

**Tungaloy**

Member IMC Group

Keeping the Customer First

Tungaloy Report No. 373-G

**MILLLINE** Round insert milling cutter

**ROUNDSPLIT**

TUNGALOY

**NEW**

TRC / ERC type


**Serrated cutting edges to significantly reduce chattering!**



## Features

### ● Exceptionally improved chatter resistance

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



Work material : S55C / C55  
(200HB)

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

Comparison of chip shape



Subdivided chips

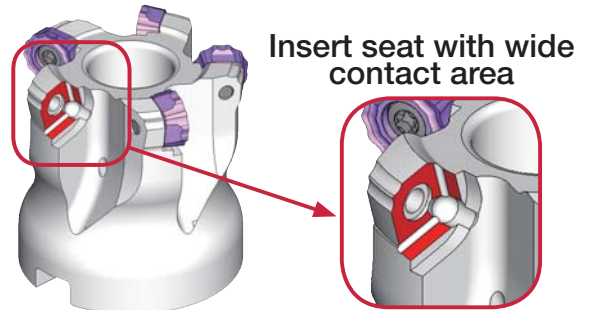
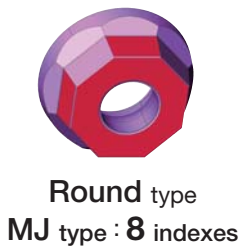


Conventional round insert

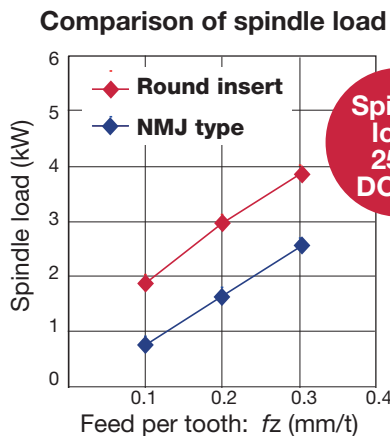
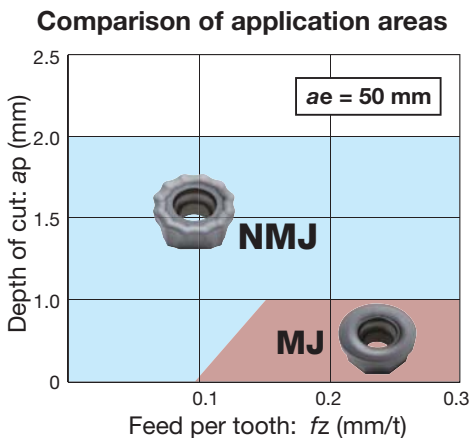
### ● Well-designed insert seat that is compatible for both types of insert

- Uniquely designed insert shape provides rigid clamping.

Note: The setting angle of each insert seat is slightly different.  
When changing the cutting edges, please rotate the insert in the same seat.



## Cutting performance



Work material : S55C / C55 (200HB)

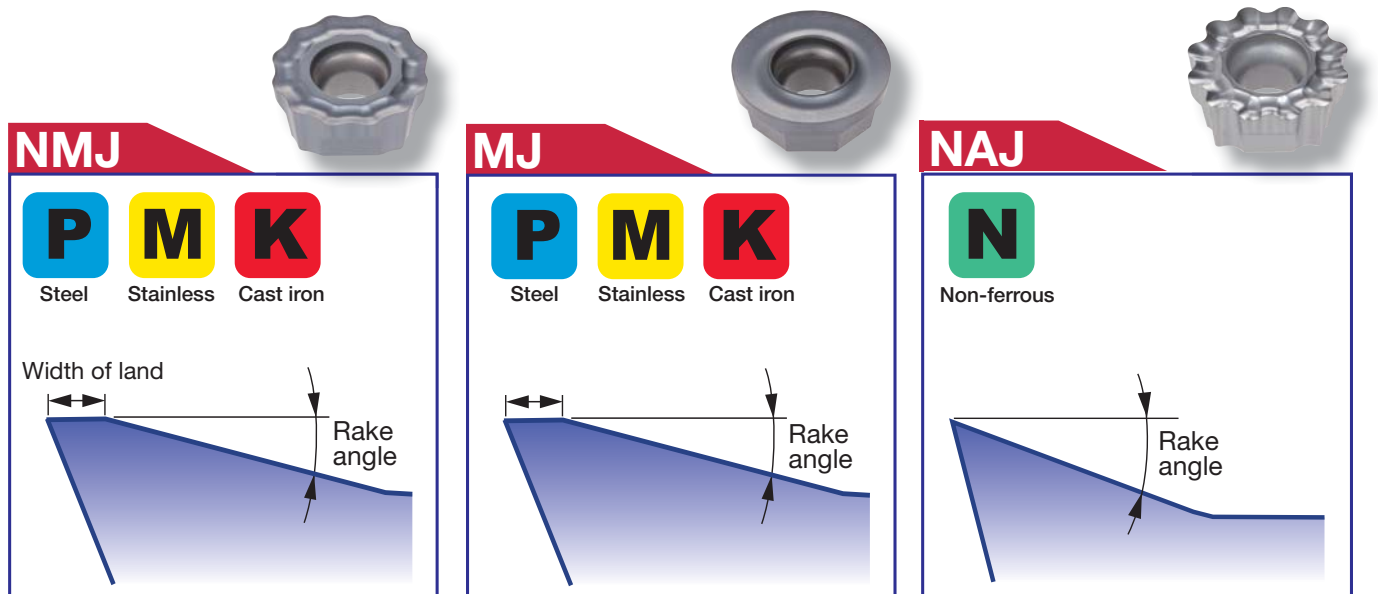
Tool  $\phi$  :  $\phi 50$  mm,  $z = 5$

