



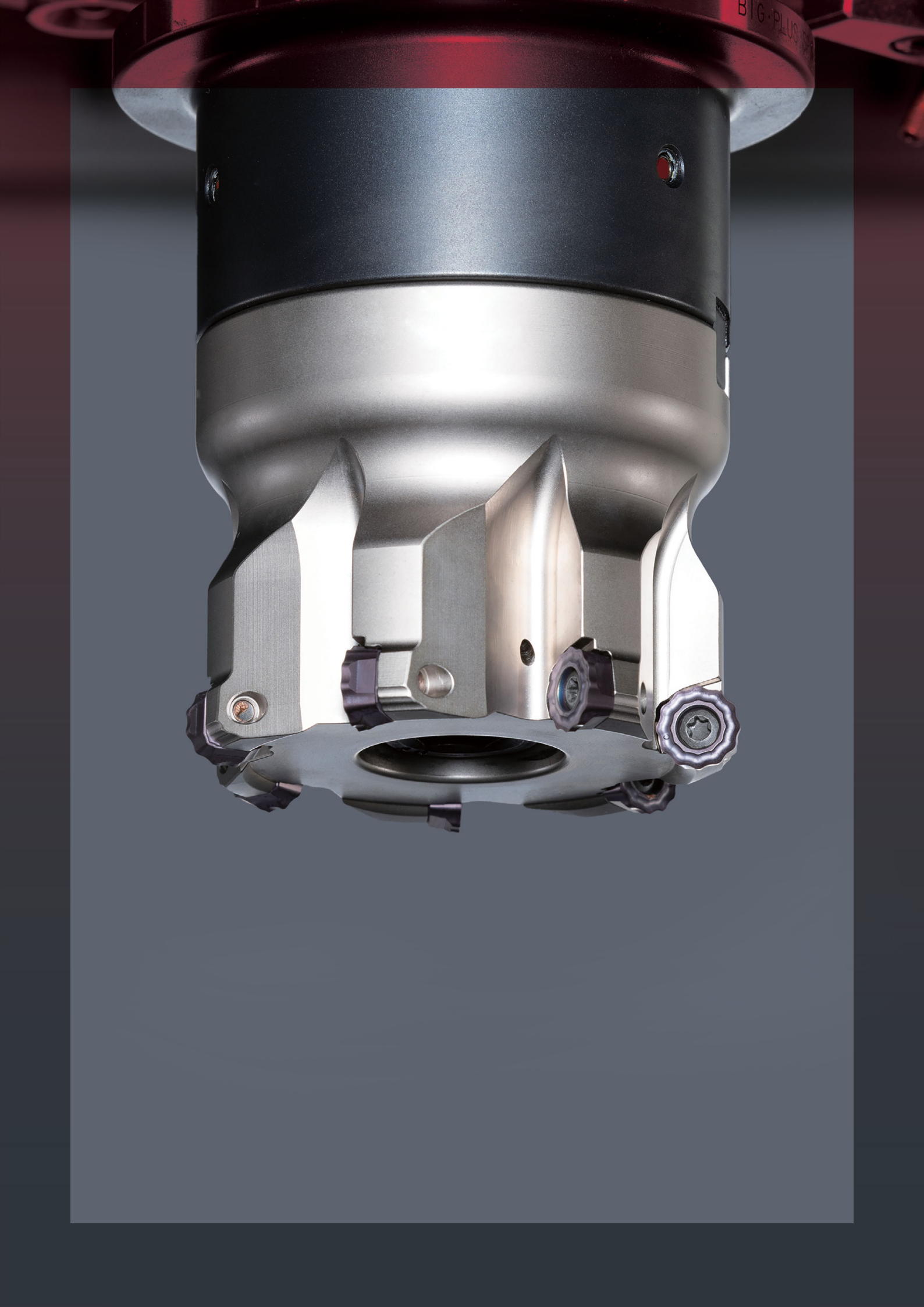
Round insert milling cutter

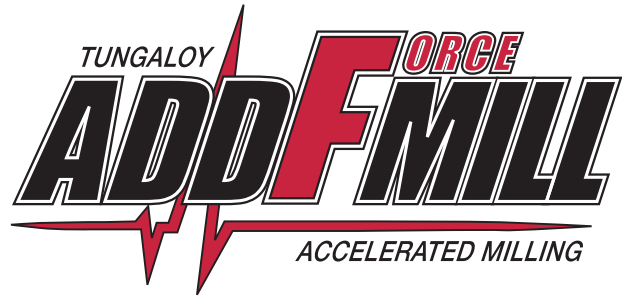
ROUNDSPLIT

Tungaloy Report No. 373-G

Round insert milling cutter with
serrated inserts for superior chatter
stability!







