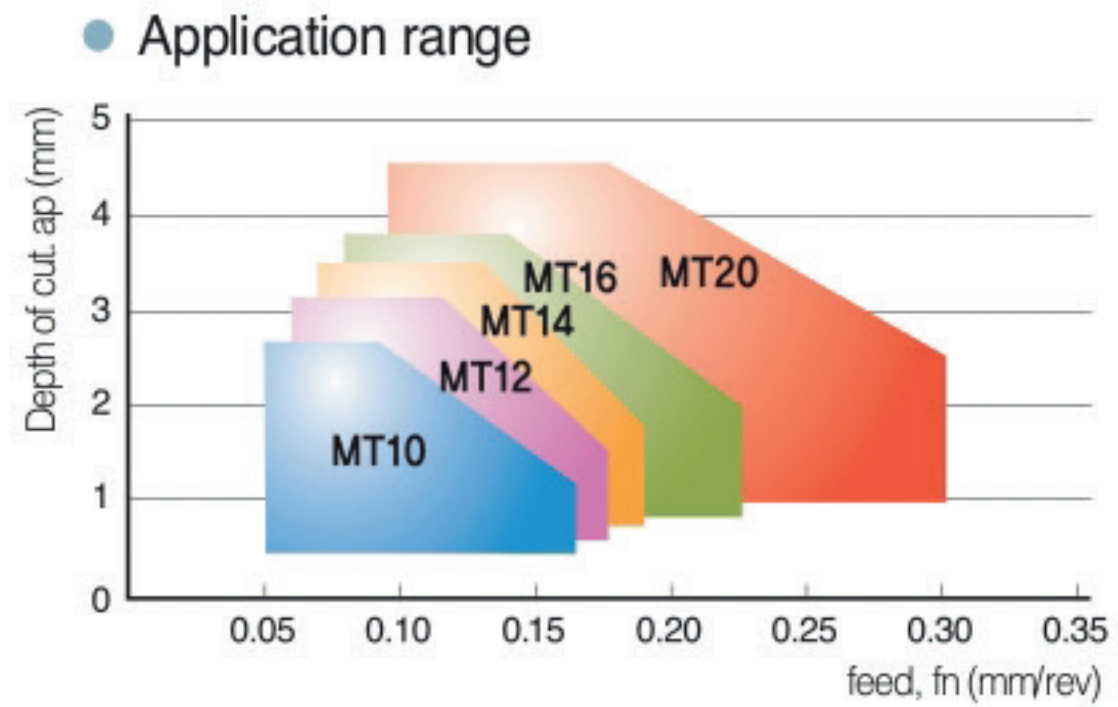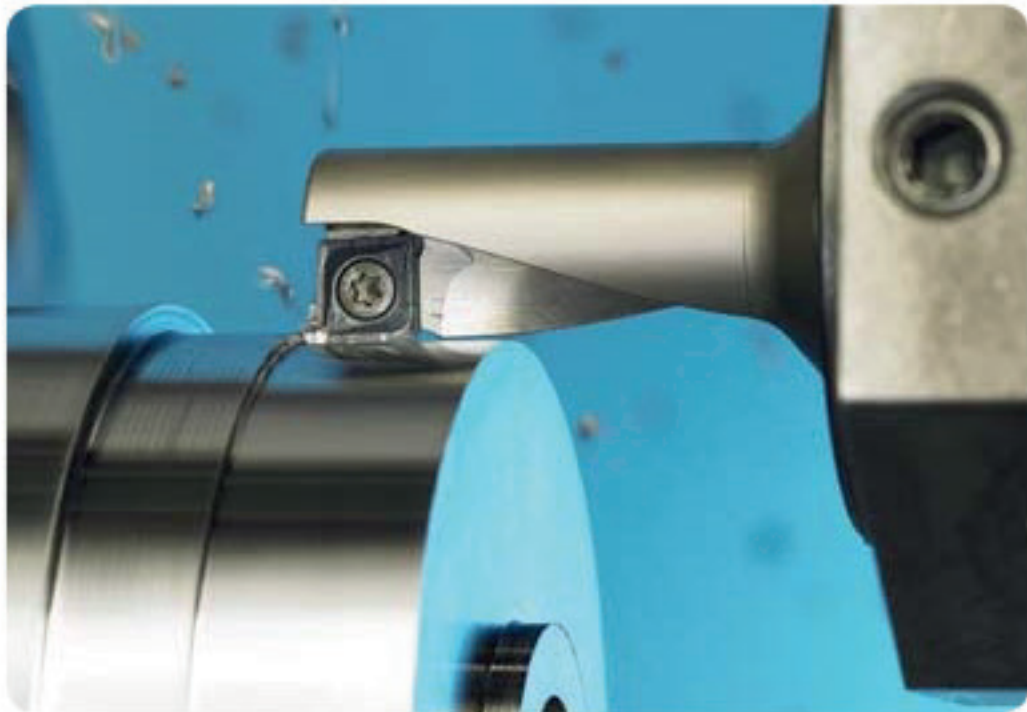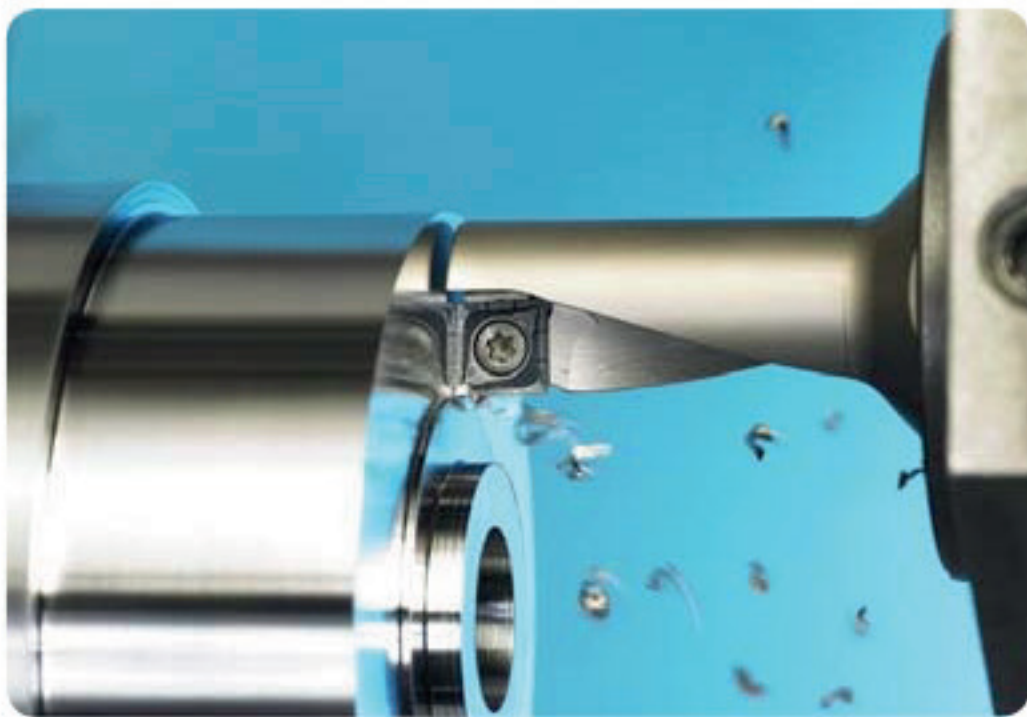