Cutting speed :  $V_c = 150$  m/min

Width of cut :  $a_e = 50$  mm (Grooving)

Overhang : 238 mm (L/D = 4.76) length

## Variation of inserts



- **Chipbreaker to decrease cutting forces**  
With serrated cutting edges

- **General purpose chipbreaker with round cutting edges**

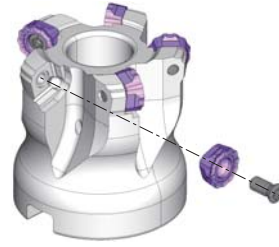
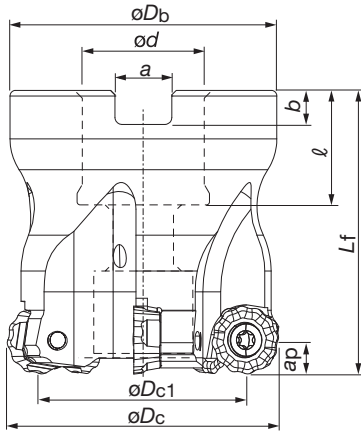
- **Chipbreaker for aluminium machining**  
With serrated cutting edges

## Standard cutting conditions

Work materials	Brinell hardness HB	Grades	Cutting Speed Vc (m/min)	Feed per tooth fz (mm/t) each chipbreaker		
				NMJ	MJ	NAJ
Low carbon steels (S15C, SS400 / C15E etc.)	~ 200	<b>AH725</b>	100 - 220	0.17 - 0.3	0.2 - 0.7	-
High carbon steels (S45C, S55C / C45, C55 etc.)	200 ~ 300		100 - 200	0.17 - 0.25		
Alloyed steels (SCM440, SCr415 / 42CrMmo4, 17Cr3 etc.)	150 ~ 300		100 - 180			
Tool steels (SK, SKH / X155CrVMo121etc.)	~ 300					
Stainless steels (SUS304, SUS316 / X5CrNi189 etc.)	-	<b>AH140</b>	90 - 180	0.15 - 0.25	0.2 - 0.6	-
Grey cast irons (FC250, FC300 / GG25, GG30 etc.)	150 ~ 250	<b>AH120</b>	140 - 250	0.17 - 0.3	0.2 - 0.7	-
Ductile cast irons (FCD400 / GGG40 etc.)						
Aluminium alloys (Si < 13%)	-	<b>KS15F</b>	500 - 1200	-	-	0.1 - 0.3
Aluminium alloys (Si ≥ 13%)	-		100 - 300			
Heat-resisting alloy (Inconel 718, Ti-6Al-4V etc.)	-	<b>AH725</b>	20 - 50	0.15 - 0.25	0.2 - 0.6	-

- To remove excessive chip accumulation use an air blast.
- When chips stick to the cutting edges (aluminium machining), use a water soluble coolant.
- When cutting an interrupted surface or a casted skin, the feed (fz) should be reduced to the lower recommended value shown in the above table.
- Cutting conditions are limited by machine power, work piece rigidity and spindle output. When the cutting width, depth or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.