ROUNDSPLIT



Expansion of AH3135 grade insert line for increased tool longevity and better efficiency at accelerated feeds and speeds

High efficiency round insert milling cutter

Exceptionally improved chatter resistance

- The serrated cutting edges produce smaller chips.
- Reduced chatter even when machining with a long overhang



Serrated edge type

Comparison of chip shape



ROUNDSPPLIT

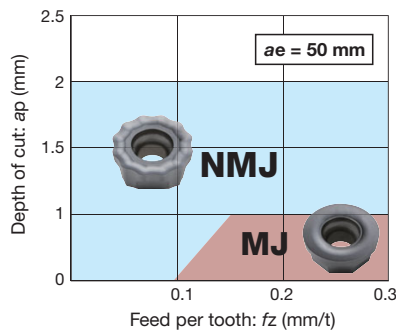


Conventional Round insert

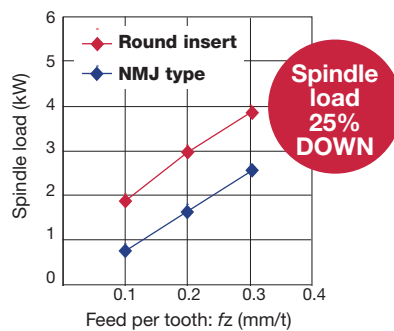
P S55C / C55

Cutter : TRC12R080M31.7-07 (ø80 mm, CICT = 7)
 Insert : RCMT1204EN-NMJ AH725
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = 0.5$ mm/t
 Depth of cut : $a_p = 2$ mm
 Width of cut : $a_e = 50$ mm
 Coolant : Dry
 Machine : Vertical M/C, BT50

Comparison of application areas



Comparison of spindle load



P S55C / C55

Cutter : TRC12R050M22.2-05 (ø50 mm, CICT = 5)
 Insert : RCMT1204EN-NMJ AH725
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = \sim 0.3$ mm/t
 Depth of cut : $a_p = \sim 2$ mm
 Width of cut : $a_e = 50$ mm (Grooving)
 Coolant : Dry
 Machine : Vertical M/C, BT50
 Overhang length : 238 mm (L/D = 4.76)

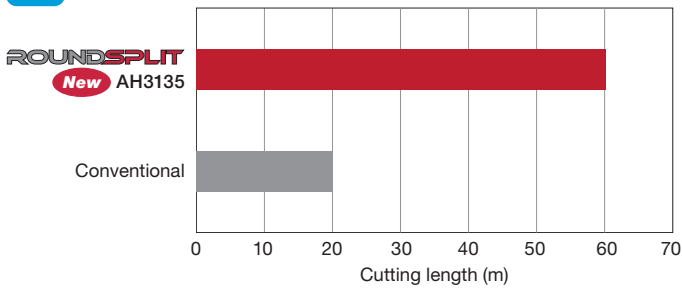
Available in the new grades

New AH3135 P M

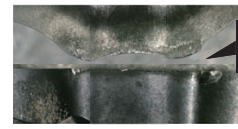
- PVD grade for high fracture resistance
- Most suitable for steel and stainless steel in general cutting parameters

CUTTING PERFORMANCE

P S55C / C55 (200HB)



ROUNDSPPLIT



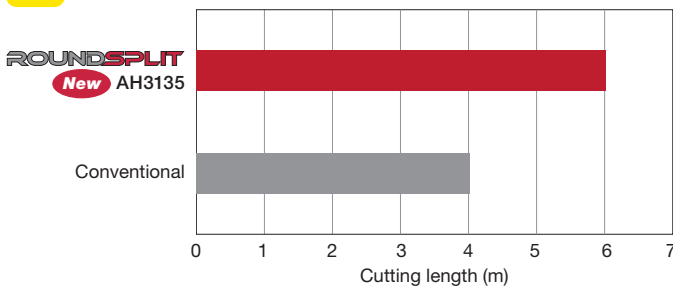
Conventional

Excessive fracture

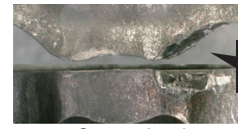
Cutter : TRC12R050M22.0-05 (ø50 mm, CICT = 5)
 Insert : RCMT1204EN-NMJ AH3135
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 0.3$ mm/t
 Depth of cut : $a_p = 1.5$ mm
 Width of cut : $a_e = 30$ mm
 Coolant : Dry
 Machine : Vertical M/C, BT50

3 times tool life increase during steel machining!