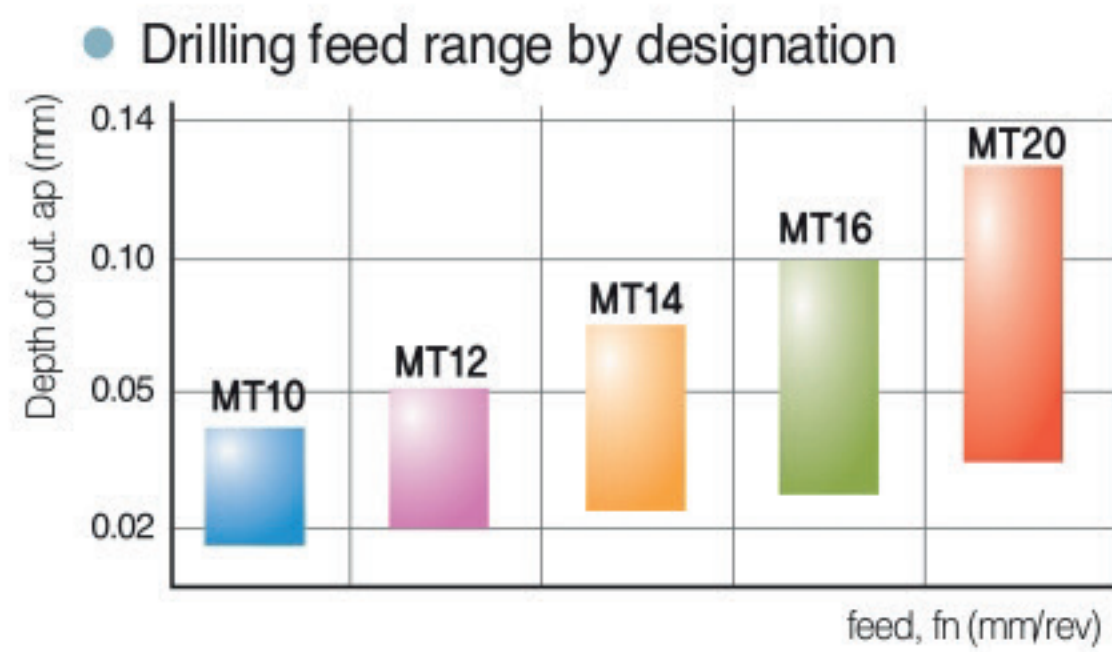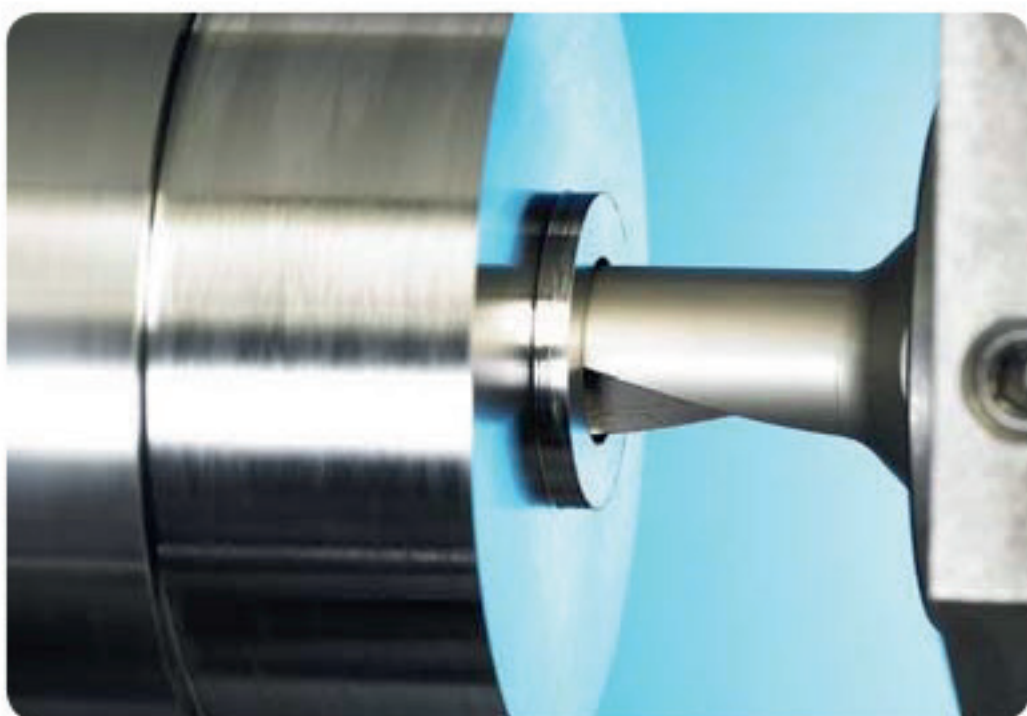
Offset (Diameter compensation)

