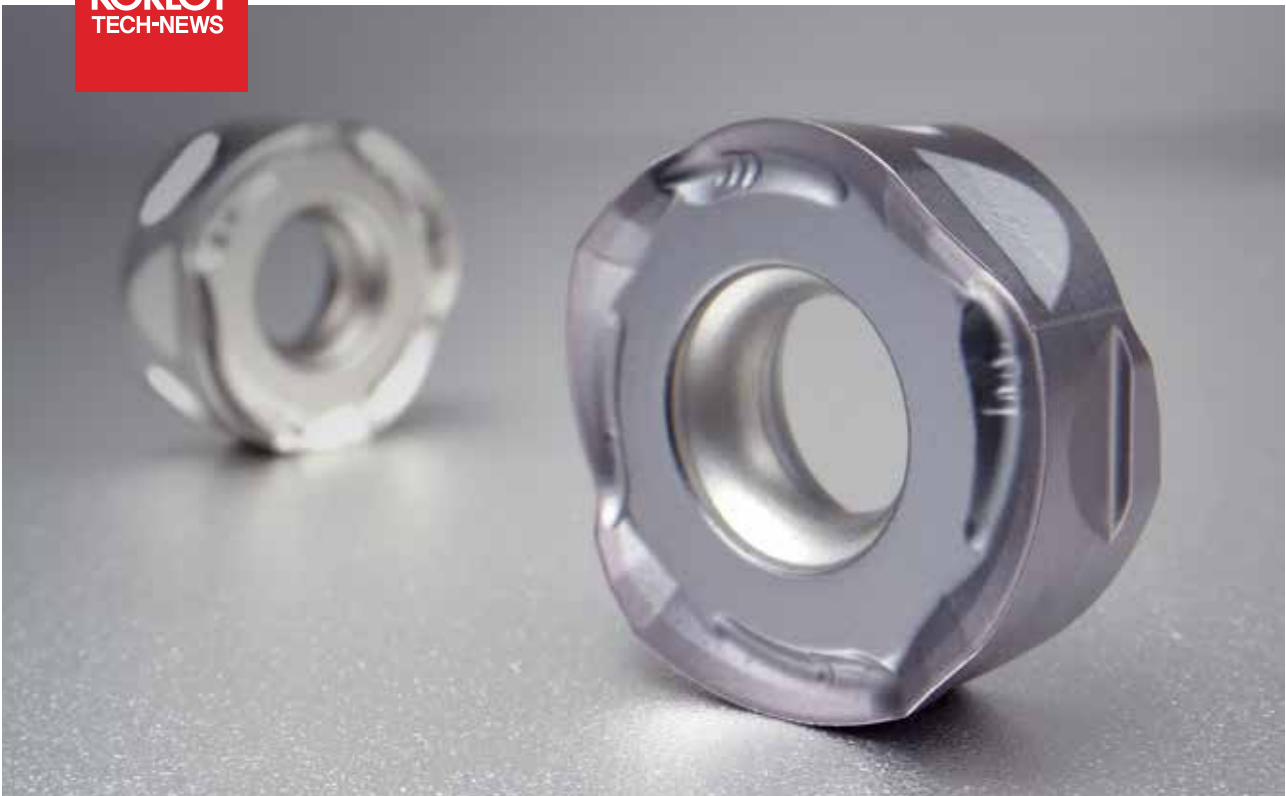


Double-sided round milling tool with 8 corners

# RMR

**KORLOY**  
TECH-NEWS



- The exclusive structure preventing rotation ensures stable machining.
- Double-sided round tool with 8 corners realizes cost efficiency.

## Double-sided round milling tool with 8 corners

# RMR

KORLOY launched double-sided round indexable milling tool, **RMR** which is the most effective in HRSA machining.

The **RMR's** exclusive reverse positive structure prevents rotation of tool that has been a big challenge in HRSA cutting caused by existing tools' round shape and enhances long tool life. In addition, its sharp chip breaker and helix cutting edge help HRSA cutting smoothly without cutting load.

The wide minor cutting edge with the optimal angle between workpiece and tool enhances machinability and the double-sided shape with 8 corners ensures cost efficiency.

The optimal cutting edge for HRSA cutting and ultracoating technology with excellent lubrication reduce fracture and enhance wear resistance and tool life.



### **High cost efficiency**

- Maximum 8 corners are usable due to applying double-sided structure.

### **Good surface finish**

- The optimal minor cutting edge ensures good surface finish.