M SUS304 / X5CrNi18-9 (170HB)



ROUNDSPPLIT



Conventional

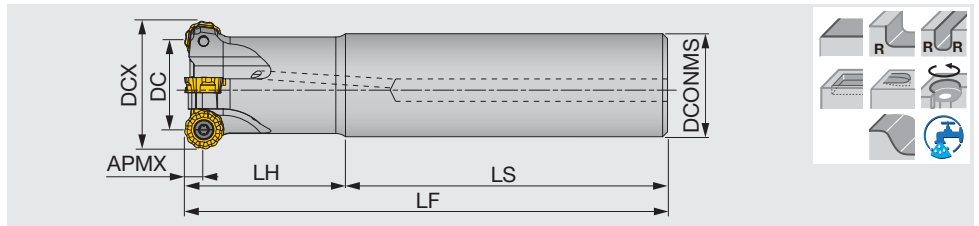
Excessive fracture

Cutter : TRC12R050M22.0-05 (ø50 mm, CICT = 5)
 Insert : RCMT1204EN-NMJ AH3135
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = 0.2$ mm/t
 Depth of cut : $a_p = 1.5$ mm
 Width of cut : $a_e = 30$ mm
 Coolant : Dry
 Machine : Vertical M/C, BT50

Reduced edge fracture during stainless steel machining, while increasing tool life by 1.5 times!

ERC12/16

Endmill, shank type



Designation	APMX	DCX	DC	CICT	DCONMS	LF	LH	LS	WT(kg)	Air hole	Insert
ERC12R032M32.0-03	6	32	20	3	32	150	70	80	0.8	With	RCMT1204...
ERC12R032M32.0-03L	6	32	20	3	32	250	150	100	1.3	With	RCMT1204...
ERC12R032M32.0-03LL	6	32	20	3	32	300	180	120	1.6	With	RCMT1204...
ERC12R033M32.0-03	6	33	21	3	32	150	70	80	0.8	With	RCMT1204...
ERC12R033M32.0-03L	6	33	21	3	32	250	150	100	1.4	With	RCMT1204...
ERC12R033M32.0-03LL	6	33	21	3	32	300	70	230	1.7	With	RCMT1204...
ERC12R040M32.0-04	6	40	28	4	32	150	50	100	0.8	With	RCMT1204...
ERC12R040M32.0-04L	6	40	28	4	32	250	50	200	1.5	With	RCMT1204...
ERC12R040M32.0-04LL	6	40	28	4	32	300	50	250	1.8	With	RCMT1204...
ERC12R050M42.0-05	6	50	38	5	42	150	50	100	1.5	With	RCMT1204...
ERC12R050M42.0-05L	6	50	38	5	42	250	50	200	2.6	With	RCMT1204...
ERC12R050M42.0-05LL	6	50	38	5	42	300	50	250	3	With	RCMT1204...
ERC16R040M32.0-02	8	40	24	2	32	150	50	100	0.8	With	RCMT1606...
ERC16R040M32.0-02L	8	40	24	2	32	250	50	200	1.4	With	RCMT1606...
ERC16R040M32.0-02LL	8	40	24	2	32	300	50	250	1.7	With	RCMT1606...
ERC16R050M42.0-03	8	50	34	3	42	150	50	100	1.4	With	RCMT1606...
ERC16R050M42.0-03L	8	50	34	3	42	250	50	200	2.4	With	RCMT1606...
ERC16R050M42.0-03LL	8	50	34	3	42	300	50	250	3	With	RCMT1606...

