

Size Added.
ø3,4mm

Roughing End Mills for Aluminium
C-SRA C-MRA C-SRARB



Roughing End Mills for Al-alloy

High speed milling over 6,000cc/min

Roughing End Mills for Aluminium

C-SRA

Short, 3 flutes, Roughing, for Al-alloy

C-MRA

Medium, 3 flutes, Roughing, for Al-alloy

C-SRARB

Short, 3 flutes, Corner Radius, Roughing, for Al-alloy

■ Features

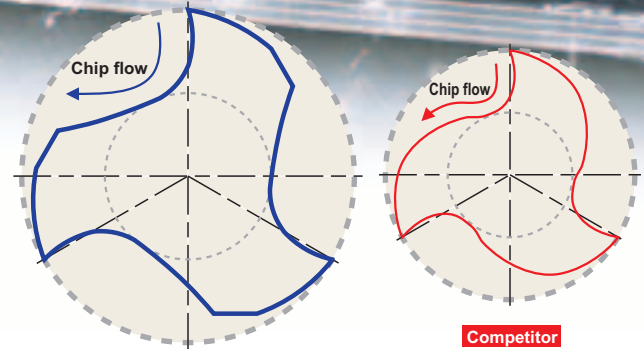
Highly efficient Roughing End Mills for Al-alloy

They are Roughing End Mills that can achieve efficient machining of Al-alloy used by the aircraft and other industries.

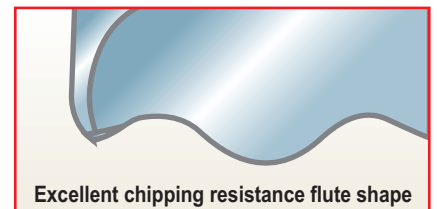
High-speed machining of Al-alloy over 6,000cc/min

High-efficiency and low-chattering milling can be achieved by smooth chip removal geometry, excellent flute shape with chipping resistance and suitable helix angle for aluminium milling.

In machining on the newest high-speed machine, high volumes of metal removal over 6,000cc/min is also possible.



Smooth chip removal flute geometry



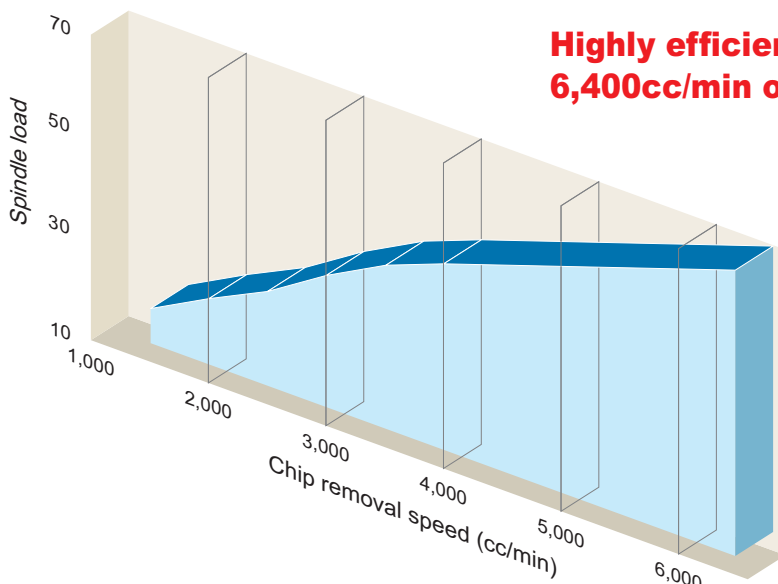
Excellent chipping resistance flute shape

Wide variation

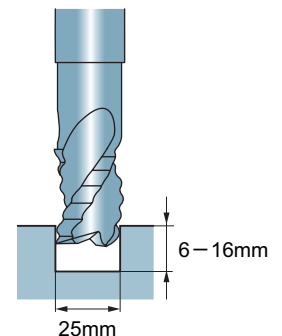
In addition to short and medium types, a corner radius type is also offered. These can cover a wide range of machining.

■ Machining example

Example 1



Highly efficient milling with 6,400cc/min on chip removal



■ Cutting conditions

End mill	C-SRARB $\phi 25 \times R5$
Work material	Aluminium A7050
Revolution	24,000min ⁻¹ (1,885m/min)
Feed rate	10,000 – 16,000mm/min
Cutting method	Emulsion

3 series 28 sizes

C-SRA

Roughing end mill, Short cut length, 3 flute, For aluminium alloy

$\phi 10 \blacktriangleright \phi 25$



C-MRA Expand

Roughing end mill, Medium cut length, 3 flute, For aluminium alloy

$\phi 3 \blacktriangleright \phi 25$



C-SRARB

Corner radius roughing end mill, Short cut length, 3 flute, For aluminium alloy

$\phi 10 \times R1 \blacktriangleright \phi 25 \times R5$



Machining example

Example 2

C-SRA

Competitor A **Stop (terrible adhesion)**

Competitor B **Chipping**

No Damage

No damage

Feed rate 5,250mm/min

Feed rate 2,250mm/min

10mm

10mm

Feed rate (mm/min)

Cutting conditions	
End mill	C-SRA $\phi 10$
Work material	Aluminium A7075
Revolution	10,000min ⁻¹ (314m/min)
Feed rate	1,500 – 5,250mm/min
Cutting method	Emulsion

Example 3

Stable milling is performed at feed rate of 7,000mm/min.