### **Stable tool life**

- The exclusive structure preventing rotation ensures stable machining.

### **Excellent performance**

- Chip breaker for good surface finish and helix cutting edge realizes excellent cutting performance.

## Code system

















### Cutter type

<b>RMR</b>	<b>C</b>	<b>M</b>	<b>063</b>	<b>R</b>	<b>22</b>	<b>5</b>	<b>RN12</b>
Rich Mill Round	Type C: Cutter	Arbor M: Metric A: Inch None: Asia	Machining dia. 063: Ø63 mm	Oil hole & Hand R: With oil hole, right-handed NR: Without oil hole, right-handed	Internal dia. 22: Ø22 mm	No. of tooth 5: 5 Teeth	Available insert RN12: RNMX12

### Shank type

<b>RMR</b>	<b>S</b>	<b>040</b>	<b>R</b>	<b>3</b>	<b>W</b>	<b>32</b>	<b>110</b>	<b>RN12</b>
Rich Mill Round	Type S: Shank	Machining dia. 040: Ø40 mm	Oil hole & Hand R: With oil hole, Right-handed NR: Without oil hole, Right-handed	No. of tooth 3: 3 Teeth	Shank type W: Weldon C: Cylinder	Shank dia. 32: Ø32 mm	Overall length 110: 110 mm	Available insert RN12: RNMX12

## Recommended grade and cutting edge

Type	Recommended insert and grade for different workpieces							
	P		M		K		S	
	C/B	Grade	C/B	Grade	C/B	Grade	C/B	Grade
1 <sup>st</sup>	 MM	 PC3700	 ML	 PC9540	 MM	 PC6510	 ML	 UNC840
2 <sup>nd</sup>	 MM	 PC5300	 MM	 PC9540	 MM	 PC5300	 ML	 UPC845

## Recommended cutting conditions

Workpiece				Specific cutting force (N/mm <sup>2</sup> )	Brinell hardness (HB)	Wear resistance ← • → Toughness						ML/MM		
ISO	Workpiece materials	ISO	AISI			Grade		C/B		Grade			C/B	
						PC3700	ML	MM	PC5300	ML	MM			
						vc (m/min)	fz (mm/t)	fz (mm/t)	vc (m/min)	fz (mm/t)	fz (mm/t)		ap (mm)	
P	Non-ferrous alloy steel Mn < 1.65	C25	1025	1500	125	100	0.5	0.5	80	0.5	0.5	1 - 3		
						180	0.3	0.3	140	0.3	0.3			
						250	0.1	0.1	200	0.1	0.1			
		C45	1045	1700	190	80	0.5	0.5	80	0.5	0.5			
						180	0.3	0.3	140	0.3	0.3			
						250	0.1	0.1	200	0.1	0.1			
Low alloy steel ≤ 5%	42CrMo4	4140	1700	175	80	0.5	0.5	80	0.5	0.5				
					160	0.3	0.3	120	0.3	0.3				
					230	0.1	0.1	190	0.1	0.1				
High alloy steel > 5%	X40CrMoV5-1	D2 H13	1950	200	120	0.7	0.7	100	0.7	0.7	1			
					140	0.5	0.5	120	0.5	0.5				
					280	0.3	0.3	210	0.3	0.3				

## Recommended cutting conditions

Workpiece				Specific cutting force (N/mm <sup>2</sup> )	Brinell hardness (HB)	Grade	C/B	ML
ISO	Workpiece materials	ISO	AISI			PC9540	ML	
						vc (m/min)	fz (mm/t)	
M	Ferritic/ martensitic	X6CrAl13 X6Cr17	405 430	1800	200	120	0.3	1 - 3
						160	0.15	
						200	0.05	
		X12CrS13 X6CrMo17-1	416 434	2850	330	100	0.3	
						140	0.15	
						180	0.05	
	X12Cr13	403 410	2350	330	100	0.3		
					140	0.15		
					180	0.05		
	Austenitic	X5CrNi18-9, X2CrNi18-9 X5CrNiMo17-12-2 XCrNiMo17-12-3	304 316	2000	180	90	0.3	
						120	0.15	
						150	0.05	
Austenitic- ferritic (Duplex)	-	S31803 S32750	2450	260	60	0.3		
					90	0.15		
					120	0.1		

