

KORLOY Innovative multifunctional tool

Multi Turn



Innovative combination for internal & external machining

- Reduced set-up times in complex machining cycles
- Double coolant supply for high tool life



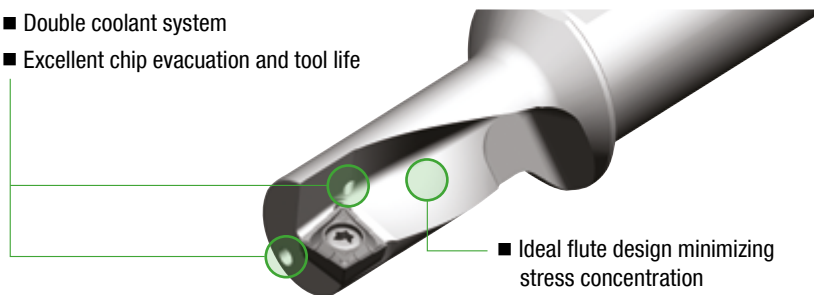
Multi Turn

Features

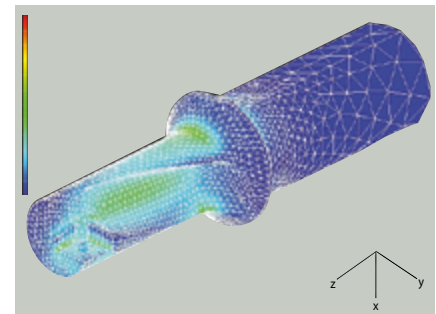
- Improved surface roughness and reduced cutting load by inclined cutting edge
- Stepping designed cutting edge enables stable machining by minimizing cutting edge part on workpiece when drilling starts
- Excellent cutting performance due to better chip curling while drilling
- Helix-angled flute design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

Tool design by FEM analysis

- Double coolant system
- Excellent chip evacuation and tool life



■ Ideal flute design minimizing stress concentration

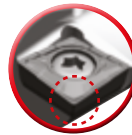


Minimized stress during cutting, prevented damage from vibration and longer tool life.

■ **Right clamping:**
High cutting edge position

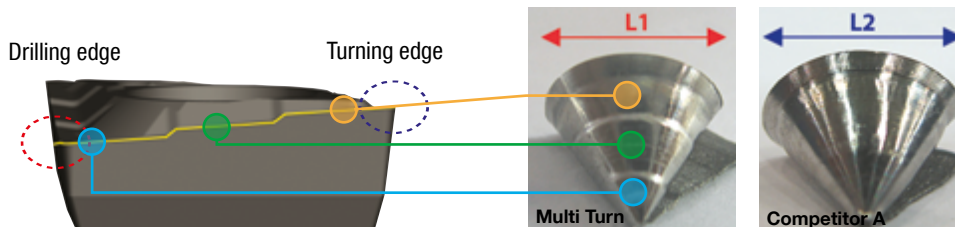


■ **Wrong clamping:**
Low cutting edge position



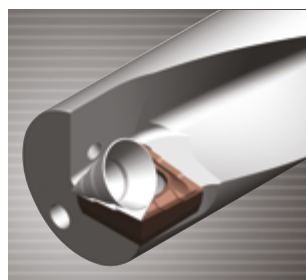
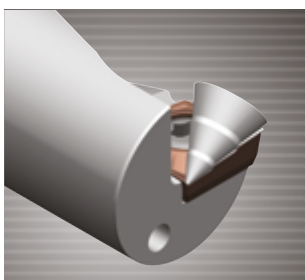
→ Optimized design

Innovative stepping cutting edge



■ Special chip forming by edge geometry

■ Better chip evacuation due to small radius width of chip curl

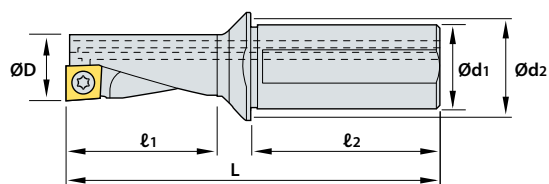
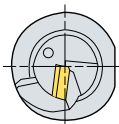