Disignation	Machined diameter (mm)	ØDmin (mm)	ØDmax (mm)
MT10R/L-2.25D	10	9.85	10.35
MT12R/L-2.25D	12	11.85	12.35
MT14R/L-2.25D	14	13.85	14.35
MT16R/L-2.25D	16	15.85	16.35
MT20R/L-2.25D	20	19.85	20.35
MT25R/L-2.25D	25	24.85	25.35
MT32R/L-2.25D	32	31.85	32.35
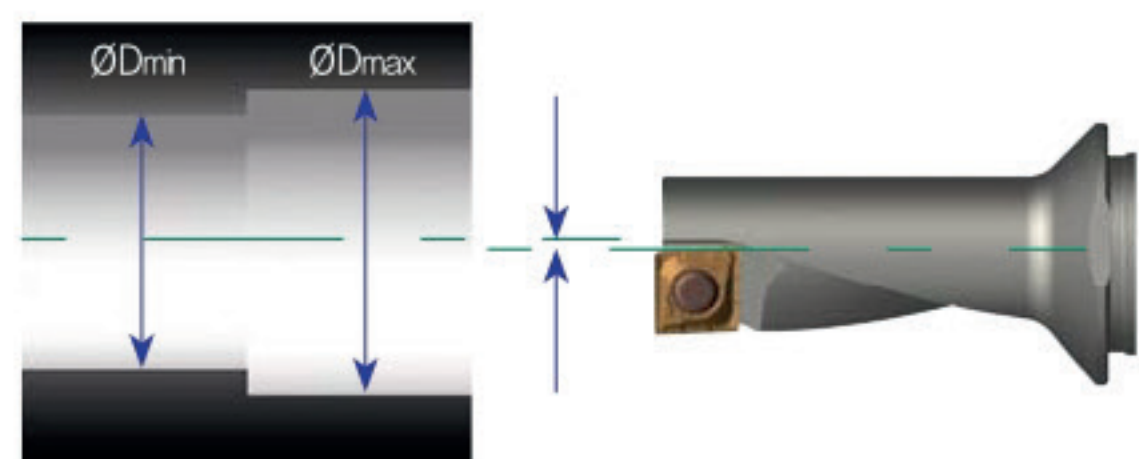
Drill diameter is adjustable by the offset compensation