Excellent finish surface. No chattering or noise.

Cutting conditions (Roughing)	
End mill	C-SRARB $\phi 12 \times R2$
Work material	Al-alloy
Revolution	18,000mm ⁻¹
Feed rate	7,000mm/min

12mm

12mm

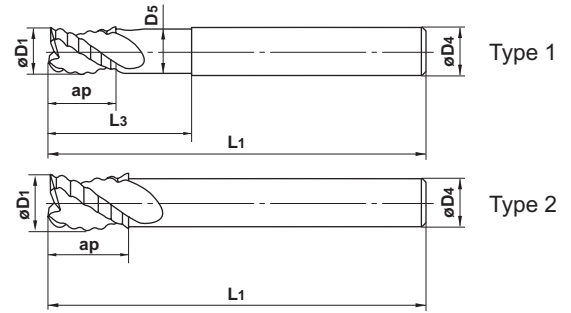
CARBIDE END MILLS

C-SRA

Roughing end mill, Short cut length, 3 flute, For aluminium alloy



● Roughing end mills for Al-alloy (S)



Unit : mm

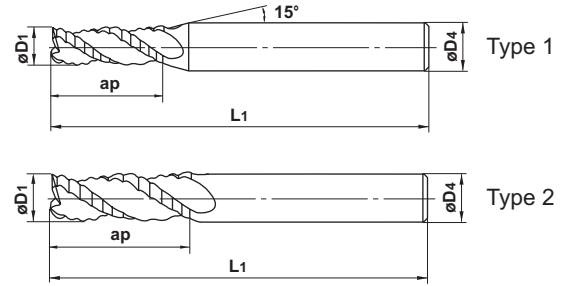
Order Number	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
CSRAD1000	10	12	25	9.4	75	10	3	●	1
D1200	12	15	30	11.4	75	12	3	●	1
D1600	16	18	35	15.4	100	16	3	●	1
D1800	18	22	—	—	100	16	3	●	2
D2000	20	25	50	19.0	125	20	3	●	1
D2200	22	25	—	—	125	20	3	●	2
D2500	25	30	60	24.0	125	25	3	●	1

C-MRA *Expand*

Roughing end mill, Medium cut length, 3 flute, For aluminium alloy



● Roughing end mills for Al-alloy (M)



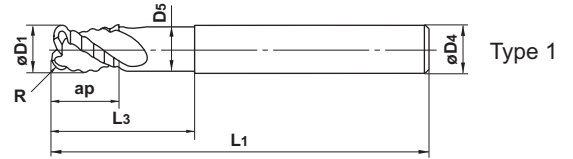
Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
<i>Expand</i> CMRAD0300	3	8	50	6	3	●	1
<i>Expand</i> D0400	4	11	50	6	3	●	1
D0500	5	13	50	6	3	●	1
D0600	6	13	50	6	3	●	2
D0800	8	19	60	8	3	●	2
D1000	10	22	75	10	3	●	2
D1200	12	26	75	12	3	●	2
D1600	16	32	100	16	3	●	2
D2000	20	38	125	20	3	●	2
D2500	25	45	125	25	3	●	2

CARBIDE END MILLS

C-SRARB

Corner radius roughing end mill, Short cut length, 3 flute, For aluminium alloy



● Roughing end mills with corner radius for Al-alloy (S)

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Overall Length L1	Shank Dia. D4	Corner R R	No. of Flutes N	Stock	Type
CSRARBD1000R100	10	12	25	9.4	75	10	1	3	●	1
D1000R200	10	12	25	9.4	75	10	2	3	●	1
D1200R100	12	15	30	11.4	75	12	1	3	●	1
D1200R200	12	15	30	11.4	75	12	2	3	●	1
D1600R200	16	18	35	15.4	100	16	2	3	●	1
D1600R300	16	18	35	15.4	100	16	3	3	●	1
D2000R200	20	25	50	19.0	125	20	2	3	●	1
D2000R300	20	25	50	19.0	125	20	3	3	●	1
D2500R300	25	30	60	24.0	125	25	3	3	●	1
D2500R400	25	30	60	24.0	125	25	4	3	●	1
D2500R500	25	30	60	24.0	125	25	5	3	●	1