Comparison	Multi Turn	Competitor A	Competitor B
f_n 0.08 (mm/rev)			
f_n 0.10 (mm/rev)			
Chip width	80%	100%	120%

Holder

MT

(Multi Turn)

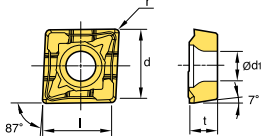
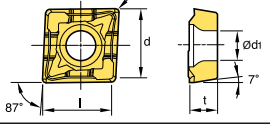
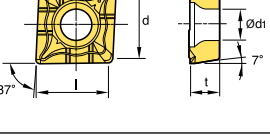


(mm)

Designation	R	L	ØD	Ød1	Ød2	ℓ1	ℓ2	L	Insert	Screw	Wrench
MT10R/L2.25D	▲	▲	10	12	16	22.5	42.0	69.5	QC_T050204(B)-__	FTNA0204S	TW06P
MT12R/L2.25D	▲	▲	12	16	20	27.0	45.0	78.0	QC_T060204(B)-__	FTNA02205S	TW06P
MT14R/L2.25D	▲	▲	14	16	20	31.5	45.0	83.5	QC_T070304(B)-__	FTKA02555	TW07P
MT16R/L2.25D	▲	▲	16	20	25	36.0	50.0	94.0	QC_T080304(B)-__	FTNA0306	TW09P
MT20R/L2.25D	▲	▲	20	25	32	45.0	56.0	111.0	QC_T10T304(B)-__	FTNA03508	TW15P
MT25R/L2.25D	▲	▲	25	32	40	56.5	61.0	130.0	QC_T130408(B)-__	FTNC04509	TW20S
MT32R/L2.25D	▲	▲	32	40	50	72.0	74.0	160.0	QC_T170508(B)-__	FTNC04511	TW20S

Applicable inserts

(mm)

Picture	Designation	Grades				Dimensions (mm)					Geometry
		NC3220	PC5300	NC6210	H01	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	
	QCMT	050204B-CM			○	5.0	5.4	2.10	0.4	2.3	
		060204B-CM			○	6.0	6.4	2.38	0.4	2.5	
		070304B-CM			○	7.0	7.4	3.18	0.4	2.8	
		080304B-CM			○	8.0	8.4	3.18	0.4	3.4	
		10T304B-CM			○	10.0	10.4	3.97	0.4	4.0	
	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 in Europe ● : Stock in Korea ○ : Order-made item

Multi Turn



Recommended cutting condition

Workpiece		Hardness (HB)	NC3220		PC5300		NC6210		H01	
			Turning	Drilling	Turning	Drilling	Turning	Drilling	Turning	Drilling
P	Low-carbon steel ($\leq 0.25\% \text{ C}$)	80-180	150-300	100-150	100-180	100-150	-	-	-	-
	High-carbon steel ($> 0.25\% \text{ C}$)	180-280	100-180	70-120	90-160	60-140	-	-	-	-
	Low alloy steel	140-260	100-180	70-120	70-120	50-120	-	-	-	-
	High alloy steel	200-350	80-150	60-100	60-110	50-100	-	-	-	-
M	Austenite	135-275	-	-	80-150	50-110	-	-	-	-
	Martensite	135-275	-	-	90-170	60-120	-	-	-	-
K	Gray cast iron	150-220	-	-	120-240	120-200	100-200	70-140	-	-
	Ductile cast iron	130-240	-	-	120-200	100-180	100-180	70-120	-	-
N	Aluminium alloy	30-150	-	-	-	-	-	-	200-500	140-220
	Copper alloy	150-160	-	-	-	-	-	-	150-300	140-200
S	HRSA	130-400	-	-	30-70	30-90	-	-	-	-