MT (Multi-Turn)

(mm)
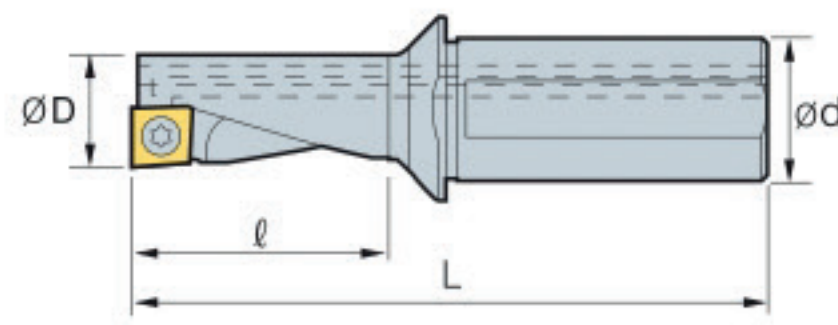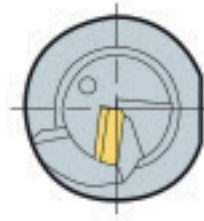
	Designation	ØD	Ød	ℓ	L	Insert		Screw	Wrench
MT	10R/L-2.25D	10	12	22.5	69.5	QC□T050204	FTNA0204S	TW06P	
	12R/L-2.25D	12	16	27.0	78.0	QC□T060204	FTNA02205S	TW06P	
	14R/L-2.25D	14	16	31.5	83.5	QC□T070304	FTKA02555	TW07P	
	16R/L-2.25D	16	20	36.0	94.0	QC□T080304	FTNA0306	TW09P	
	20R/L-2.25D	20	25	45.0	111.0	QC□T10T304	FTNA03508	TW15P	
	25R/L-2.25D	25	32	56.5	130.0	QC□T130408	FTNC04509	TW20S	
	32R/L-2.25D	32	40	72.0	160.0	QC□T170508	FTNC04511	TW20S	

➲ Applicable inserts **B133**

Insert

Picture	Designation		Coated				Uncoated		Dimensions (mm)					Configuration
			NC3120	NC3225	NC6315	PC5300	H01	H05	l	d	t	r	Ød1	
	QCMT	050204-CM		●	●	●			5.0	5.4	2.10	0.4	2.3	
		060204-CM		●	●	●			6.0	6.4	2.38	0.4	2.5	
		070304-CM		●	●	●			7.0	7.4	3.18	0.4	2.8	
		080304-CM		●	●	●			8.0	8.4	3.18	0.4	3.4	
		10T304-CM		●	●	●			10.0	10.4	3.97	0.4	4.0	
		130408-CM		●	●	●			12.7	13.5	4.76	0.8	5.5	
		170508-CM		●	●	●			16.7	17.5	5.56	0.8	5.5	
	QCGT	050204-CA					●		5.0	5.4	2.10	0.4	2.3	
		060204-CA					●		6.0	6.4	2.38	0.4	2.5	
		070304-CA					●		7.0	7.4	3.18	0.4	2.8	
		080304-CA					●		8.0	8.4	3.18	0.4	3.4	
		10T304-CA					●		10.0	10.4	3.97	0.4	4.0	
		130408-CA					●		12.7	13.5	4.76	0.8	5.5	
		170508-CA					●		16.7	17.5	5.56	0.8	5.5	

● : Stock item