SPARE PARTS

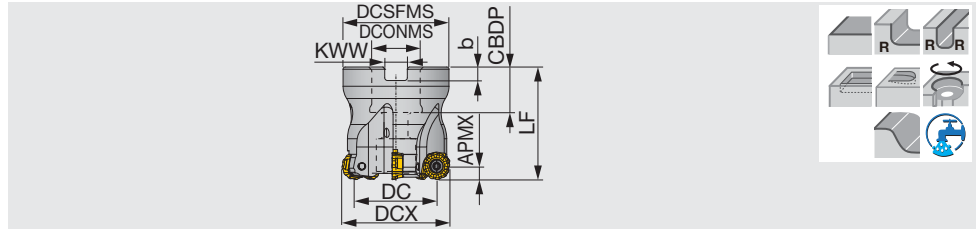
Designation	Clamping screw	Wrench
ERC12R...	CSTB-4L090	T-15DB
ERC16R040...	CSTB-5L105	T-20DB
ERC16R050...	CSTB-5L120	T-20DB

Recommended clamping torque: CSTB-4L090 = 3.5 N·m, CSTB-5L105 = 5 N·m, CSTB-5L120 = 5 N·m

TRC12/16

Face mill bore type cutter

GAMP = +0°, GAMF = -1° ~ -5°



Designation	APMX	DCX	DC	CICT	DCSFMS	Lf	DCONMS	CBDP	KWW	b	WT(kg)	Air hole	Insert
TRC12R040M16.0-04	6	40	28	4	35	40	16	18	8.2	5.6	0.2	With	RCMT1204...
TRC12R040M16.0E04	6	40	28	4	35	40	16	19	8.4	5.6	0.2	With	RCMT1204...
TRC12R050M22.0-05	6	50	38	5	47	50	22	20	10	6	0.4	With	RCMT1204...
TRC12R050M22.0E05	6	50	38	5	47	50	22	20	10.4	6.3	0.4	With	RCMT1204...
TRC12R050M22.2-05	6	50	38	5	47	50	22.225	20	8	5	0.4	With	RCMT1204...
TRC12R052M22.0E05	6	52	40	5	49	50	22	20	10.4	6.3	0.4	With	RCMT1204...
TRC12R063M22.0-06	6	63	51	6	59	50	22	20	10	6	0.7	With	RCMT1204...
TRC12R063M22.0E06	6	63	51	6	59	50	22	20	10.4	6.3	0.7	With	RCMT1204...
TRC12R063M22.2-06	6	63	51	6	59	50	22.225	20	8	5	0.7	With	RCMT1204...
TRC12R066M22.0E06	6	66	54	6	62	50	22	20	10.4	6.3	0.7	With	RCMT1204...
TRC12R080M27.0E07	6	80	68	7	76	50	27	22	12.4	7	1.1	With	RCMT1204...
TRC12R080M31.7-07	6	80	68	7	76	63	31.750	32	12.7	8	1.5	With	RCMT1204...
TRC16R050M22.0-04	8	50	34	4	47	50	22	20	10	6	0.4	With	RCMT1606...
TRC16R050M22.0E04	8	50	34	4	47	50	22	20	10.4	6.3	0.3	With	RCMT1606...
TRC16R050M22.2-04	8	50	34	4	47	50	22.225	20	8	5	0.4	With	RCMT1606...
TRC16R052M22.0E04	8	52	36	4	49	50	22	20	10.4	6.3	0.4	With	RCMT1606...
TRC16R063M22.0-05	8	63	47	5	59	50	22	20	10	6	0.6	With	RCMT1606...
TRC16R063M22.0E05	8	63	47	5	59	50	22	20	10.4	6.3	0.6	With	RCMT1606...
TRC16R063M22.2-05	8	63	47	5	59	50	22.225	20	8	5	0.7	With	RCMT1606...
TRC16R066M22.0E05	8	66	50	5	62	50	22	20	10.4	6.3	0.7	With	RCMT1606...
TRC16R080M27.0E06	8	80	64	6	76	50	27	22	12.4	7	1	With	RCMT1606...
TRC16R080M31.7-06	8	80	64	6	76	63	31.75	32	12.7	8	1.3	With	RCMT1606...
TRC16R100M31.7-07	8	100	84	7	96	63	31.75	32	12.7	8	1.6	With	RCMT1606...
TRC16R100M32.0E07	8	100	84	7	96	63	32	25	14.4	8	2.4	With	RCMT1606...
TRC16R125M38.1-08	8	125	109	8	98	63	38.1	43	15.9	10	3.6	With	RCMT1606...
TRC16R125M40.0E08	8	125	109	8	98	63	40	32	16.4	9	3	With	RCMT1606...