m/min

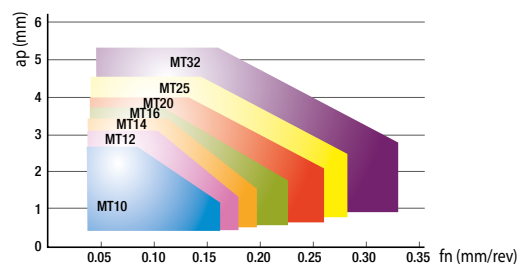


Applications

External / Internal turning



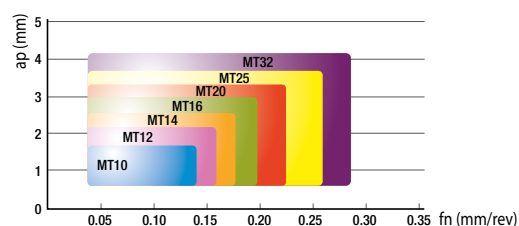
Application range



Facing



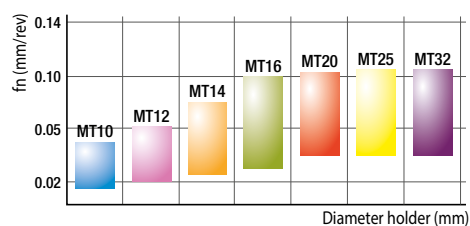
Application range



Drilling

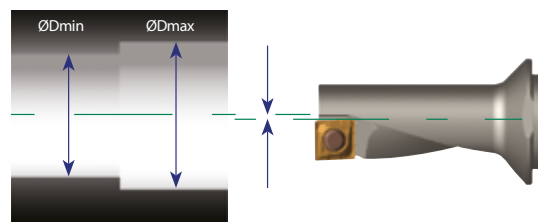


Drilling feed range



Offset (Diameter compensation)

Designation	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



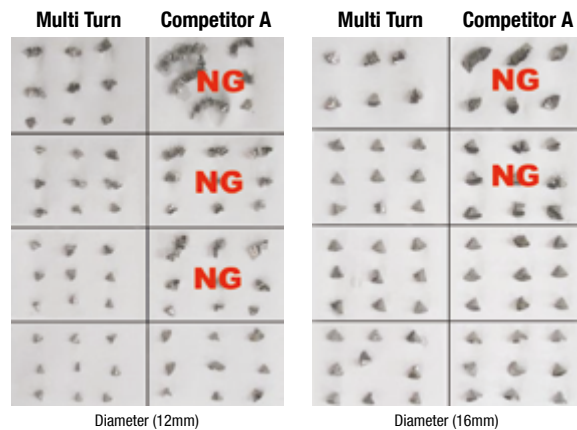
Drill diameter is adjustable by the offset compensation

Multi Turn

Cutting performance

Comparison of chip controls (Drilling)

- **Holder:** MT12R / MT16R-2.25D
- **Insert:** QCMT060204/080304-CM NC3220
- **Workpiece:** Low alloy steel
(42CrMo4, SCM440)
- **Cutting conditions:**
 - vc: 100 m/min
 - fn: 0.04-0.12 mm/rev
 - wet



Tool life comparison

■ Turning

(Carbon steel: C45, SM45C)

- **Holder:** MT14R-2.25D
- **Insert:** QCMT070304-CM NC3220
- **Application:**
External turning and facing
(Roughing & finishing)

■ Cutting conditions:

vc: 180 m/min
fn: 0.1-0.2 mm/rev
ap: 0.5-1.2 mm
wet

■ Result:

Multi Turn **50 min.**
Competitor **25 min.**

■ Turning

(Low alloy steel)

- **Holder:** MT12R-2.25D
- **Insert:** QCMT060204-CM NC3220
- **Application:**
External turning and facing
(Roughing & finishing)

■ Cutting conditions:

vc: 180 m/min
fn: 0.1-0.2 mm/rev
ap: 0.5-1.2 mm
wet

■ Result:

Multi Turn **45 min.**
Competitor **22 min.**

■ Drilling and turning

(Low alloy steel)

- **Holder:** MT16R-2.25D
- **Insert:** QCMT080304-CM NC3220
- **Application:**
Drilling, external turning, facing
and internal turning
(Roughing & finishing)