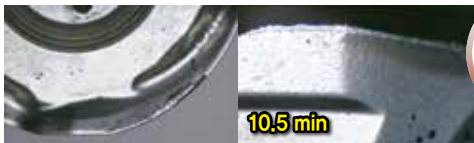
Workpiece				Specific cutting force (N/mm <sup>2</sup> )	Brinell hardness (HB)	Wear resistance ← • → Toughness			ML/MM			
ISO	Workpiece materials	ISO	AISI			Grade	C/B			Grade	C/B	
						PC6510	ML	MM		PC5300	ML	MM
K	Gray cast iron	200	No 30 B	900	180	140	0.25	0.3	120	0.25	0.3	1 - 3
						180	0.2	0.2	160	0.2	0.2	
						230	0.1	0.1	200	0.1	0.1	
	Nodular graphite cast iron	500-7	80-55-06	870	155	120	0.25	0.3	110	0.25	0.3	
						160	0.2	0.2	145	0.2	0.2	
						200	0.1	0.1	180	0.1	0.1	

Workpiece				Specific cutting force (N/mm <sup>2</sup> )	Brinell hardness (HB)	Wear resistance ← • → Toughness				ML
ISO	Workpiece materials	ISO	AISI			Grade	C/B	Grade	C/B	
						UNC840	ML	UPC845	ML	
S	Nickel base	15156-3	Inconel625	2650	250	30	0.4	25	0.4	1 - 3
						45	0.2	40	0.2	
						60	0.05	55	0.1	
		9723	Inconel718	3000	320	25	0.4	20	0.4	
						40	0.2	35	0.2	
						55	0.05	50	0.1	
	Cobalt based alloy	Stellite	Stellite	3000 - 3100	300 - 320	30	0.4	20	0.4	
						45	0.2	35	0.2	
						60	0.05	50	0.1	
	Cobalt based alloy	5832-11	Ti-6Al-4V	1400	320	30	0.4	20	0.4	
						50	0.2	40	0.2	
						70	0.05	60	0.1	

# Performance evaluation

## Aerospace Industry (Wear resistance)

<b>Workpiece</b>	Inconel718	
<b>Cutting condition</b>	vc = 30 m/min, fz 0,4 mm/t, ap = 1,8 mm, wet	
<b>Tool</b>	<b>Insert</b> RNMX1204M0E-ML (UNC840)	<b>Holder</b> RMRCM050R-22-5-RN12



RMR

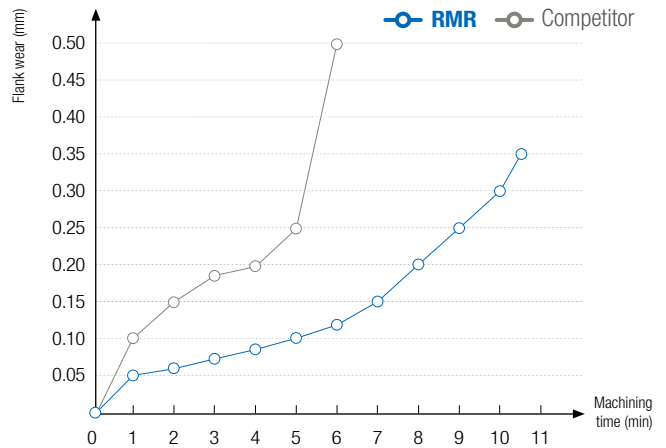
TQ = 264.7 cm<sup>3</sup>



Competitor

TQ = 144.4 cm<sup>3</sup>

75%  
longer tool  
life



## Mold Industry (Wear resistance)

<b>Workpiece</b>	Alloy steel (SCM440, HRC20)	
<b>Cutting condition</b>	vc = 120 m/min, fz = 0,55 mm/t, ap = 3,0 mm, dry	
<b>Tool</b>	<b>Insert</b> RNMX1204MOS-MM (PC3700)	<b>Holder</b> RMRCM050R-22-4-RN12