SPARE PARTS

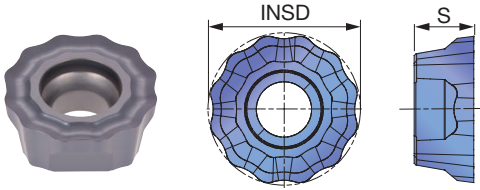


Designation	Clamping screw	Grip	Shell locking bolt 1	Shell locking bolt 2	Torx bit
TRC12R040...	CSTB-4L090	H-TBS	-	FSHM8-30H	BT15S
TRC12R050 - 066...	CSTB-4L090	H-TBS	-	CM10X30H	BT15S
TRC12R080M27.0E07	CSTB-4L090	H-TBS	-	CM12X30H	BT15S
TRC12R080M31.7-07	CSTB-4L090	H-TBS	-	CM16X40H	BT15S
TRC16R050 - 052...	CSTB-5L120	H-TB	-	FSHM10-40H	BT20S
TRC16R063 - 066...	CSTB-5L120	H-TB	-	CM10X30H	BT20S
TRC16R080M27.0E06	CSTB-5L120	H-TB	-	CM12X30H	BT20S
TRC16R080M31.7-06	CSTB-5L120	H-TB	-	CM16X40H	BT20S
TRC16R100...	CSTB-5L120	H-TB	-	CM16X40H	BT20S
TRC16R125...	CSTB-5L120	H-TB	TMBA-M20H	-	BT20M

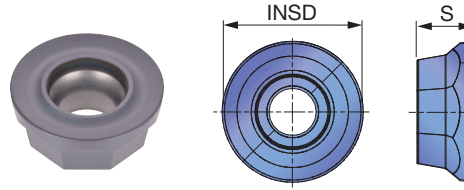
Recommended clamping torque: CSTB-4L090 = 3.5 N·m, CSTB-5L120 = 5 N·m

INSERT

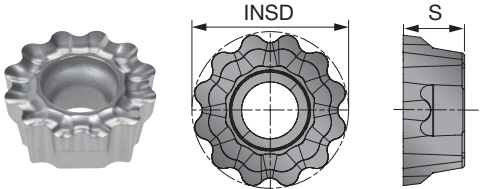
RCMT-NMJ



RCMT-MJ



RCMT-NAJ



P Steel	☆	★	☆							
M Stainless		☆	★	☆						
K Cast iron	☆		★	☆						
N Non-ferrous					★					
S Superalloys	★		★	☆						
H Hard materials										

★ : First choice
☆ : Second choice

Designation	APMX	Coated				Uncoated				INSD	S
		AH120	AH140	AH3135	AH725	KS15F					
RCMT1204EN-NMJ	6	●	●	●	●					12	4.8
RCMT1204EN-MJ	6	●	●	●	●					12	4.8
RCMT1204FN-NAJ	6					●				12	4.8
RCMT1606EN-NMJ	8	●	●	●	●					16	6.5
RCMT1606EN-MJ	8	●	●	●	●					16	6.5
RCMT1606FN-NAJ	8					●				16	6.5