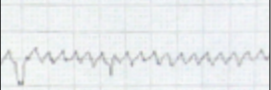
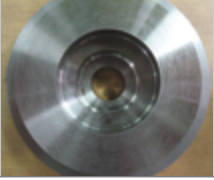
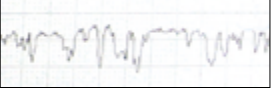
■ Cutting conditions:

vc: 100-180 m/min
fn: 0.05-0.2 mm/rev
ap: 0.5-2.0 mm
wet

■ Result:

Multi Turn **11 pcs.**
Competitor **6 pcs.**

Comparison on surface roughness

Multi Turn			■ Visible roughness · Glossy surface → Superior ■ Measurement · Ra: 0.47 μm · Rz: 4.56 μm
Competitor			■ Visible roughness · Hazy surface → Inferior ■ Measurement · Ra: 0.70 μm · Rz: 5.92 μm

Advantages of Multi Turn

Standard tools



3 different
kinds of tools
(External, internal, drill)



Multi Turn



Preparatory time of work - Reduced

20 min.



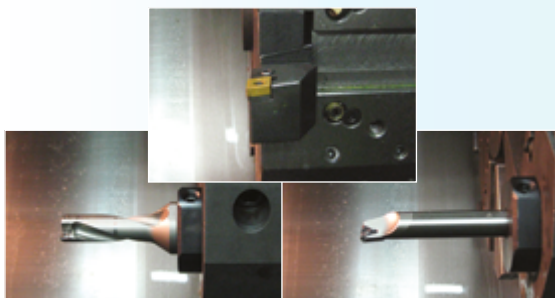
5 min.

Operating time - Reduced

10 min. / pcs

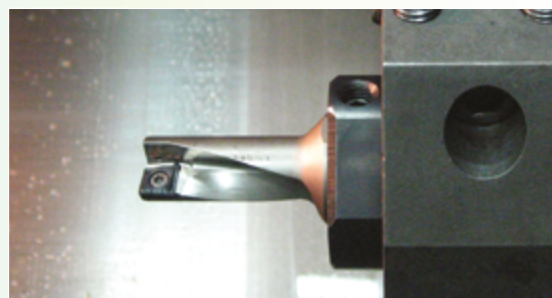


8 min. / pcs



■ Productivity comparison

Standard tools	
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

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% less time (22% improved)



Finished goods



→ Superior productivity and cost reduction achieved

**Head Office**

Holystar B/D, 1350, Nambusunhwan-ro, Geumcheon-gu, Seoul, 153-823, Korea
Tel: +82-2-522-3181, Fax: +82-2-522-3184, +82-2-3474-4744
Web: www.korloy.com E-mail: export@korloy.com

Cheongju Factory

55, Sandan-ro, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, 361-290, Korea
Tel: +82-43-262-0141, Fax: +82-43-262-0146

Jincheon Factory

54, Gwanghyewonsandan 2-gil, Gwanghyewon-myeon, Jincheon-gun, Chungcheongbuk-do, 365-831, Korea
Tel: +82-43-535-0141, Fax: +82-43-535-0144

R & D Institute

55, Sandan-ro, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, 361-290, Korea
Tel: +82-43-262-0141, Fax: +82-43-262-0711



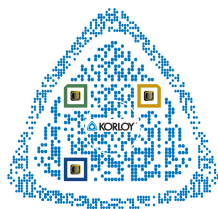
620 Maple Avenue, Torrance, CA 90503, USA
Tel: +1-310-782-3800, Toll Free: +1-888-711-0001, Fax: +1-310-782-3885
Web: www.korloyamerica.com E-mail: sales@korloy.us



Ground Floor, Property No. 217, Udyog Vihar Phase 4, Gurgaon 122016, Haryana, India
Tel: +91-124-4050030, Fax: +91-124-4050032
Web: www.korloyindia.com E-mail: sales.kip@korloy.com



Av. Aruana 280, conj.12, WLC, Alphaville, Barueri, CEP06460-010, SP, Brasil
Tel: +55-11-4193-3810
E-mail: vendas@korloy.com



Gablonzer Str. 25-27, D-61440 Oberursel, Germany
Tel: +49-6171-277-83-0, Fax: +49-6171-277-83-59
Web: www.korloyeurope.com E-mail: info@korloyeurope.com

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