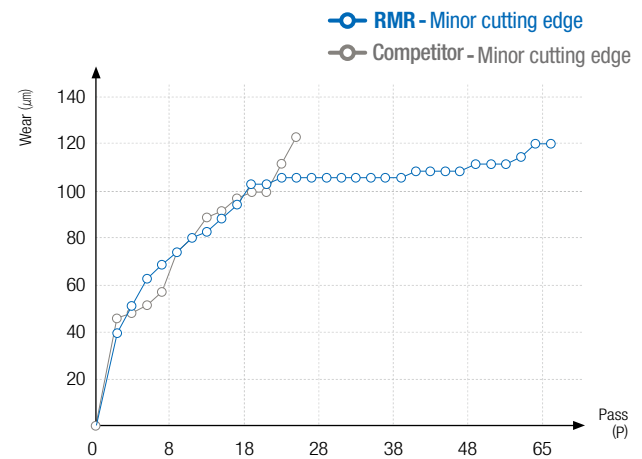


RMR



Competitor

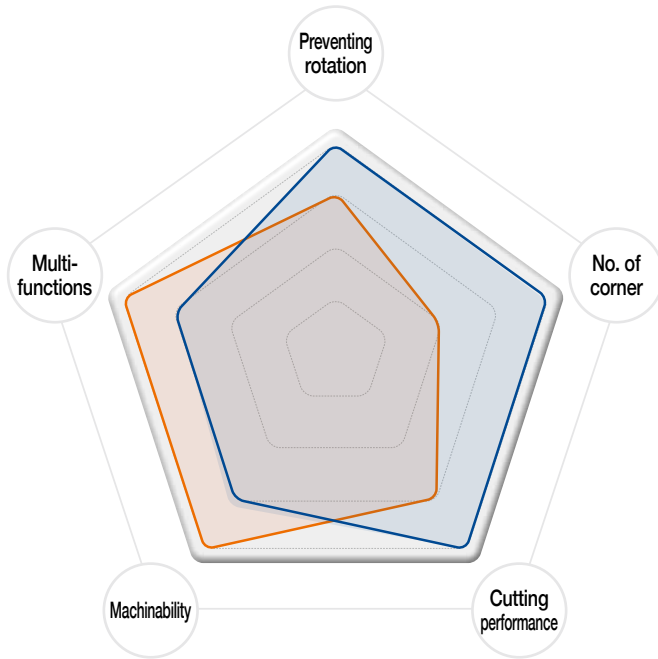
271%  
longer tool  
life



Wear: vc = 120 m/min · fz = 0.55 mm/t · ap = 3 mm

※ TQ : Total Material Removal Amount (cm<sup>3</sup>)

# Tool selection guide



— RMR

— FMR P-positive

## RMR

- Excellent clamping force due to preventing rotation with reverse positive angle
- High cost efficiency from double-sided corners (max. 8 corners)
- High cutting performance with an optimal minor edge structure



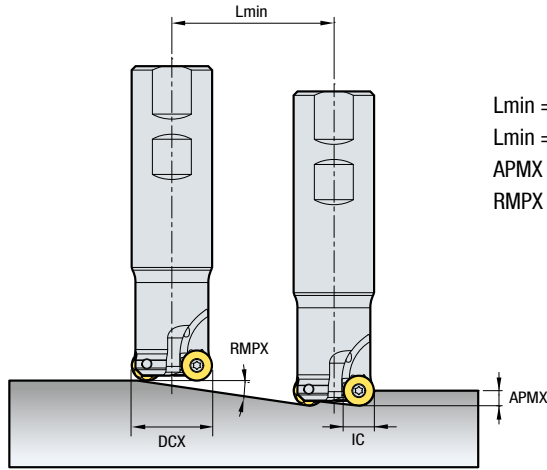
## FMR P-positive

- Multi-functions by applying one sided shape
- Low cutting resistance due to positive setting



Tools	Preventing rotation	No. of corners	Cutting performance	Machinability	Multi-functions
RMR	★★★★★	★★★★★	★★★★★	★★★	★★★
FMR P-positive	★★★	★★	★★★	★★★★★	★★★★★

# Ramping Max Rake Angle $\alpha^\circ$



$L_{min} = APMX / \tan(RMPX)$  (mm)  
 $L_{min}$  = Min. length of ramping  
 $APMX$  = Depth of cut  
 $RMPX$  = Max. ramping angle

(mm)

Section	Min. Cutting Dia	Circle of insert	Tool dia. DCX	Ramping Angle (Max) RMPX	Cutting length (Lmin)				
					APMX = 1	APMX = 1.5	APMX = 2	APMX = 2.5	APMX = 3
RNM12	32	12	32	1.2	48	72	95	119	143
	40	12	40	1	57	86	115	143	172
	50	12	50	0.8	71	107	143	179	214
	63	12	63	0.64	89	134	179	224	268
	80	12	80	0.52	111	166	221	276	332
	100	12	100	0.42	136	205	273	341	409
	125	12	125	0.34	169	253	338	422	507

- When ramping and helical milling, table feed,  $v_f$  (mm/min) should be lower than 70% of the recommended cutting conditions.
- When helical milling, Max. pitch,  $DH_{max}$  should be lower than max. depth of cut,  $ap$ .
- When ramping, the depth of cut should be lower than max. depth of cut,  $ap$ .