● : New product
● : Line up

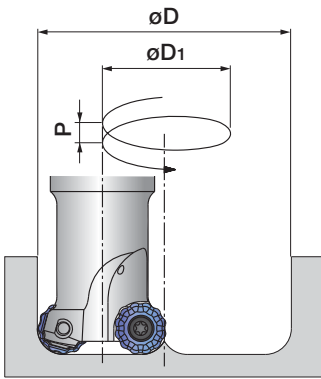
STANDARD CUTTING CONDITIONS

ISO	Workpiece material	Hardness HB	Priority	Grade	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t) each chipbreaker		
						NMJ	MJ	NAJ
P	Low carbon steels S15C, SS400, etc. C15E4, E275A, etc.	~ 200	First choice	AH3135	100 - 220	0.17 - 0.3	0.2 - 0.7	-
			For wear resistance	AH120				
	High carbon steels S45C, S55C, etc. C45, C55, etc.	200 ~ 300	First choice	AH3135	100 - 200	0.17 - 0.25	0.2 - 0.7	-
			For wear resistance	AH120				
Alloyed steels SCM440, SCr415, etc. 42CrMo4, 20Cr4, etc.	150 ~ 300	First choice	AH3135	100 - 200	0.17 - 0.25	0.2 - 0.7	-	
		For wear resistance	AH120					
M	Tool steels SK, SKH, etc. X40CrMoV5-1, etc.	~ 300	First choice	AH3135	100 - 180	0.17 - 0.25	0.2 - 0.7	-
			For wear resistance	AH120				
K	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-3, etc.	-	First choice	AH3135	90 - 180	0.15 - 0.25	0.2 - 0.6	-
			For impact resistance	AH140				
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 ~ 250	First choice	AH3135	140 - 250	0.17 - 0.3	0.2 - 0.7	-
			For wear resistance	AH120				
N	Ductile cast irons FCD400, etc. 400-15S, etc.	150 ~ 250	First choice	AH3135	140 - 250	0.17 - 0.3	0.2 - 0.7	-
			For wear resistance	AH120				
N	Aluminium alloys Si < 13%	-		KS15F	500 - 1200	-	-	0.1 - 0.3
	Aluminium alloys Si ≥ 13%	-		KS15F	100 - 300	-	-	0.1 - 0.3
S	Heat-resistant alloy Inconel 718, Ti-6Al-4V, etc.	-	First choice	AH3135	20 - 50	0.15 - 0.25	0.2 - 0.6	-
			For wear resistance	AH725				

- To remove excessive chip accumulation use an air blast.
- When chips stick to the cutting edges (aluminium machining), use a water soluble cutting fluid.

- Cutting conditions are limited by machine power and material rigidity. When the cutting width or depth is large, set Vc and fz below the recommended values and check the machine vibration and spindle load.

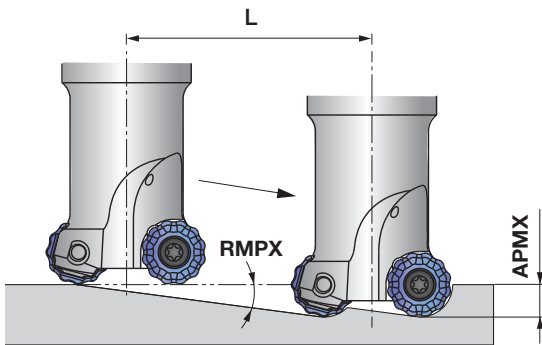
Holemaking with helical feed



Designation	Tool diameter DCX (mm)	Min. machining diameter (mm)		Max. machining diameter (mm)		Pitch P (mm)
		ϕD	$\phi D1$	ϕD	$\phi D1$	
ERC12R032...	$\phi 32$	52	20	62	30	< 6
ERC12R033...	$\phi 33$	54	21	64	31	< 6
T/ERC12R040...	$\phi 40$	68	28	78	38	< 6
T/ERC12R050...	$\phi 50$	88	38	98	48	< 6
TRC12R063...	$\phi 63$	114	51	124	61	< 6
TRC12R080...	$\phi 80$	148	68	158	78	< 6
ERC16R040...	$\phi 40$	64	24	78	38	< 8
T/ERC16R050...	$\phi 50$	84	34	98	48	< 8
TRC16R063...	$\phi 63$	110	47	124	61	< 8
TRC16R080...	$\phi 80$	144	64	158	78	< 8
TRC16R100...	$\phi 100$	184	84	198	98	< 8
TRC16R125...	$\phi 125$	234	109	248	123	< 8

When holemaking with a helical feed, the pitch (P) needs to be set at lower values than that shown above.

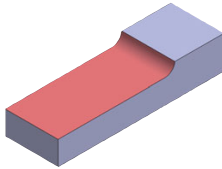
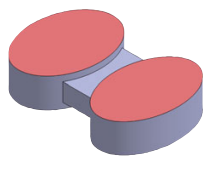
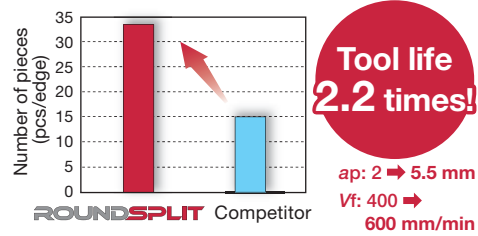
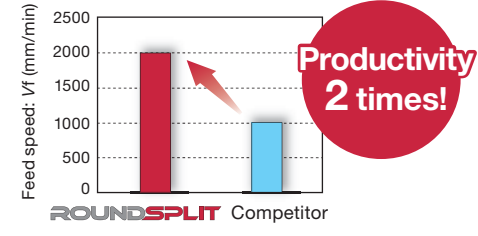
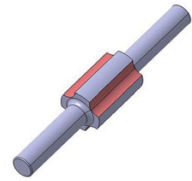
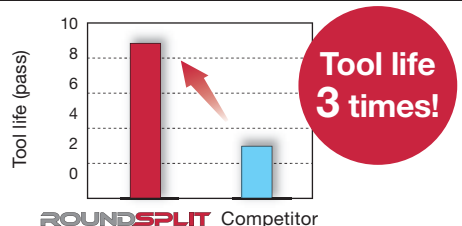
Ramping