# Milling cutter



Max. depth of cut  
RCMT12 type : Max.  $ap = 6.0$  mm  
RCMT16 type : Max.  $ap = 8.0$  mm

Description		Replacement parts Cat. No.		
Applicable cutter		TRC12R...	TRC16R050~100...	TRC16R125...
Clamping screw		CSTB-4L090	CSTB-5L120	CSTB-5L120
Wrench	Torx bit	BT15S	BT20S	BT20M
	Grip	H-TBS	H-TB	H-TB
Mono block type substitution wrench		T-15D	T-20D	T-20D

## ● Bore type

### JIS

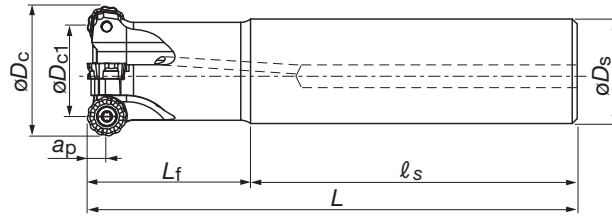
Cat. No.	Stock	No. of inserts	Dimensions (mm)								Weight (kg)	Air hole	Cutter mounting screw	Inserts
			$\phi D_c$	$\phi D_{c1}$	$\phi D_b$	$\phi d$	$\ell$	$L_f$	$b$	$a$				
TRC12R040M16.0-04	●	4	40	28	35	16	18	40	5.6	8.2	0.2	with	FSHM8-30H	RCMT1204*N-***
TRC12R050M22.0-05	●	5	50	38	47	22	20	50	6	10	0.4	with	CM10X30H	
TRC12R050M22.2-05	●	5	50	38	47	22.225	20	50	5	8	0.4	with	CM10X30H	
TRC12R063M22.0-06	●	6	63	51	59	22	20	50	6	10	0.7	with	CM10X30H	
TRC12R063M22.2-06	●	6	63	51	59	22.225	20	50	5	8	0.7	with	CM10X30H	
TRC12R080M31.7-07	●	7	80	68	76	31.75	32	63	8	12.7	1.5	with	CM16X40H	
TRC16R050M22.0-04	●	4	50	34	47	22	20	50	6	10	0.4	with	FSHM10-40H	RCMT1606*N-***
TRC16R050M22.2-04	●	4	50	34	47	22.225	20	50	5	8	0.4	with	FSHM10-40H	
TRC16R063M22.0-05	●	5	63	47	59	22	20	50	6	10	0.6	with	CM10X30H	
TRC16R063M22.2-05	●	5	63	47	59	22.225	20	50	5	8	0.7	with	CM10X30H	
TRC16R080M31.7-06	●	6	80	64	76	31.75	32	63	8	12.7	1.3	with	CM16X40H	
TRC16R100M31.7-07	●	7	100	84	96	31.75	32	63	8	12.7	1.6	with	CM16X40H	
TRC16R125M38.1-08	●	8	125	109	98	38.1	43	63	10	15.9	3.6	with	TMBA-M20H	

### ISO

Cat. No.	Stock	No. of inserts	Dimensions (mm)								Weight (kg)	Air hole	Cutter mounting screw	Inserts
			$\phi D_1$	$\phi D_c$	$\phi D_b$	$\phi d$	$\ell$	$L_f$	$b$	$a$				
TRC12R040M16.0E04	●	4	40	28	35	16	19	40	5.6	8.4	0.2	with	FSHM8-30H	RCMT1204*N-***
TRC12R050M22.0E05	●	5	50	38	47	22	20	50	6.3	10.4	0.4	with	CM10X30H	
TRC12R052M22.0E05	●	5	52	40	49	22	20	50	6.3	10.4	0.4	with	CM10X30H	
TRC12R063M22.0E06	●	6	63	51	59	22	20	50	6.3	10.4	0.7	with	CM10X30H	
TRC12R066M22.0E06	●	6	66	54	62	22	20	50	6.3	10.4	0.7	with	CM10X30H	
TRC12R080M27.0E07	●	7	80	68	76	27	22	50	7	12.4	1.1	with	CM12X30H	
TRC16R050M22.0E04	●	4	50	34	47	22	20	50	6.3	10.4	0.3	with	FSHM10-40H	RCMT1606*N-***
TRC16R052M22.0E04	●	4	52	36	49	22	20	50	6.3	10.4	0.4	with	FSHM10-40H	
TRC16R063M22.0E05	●	5	63	47	59	22	20	50	6.3	10.4	0.6	with	CM10X30H	
TRC16R066M22.0E05	●	5	66	50	62	22	20	50	6.3	10.4	0.7	with	CM10X30H	
TRC16R080M27.0E06	●	6	80	64	76	27	22	50	7	12.4	1.0	with	CM12X30H	
TRC16R100M32.0E07	●	7	100	84	96	32	25	63	8	14.4	2.4	with	CM16X40H	
TRC16R125M40.0E08	●	8	125	109	98	40	32	63	9	16.4	3.0	with	-	