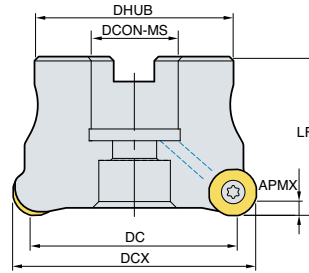
## Insert

(mm)

Insert	Designation	Application grade						IC	BS	RE	S	Geometrie
		PC6510	PC3700	PC5300	PC9540	UNC840	UPC845					
	RNM12 1204M0E-ML	●	●	●	●	●	●	12.0	2.0	6.0	4.75	
	RNM12 1204M0S-MM	●	●	●				12.0	2.0	6.0	4.75	

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand

# RMRC(M)-RN12



- AR: -7°
- RR: -13°

(mm)

Designation	Stock		DCX	DC	DHUB	DCON-MS	LF	APMX		MIID
RMRCM	050R-22-5-RN12	●	5	50	40.4	42	22	40	3.5	0.28
	050R-22-6-RN12	●	6	50	40.4	42	22	40	3.5	0.29
	063R-22-6-RN12	●	6	63	53.4	42	22	40	3.5	0.45
	063R-22-7-RN12	●	7	63	53.4	42	22	40	3.5	0.46
	080R-27-6-RN12	○	6	80	70.4	60	27	50	3.5	0.83
	080R-27-8-RN12	○	8	80	70.4	60	27	50	3.5	0.82
	100R-32-7-RN12	○	7	100	90.4	70	32	63	3.5	1.67
	100R-32-9-RN12	○	9	100	90.4	70	32	63	3.5	1.67
	125R-40-10-RN12	○	10	125	115.4	90	40	63	3.5	2.82
	125R-40-12-RN12	○	12	125	115.4	90	40	63	3.5	2.83
RMRC	080R-25.4-6-RN12	○	6	80	70.4	60	25.4	50	3.5	0.85
	080R-25.4-8-RN12	○	8	80	70.4	60	25.4	50	3.5	0.85
	100R-31.75-7-RN12	○	7	100	90.4	70	31.75	63	3.5	1.71
	100R-31.75-9-RN12	○	9	100	90.4	70	31.75	63	3.5	1.71
	125R-38.1-10-RN12	○	10	125	115.4	90	38.1	63	3.5	2.88
	125R-38.1-12-RN12	○	12	125	115.4	90	38.1	63	3.5	2.88

RNMX12

## Available inserts



RNMX-ML



RNMX-MM

Designation	Coated					
	PC6510	PC3700	PC5300	PC9540	UNC840	UPC845
RNMX	1204MOE-ML	●	●	●	●	●
	1204MOS-MM	●	●	●		

## Available Arbors

Designation	DCON	NC arbor
050R-22-□-RN12	22	BT□□-FMC22-□□
063R-22-□-RN12		
080R-27-□-RN12	27	BT□□-FMC27-□□
100R-32-□-RN12	32	BT□□-FMC32-□□
125R-40-□-RN12	40	BT□□-FMC40-□□

Designation	DCON	NC arbor
080R-25.4-□-RN12	25.4	BT□□-FMC25.4-□□
100R-31.75-□-RN12	31.75	BT□□-FMC31.75-□□
125R-38.1-□-RN12	38.1	BT□□-FMC38.1-□□

(mm)

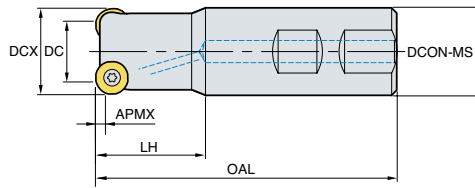
## Parts

Specification	Screw	Wrench
050-0125	FTNA0411-A	TW15S

▲: Stock item Europe ●: Stock item Korea ○: Production on demand



# RMRS-RN12



- AR: -7°
- RR: -15° - -13°

(mm)

