

**NEW Concept,
Economical Multi
Functional Tool**

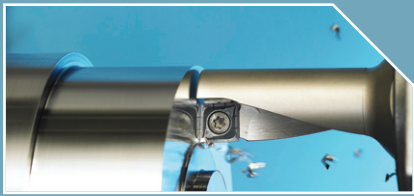
**Innovative
Multi
Functional
Tool**

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.

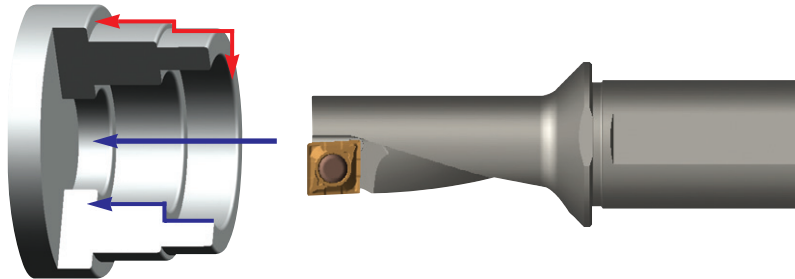




Multi Turn

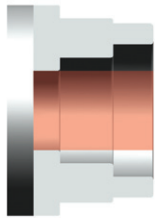
Application

Application

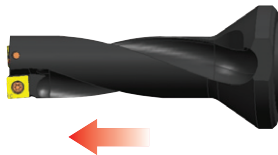


→ Internal, External, Face Turning, Drilling by only one tool

General Tooling

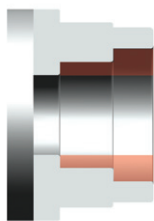


Drilling

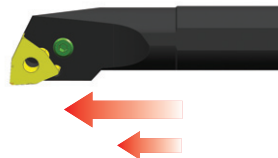


Drill

+



Internal machining

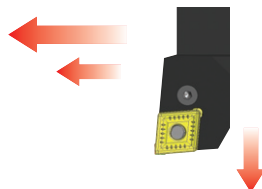


Internal holder

+



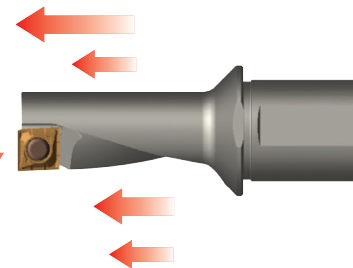
Face Turning & external machining



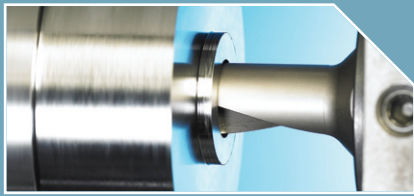
External holder



Multi Turn



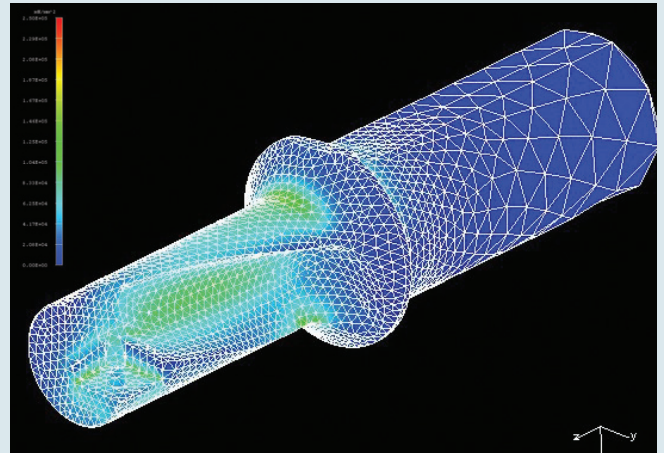
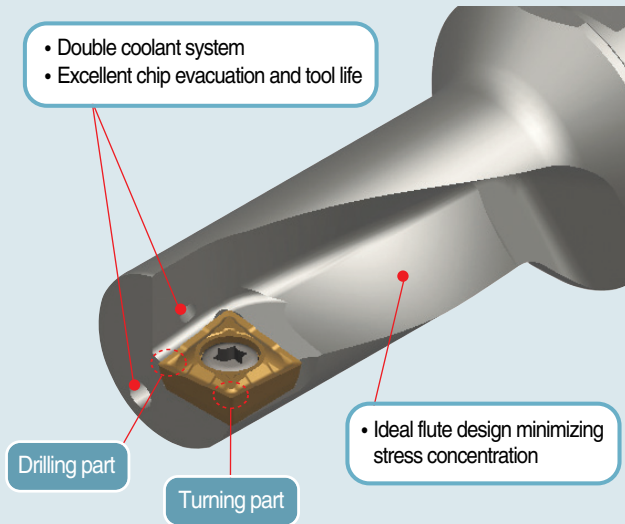
Multi Turn