● : Stocked items

## Shank type

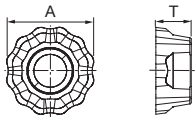


Description	Replacement parts Cat. No.		
Applicable cutter	ERC12R...	ERC16R...	ERC16R040M32.0-02
Clamping screw	CSTB-4L090	CSTB-5L120	CSTB-5L105
Wrench (substitution)	T-15DB (T-15D)	T-20DB (T-20D)	T-20DB (T-20D)

type	Cat. No.	Stock	No. of inserts	Dimensions (mm)						Weight (kg)	Air hole	Inserts
				$\phi D_c$	$\phi D_{c1}$	$\phi D_s$	$l_s$	$L_f$	$L$			
Standard	ERC12R032M32.0-03	●	3	32	20	32	80	70	150	0.8	with	RCMT1204*N-***
	ERC12R033M32.0-03	●	3	33	21	32	80	70	150	0.8	with	
	ERC12R040M32.0-04	●	4	40	28	32	100	50	150	0.8	with	
	ERC12R050M42.0-05	●	5	50	38	42	100	50	150	1.5	with	
	ERC16R040M32.0-02	●	2	40	24	32	100	50	150	0.8	with	RCMT1606*N-***
	ERC16R050M42.0-03	●	3	50	34	42	100	50	150	1.4	with	
Long	ERC12R032M32.0-03L	●	3	32	20	32	100	150	250	1.3	with	RCMT1204*N-***
	ERC12R033M32.0-03L	●	3	33	21	32	100	150	250	1.4	with	
	ERC12R040M32.0-04L	●	4	40	28	32	200	50	250	1.5	with	
	ERC12R050M42.0-05L	●	5	50	38	42	200	50	250	2.6	with	
	ERC16R040M32.0-02L	●	2	40	24	32	200	50	250	1.4	with	RCMT1606*N-***
	ERC16R050M42.0-03L	●	3	50	34	42	200	50	250	2.4	with	
Extra long	ERC12R032M32.0-03LL	●	3	32	20	32	120	180	300	1.6	with	RCMT1204*N-***
	ERC12R033M32.0-03LL	●	3	33	21	32	230	70	300	1.7	with	
	ERC12R040M32.0-04LL	●	4	40	28	32	250	50	300	1.8	with	
	ERC12R050M42.0-05LL	●	5	50	38	42	250	50	300	3.0	with	
	ERC16R040M32.0-02LL	●	2	40	24	32	250	50	300	1.7	with	RCMT1606*N-***
	ERC16R050M42.0-03LL	●	3	50	34	42	250	50	300	3.0	with	

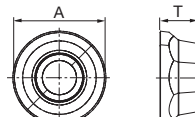
## Inserts

For general machining  
Inserts with a serrated cutting edge



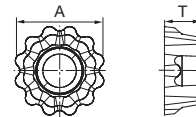
NMJ

For general machining  
Round insert



MJ

For aluminium machining  
Inserts with a serrated cutting edge



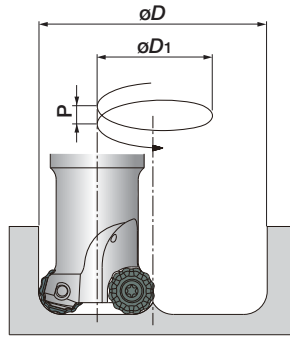
NAJ

Cat. No.	Accuracy	Honing	Stock				Dimensions (mm)		Shape	Cutter
			Coated grades			Carbide	A	T		
			AH725	AH120	AH140	KS15F				
RCMT1204EN-NMJ	M	with	●	●	●		12	4.8	Fig. 1	TRC12 ERC12
RCMT1204EN-MJ	M	with	●	●	●		12	4.8	Fig. 2	
RCMT1204FN-NAJ	M	without				●	12	4.8	Fig. 3	
RCMT1606EN-NMJ	M	with	●	●	●		16	6.5	Fig. 1	TRC16 ERC16
RCMT1606EN-MJ	M	with	●	●	●		16	6.5	Fig. 2	
RCMT1606FN-NAJ	M	without				●	16	6.5	Fig. 3	