Designation	Tool diameter DCX (mm)	Max. ramping angle RMPX	L: tool pass length when ramping angle is 2 degrees ap (mm)				
			2	3	4	6	8
ERC12R032...	$\phi 32$	10°	57	85	114	171	-
ERC12R033...	$\phi 33$	9°	57	85	114	171	-
T/ERC12R040...	$\phi 40$	6°	57	85	114	171	-
T/ERC12R050...	$\phi 50$	4°	57	85	114	171	-
TRC12R063...	$\phi 63$	3°	57	85	114	171	-
TRC12R080...	$\phi 80$	2.3°	57	85	114	171	-
ERC16R040...	$\phi 40$	12°	57	85	114	171	229
T/ERC16R050...	$\phi 50$	7.4°	57	85	114	171	229
TRC16R063...	$\phi 63$	6°	57	85	114	171	229
TRC16R080...	$\phi 80$	4.3°	57	85	114	171	229
TRC16R100...	$\phi 100$	3°	57	85	114	171	229
TRC16R125...	$\phi 125$	2.4°	57	85	114	171	229

Tool pass length: $L = ap / \tan RMPX$, Ramping angle needs to be set at smaller than 2 degrees in order to prevent chips from getting tangled.

PRACTICAL EXAMPLES

Workpiece type		Die & mold parts	Die & mold parts
Cutter		TRC12R050M22.0-05 (ø50 mm, CICT = 5)	ERC12R033M32.0-03 (ø33 mm, CICT = 3)
Insert		RCMT1204EN-NMJ	RCMT1204EN-NMJ
Grade		AH725	AH725
Workpiece material		S50C / C50  P	SS400 / St44-2  P
Cutting conditions	Cutting speed : V_c (m/min)	220	220
	Feed per tooth : f_z (mm/t)	0.09	0.3
	Depth of cut : a_p (mm)	5.5	1
	Width of cut : a_e (mm)	32	20
	Machining	Shoulder milling	Face milling
	Coolant	Dry	Dry
Machine		Vertical M/C, BT40	Vertical M/C, BT40
Results		 <p>Tool life 2.2 times!</p> <p>$a_p: 2 \rightarrow 5.5$ mm $V_f: 400 \rightarrow 600$ mm/min</p> <p>ROUNDSPPLIT Competitor</p> <p>NMJ chipbreaker with low cutting force provides high productivity.</p>	 <p>Productivity 2 times!</p> <p>ROUNDSPPLIT Competitor</p> <p>NMJ chipbreaker with serrated edges allows feed speed to be doubled without chattering, even when machining low rigidity work pieces.</p>
Workpiece type		Stabilizer	
Cutter		TRC12R080M27.0E07 (ø80 mm, CICT = 7)	
Insert		RCMT1204EN-MJ	
Grade		AH725	
Workpiece material		High alloyed steel  P	
Cutting conditions	Cutting speed : V_c (m/min)	100	
	Feed per tooth : f_z (mm/t)	0.1	
	Feed speed : V_f (mm/min)	279	
	Depth of cut : a_p (mm)	5	
	Width of cut : a_e (mm)	40	
	Machining	Face milling	
Coolant	Wet (Internal)		
Machine		Vertical M/C, HSK63	
Results		 <p>Tool life 3 times!</p> <p>ROUNDSPPLIT Competitor</p> <p>RoundSplit MJ geometry delivered low cutting forces, and together with wear-resistant AH725 grade inserts, ensured process security and achieved 3 times tool life at 40% higher cutting speed.</p>	

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