Multi Turn

Tool design by FEM analysis | Creative stepping cutting edge

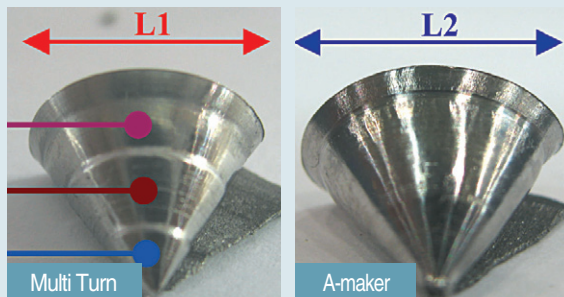
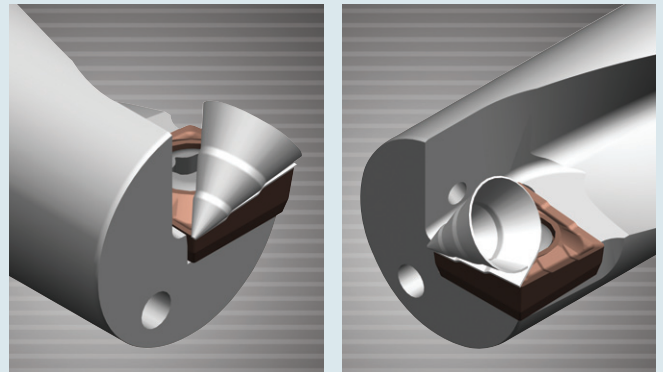
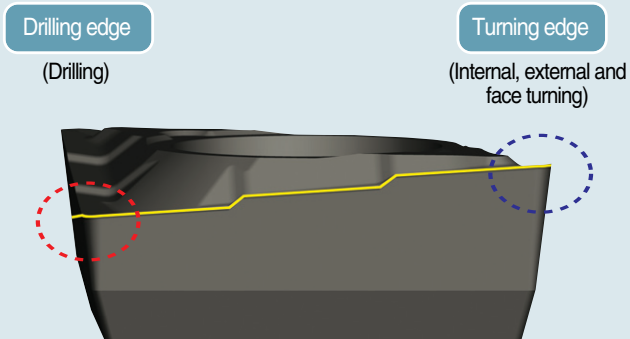
Tool design by FEM analysis



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

➔ Optimized design

Creative stepping cutting edge



- 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%

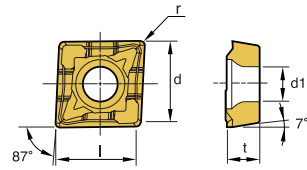
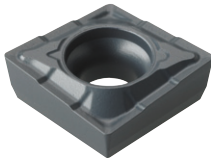
➔ Excellent chip evacuation and tool life guaranteed.

Multi Turn

Insert code system | Holder code system | Recommended tool by drill diameter

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

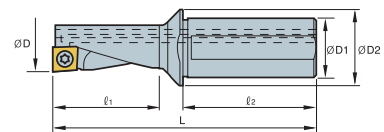


Designation	l	d	t	r	Grades		
					P	M	K
					NC3120	PC9030	NC6110
QCMT 050204-CM	5.0	5.4	2.10	0.4	●	○	●
060204-CM	6.0	6.4	2.38	0.4	●	○	●
070304-CM	7.0	7.4	3.18	0.4	●	○	●
080304-CM	8.0	8.4	3.18	0.4	●	○	●
10T304-CM	10.0	10.4	3.97	0.4	●	○	●

● : 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		

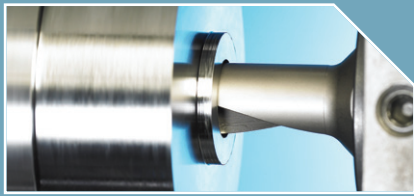


Designation	Stock		ØD	ØD1	ØD2	l ₁	l ₂	L	Inserts	Screws	Wrench
	R	L									
MT 10R/L-2.25D	●		10	12	16	22.5	42.0	69.5	QC..050204	FTNA0204S	TW06P
MT 12R/L-2.25D	●		12	16	20	27.0	45.0	78.0	QC..060204	FTNA02205S	TW06P
MT 14R/L-2.25D	●		14	16	20	31.5	45.0	83.5	QC..070304	FTKA02555	TW07P
MT 16R/L-2.25D	●		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