● : Stocked items

# Machining capability

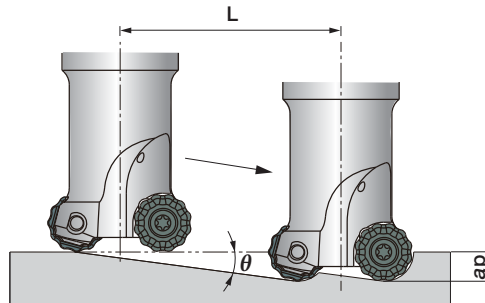
## ◆ Holmaking with helical feed



Cat. No.	Tool $\phi D_c$ (mm)	Min. machining diameter (mm)		Max. machining diameter (mm)		Pitch P (mm)
		$\phi D$	$\phi D_1$	$\phi D$	$\phi D_1$	
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 holmaking with a helical feed, the pitch (P) needs to be set at lower values than that shown above.

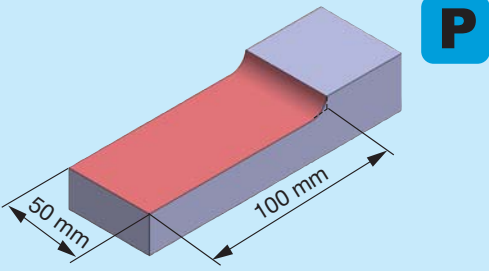
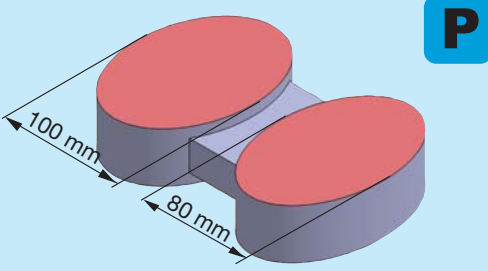
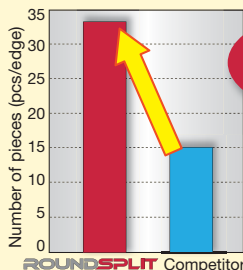
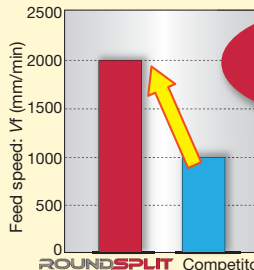
## ◆ Ramping



Cat. No.	Tool $\phi D_c$ (mm)	Max. ramping angle $\theta$	L (mm): tool pass length when ramping angle is 2 degrees				
			ap (mm)				
			2	3	4	6	8
ERC12R032...	$\phi 32$	10°	57	85	114	171	229
ERC12R033...	$\phi 33$	9°					
T/ERC12R040...	$\phi 40$	6°					
T/ERC12R050...	$\phi 50$	4°					
TRC12R063...	$\phi 63$	3°					
TRC12R080...	$\phi 80$	2.3°					
ERC16R040...	$\phi 40$	12°					
T/ERC16R050...	$\phi 50$	7.4°					
TRC16R063...	$\phi 63$	6°					
TRC16R080...	$\phi 80$	4.3°					
TRC16R100...	$\phi 100$	3°	248	123	198	98	< 8
TRC16R125...	$\phi 125$	2.4°					

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

# Practical examples

Workpiece type		Die & mould parts	Die & mould parts
Milling cutter		TRC12R050M22.0-05 ( $\phi 50$ , $z = 5$ )	ERC12R033M32.0-03 ( $\phi 33$ , $z = 3$ )
Insert		RCMT1204EN-NMJ	RCMT1204EN-NMJ
Grade		AH725	AH725
Workpiece material		<b>S50C / C50</b>	<b>SS400 / St44-2</b>
			
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
	Process	Shoulder milling	Face milling
	Coolant	Dry	Dry
	Machine	Vertical M/C, BT40	Vertical M/C, BT40
Results		 <p><b>Pieces per edge increased by 2.2 times!</b></p> <p><math>a_p</math>: 2.0 <math>\rightarrow</math> 5.5 mm  <math>V_f</math>: 400 <math>\rightarrow</math> 600 mm/min</p> <p>NMJ chipbreaker with low cutting force provides high productivity.</p>	 <p><b>Feed speed 2.4 times faster!</b></p> <p>NMJ chipbreaker with serrated edges allows feed speed to be doubled without chattering, even when machining low rigidity work pieces.</p>



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