C-SRA

Roughing end mill, Short cut length, 3 flute, For aluminium alloy

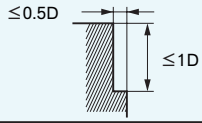
C-SRARB

Corner radius roughing end mill, Short cut length, 3 flute, For aluminium alloy

Side milling

Work material	Aluminum alloy A7075		Cast aluminium AC4B	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)
10	19,000	8,600	9,500	3,400
12	16,000	8,200	8,000	3,200
16	12,000	7,600	6,000	3,100
18	10,500	7,200	5,300	2,900
20	9,500	7,100	4,800	2,900
22	8,500	6,900	4,300	2,800
25	7,500	6,800	3,800	2,700

Depth of cut

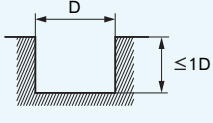


D: Dia.

Slotting

Work material	Aluminum alloy A7075		Cast aluminium AC4B	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)
10	19,000	6,800	9,500	2,700
12	16,000	6,500	8,000	2,600
16	12,000	6,100	6,000	2,400
18	10,500	5,800	5,300	2,400
20	9,500	5,700	4,800	2,300
22	8,500	5,500	4,300	2,200
25	7,500	5,400	3,800	2,200

Depth of cut



D: Dia.

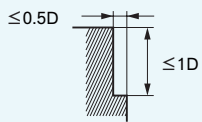
- 1) If the rigidity of the machine or the work material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 3) Water-soluble cutting fluid is recommended.
- 4) Climb cut is recommended for side milling.

Using high-speed and high-rigidly machining center

Side milling

Work material	Aluminum alloy A7075		Cast aluminium AC4B	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)
10	30,000	11,000	19,000	5,400
12	30,000	12,000	16,000	5,300
16	24,000	12,000	12,000	4,900
18	21,000	12,000	10,500	4,700
20	19,000	11,000	9,500	4,600
22	17,000	11,000	8,500	4,300
25	15,000	11,000	7,500	4,300

Depth of cut

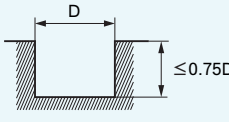


D: Dia.

Slotting

Work material	Aluminum alloy A7075		Cast aluminium AC4B	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)
10	30,000	8,600	19,000	4,300
12	30,000	9,900	16,000	4,300
16	24,000	9,700	12,000	4,000
18	21,000	9,500	10,500	3,800
20	19,000	9,100	9,500	3,700
22	17,000	8,700	8,500	3,400
25	15,000	8,600	7,500	3,400

Depth of cut



D: Dia.

- 1) If the rigidity of the machine or the work material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 3) Water-soluble cutting fluid is recommended.
- 4) Climb cut is recommended for side milling.

C-MRA

Roughing end mill, Medium cut length, 3 flute, For aluminium alloy

Side milling

Work material	Aluminum alloy A7075		Cast aluminium AC4B	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)
3	40,000	2,700	25,000	1,100
4	36,000	2,700	20,000	1,100
5	30,000	5,400	16,000	2,200
6	27,000	6,100	13,000	2,300
8	20,000	6,000	10,000	2,400
10	16,000	5,800	8,000	2,300
12	13,000	5,300	6,500	2,100
16	10,000	5,100	5,000	2,000
20	8,000	4,800	4,000	1,900
25	6,400	4,600	3,200	1,800

Depth of cut	
--------------	--

Slotting

Work material	Aluminum alloy A7075		Cast aluminium AC4B	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)
3	30,000	1,800	16,000	700
4	24,000	2,200	12,000	900
5	19,000	2,300	10,000	900
6	16,000	2,400	8,000	1,000
8	12,000	2,500	6,000	1,000
10	9,500	2,600	5,000	1,100

Depth of cut	
--------------	--

- 1) If the rigidity of the machine or the work material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 3) Water-soluble cutting fluid is recommended.
- 4) Climb cut is recommended for side milling.

MITSUBISHI MATERIALS KOBE TOOLS



JQA-2522
JQA-EM0941

Overseas Operations Center : Cutting Tools

KFC bldg., 8F, 1-6-1, Yokoami, Sumida-ku, Tokyo 130-0015, Japan
TEL 81-3-5819-8771 FAX 81-3-5819-8774

MMC HARTMETALL GmbH

Comeniusstr.2, 40670, Meerbusch GERMANY
TEL 49-2159-9189-0 FAX 49-2159-50462

MITSUBISHI MATERIALS U.S.A. CORPORATION Headquarters

17401, Eastman Street, Irvine, California, 92614, USA
TEL 1-949-862-5100 FAX 1-949-862-5180

MMC METAL SINGAPORE PTE LTD.

10, Arumugam Road, #04-00 Lion Industrial Bldg., 409957, SINGAPORE
TEL 65-6743-9370 FAX 65-6749-1469