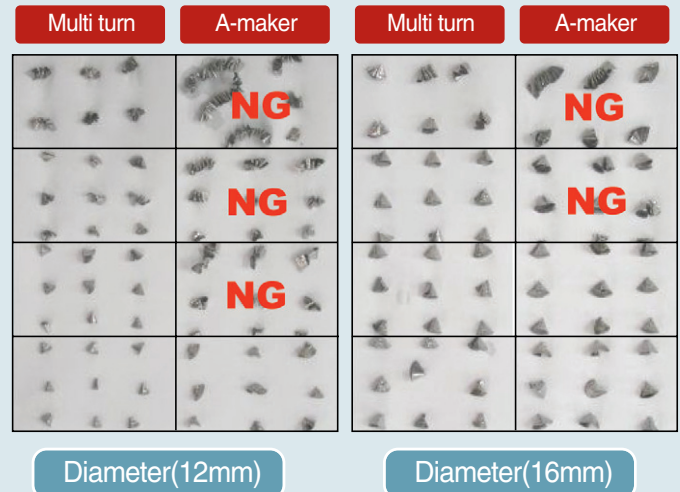
Comparison of Chip Controls(Drill) | Tool life comparison | Comparison on surface roughness

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



Tool life comparison

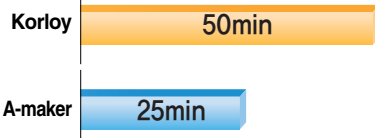
Turning(Carbon steel: DIN C45, SM45C)

- 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



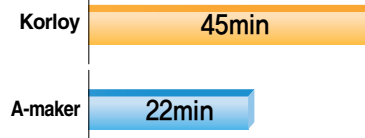
Turning (Low alloy steel)

- 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



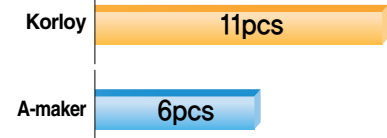
Drilling+Turning(Low alloy steel)

- 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



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

Multi Turn

Advantages of Multi Turn

Advantages of Multi Turn

Standard Tool



Using tool – Single

Three kinds of tools
External/Drill/Internal

Multi turn

Preparatory time of work-Reduced

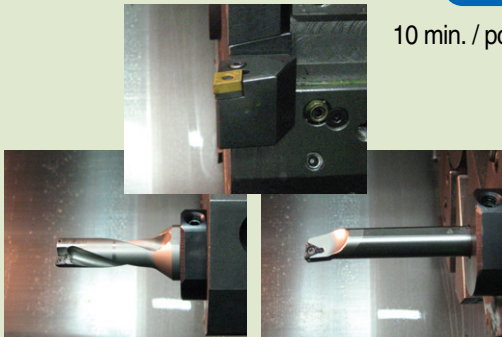
20 min.

5 min.

Operating time-Reduced

10 min. / pcs

8 min. / pcs



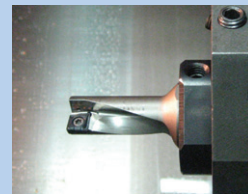
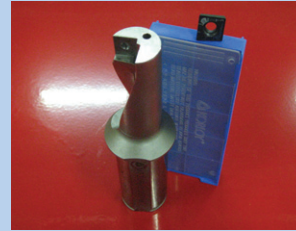
● Productivity comparison(Lot : 50 pcs)

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)	~ ~



Finished goods

Multi Turn



● 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%)



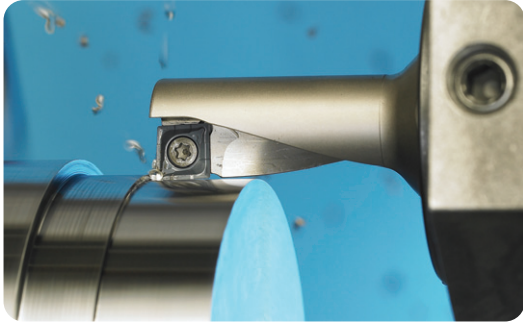
➔ Superior productivity and cost reduction achieved.