Designation	Stock		DCX	DC	DCON-MS	LH	OAL	Shaft	APMX		MIID
032R-2W32-110-RN12	●	2	32	22.4	32	40	110	W	3.5	0.56	RNMX12
032R-3W32-110-RN12	●	3	32	22.4	32	40	110	W	3.5	0.55	
032R-2C32-200-RN12	●	2	32	22.4	32	40	200	C	3.5	1.09	
032R-3C32-200-RN12	●	3	32	22.4	32	40	200	C	3.5	1.09	
040R-3W32-110-RN12	●	3	40	30.4	32	40	110	W	3.5	0.62	
040R-4W32-110-RN12	●	4	40	30.4	32	40	110	W	3.5	0.62	
040R-3C32-200-RN12	●	3	40	30.4	32	40	200	C	3.5	1.15	
040R-4C32-200-RN12	●	4	40	30.4	32	40	200	C	3.5	1.15	
050R-5W40-120-RN12	○	5	50	40.4	40	40	120	W	3.5	1.08	
050R-6W40-120-RN12	○	6	50	40.4	40	40	120	W	3.5	1.08	
050R-5C42-300-RN12	○	5	50	40.4	42	40	300	C	3.5	3.05	
050R-6C42-300-RN12	○	6	50	40.4	42	40	300	C	3.5	3.05	
063R-6W40-130-RN12	○	6	63	53.4	40	50	130	W	3.5	1.43	
063R-7W40-130-RN12	○	7	63	53.4	40	50	130	W	3.5	1.43	
063R-6C42-300-RN12	○	6	63	53.4	42	50	300	C	3.5	3.30	
063R-7C42-300-RN12	○	7	63	53.4	42	50	300	C	3.5	3.26	

## Available inserts



RNMX-ML



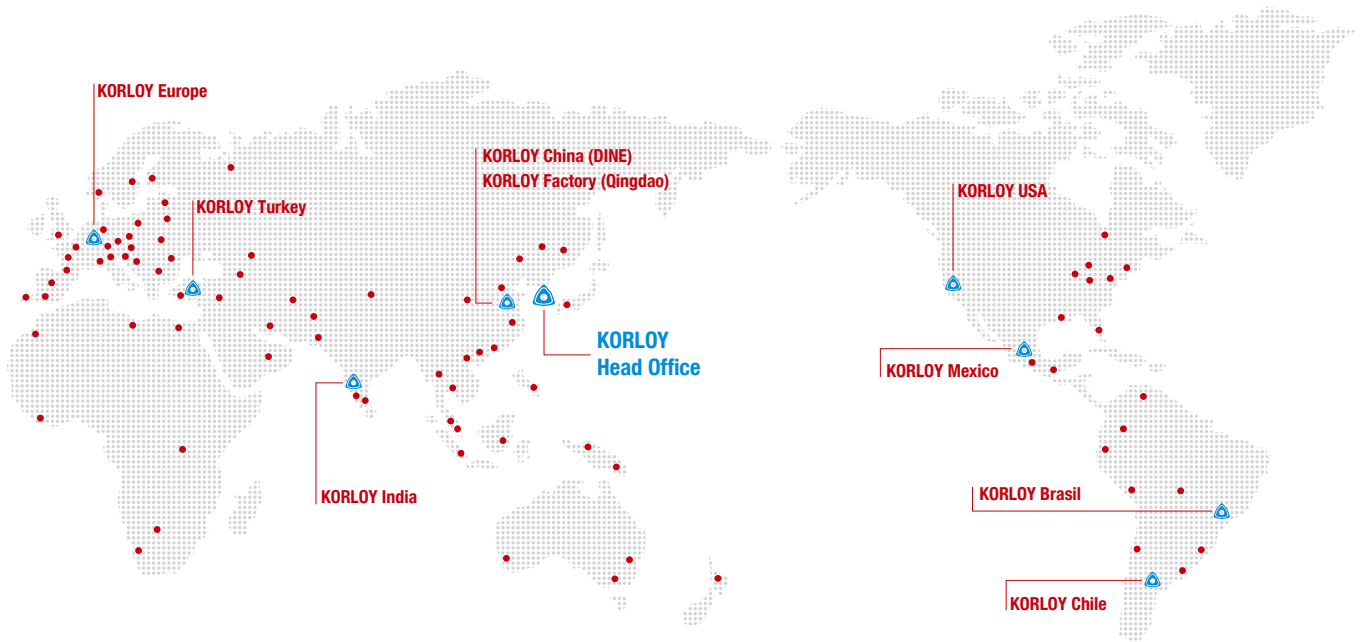
RNMX-MM

Designation	Coated					
	PC6510	PC3700	PC5300	PC9540	UNC840	UPC845
RNMX 1204MOE-ML	●	●	●	●	●	●
1204MOS-MM	●	●	●			

## Parts

Specification	Screw	Wrench
Ø32-Ø63	FTNA0411-A	TW15S

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand



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