Multi Turn

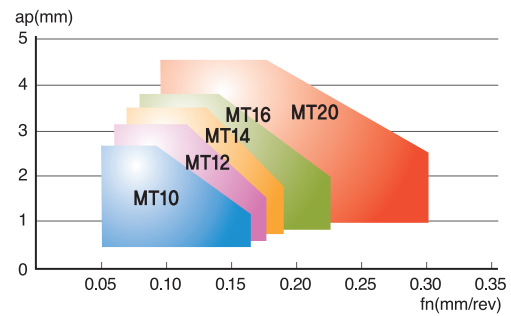
User's guide

User's guide

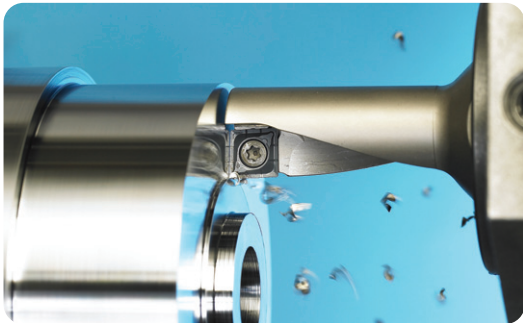
• External / Internal turning



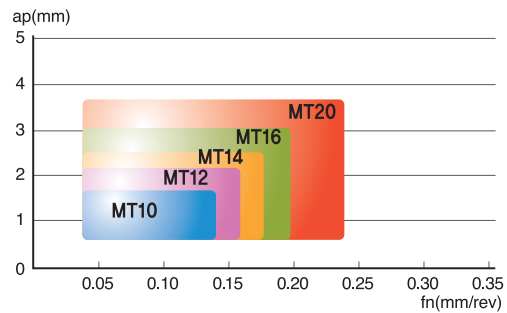
• Range



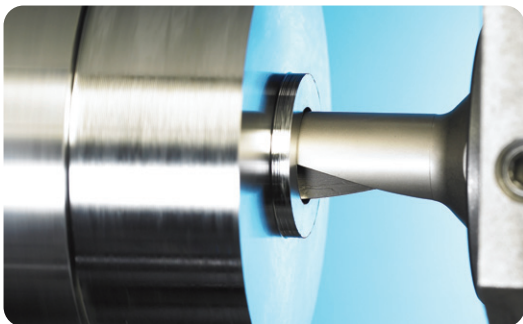
• Face turning



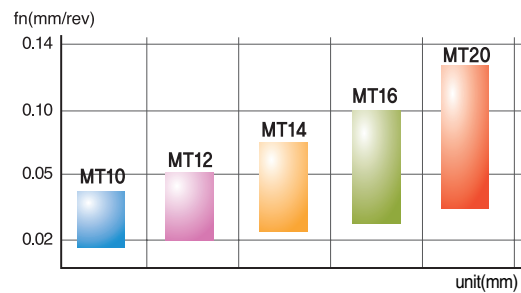
• Range



• Drilling



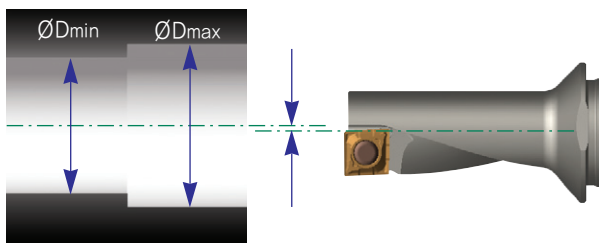
• Drilling feed range by designation



• 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.

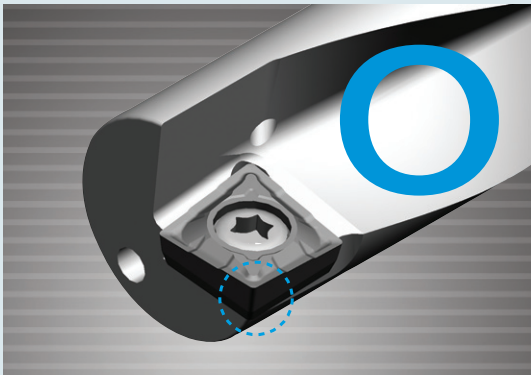
Multi Turn

Recommended cutting condition | Clamping tip

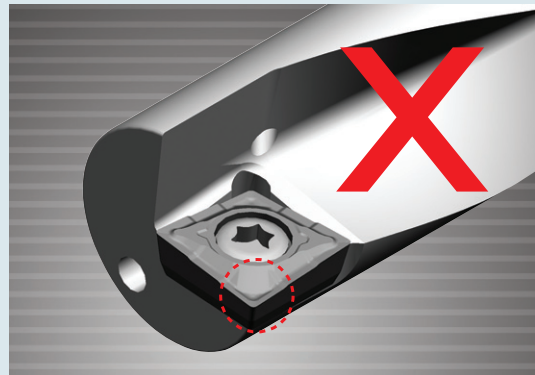
Recommended cutting condition

Workpiece		Hardness(HB)	NC3120		PC9030		NC6110	
			Turning	Drilling	Turning	Drilling	Turning	Drilling
P	Low-carbon steel($\leq 0.25\%C$)	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

Clamping 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.



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