

Supercut Solid Carbide Mills



High Performance Solid Carbide End-Mills

Features & Product Identification

4 flutes - Short or long

4 flutes with corner radius – Short, long or with neck

5 flutes – Long

5 flutes with corner radius – Long or with neck

6 flutes - Extra Long

6 flutes with corner radius and neck

7 flutes with corner radius

Ball nose End-Mills 4 flutes

Technical Section



3-31

3-5

6

7-9

10

11-12

13

14

15

15

16-19

High Performance Solid Carbide End-Mills for Aluminum machining

20-22

Features & Product Identification

20

Solid Carbide End-Mills 3 flutes

21

Solid Carbide End-Mills 3 flutes with corner radius

22

Technical Section

23-31

Multi-Function Milling Tools (MF)

32-35

Features & Product Identification

32-33

Multi-Function Milling Tools

33

Working Methods

34

Technical Section

35



Solid Carbide Roughers

36-44

Features & Product Identification

36-37

Solid Carbide Roughers – Short, long or with neck

38-39

Solid Carbide Roughers for Aluminum Machining

40-41

Features

40

without internal coolant

40

with internal coolant through the flutes

41

Technical Section

42-44



Indexable CMT Roughers and Finishers

45-47

Indexable CMT Roughers and Finishers

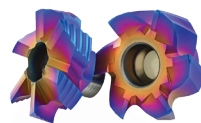
45

Roughers & Finishers

46

Toolholders

47



CR-Supercut High Feed End-Mills

48-54

Product Identification & Features

48-50

Solid Carbide High Feed End-Mills

51

Technical Section

52-54



Solid Carbide Chamfering & filleting End-Mills

55-61

Product Identification & Features

55

Radius fillet End-Mills

56

Countersink

57

Technical Section

58-61



Diamond End-Mills

62-66

Product Identification & Features

62-63

Diamond End-Mills with corner radius

64

Diamond Ball nose End-Mills

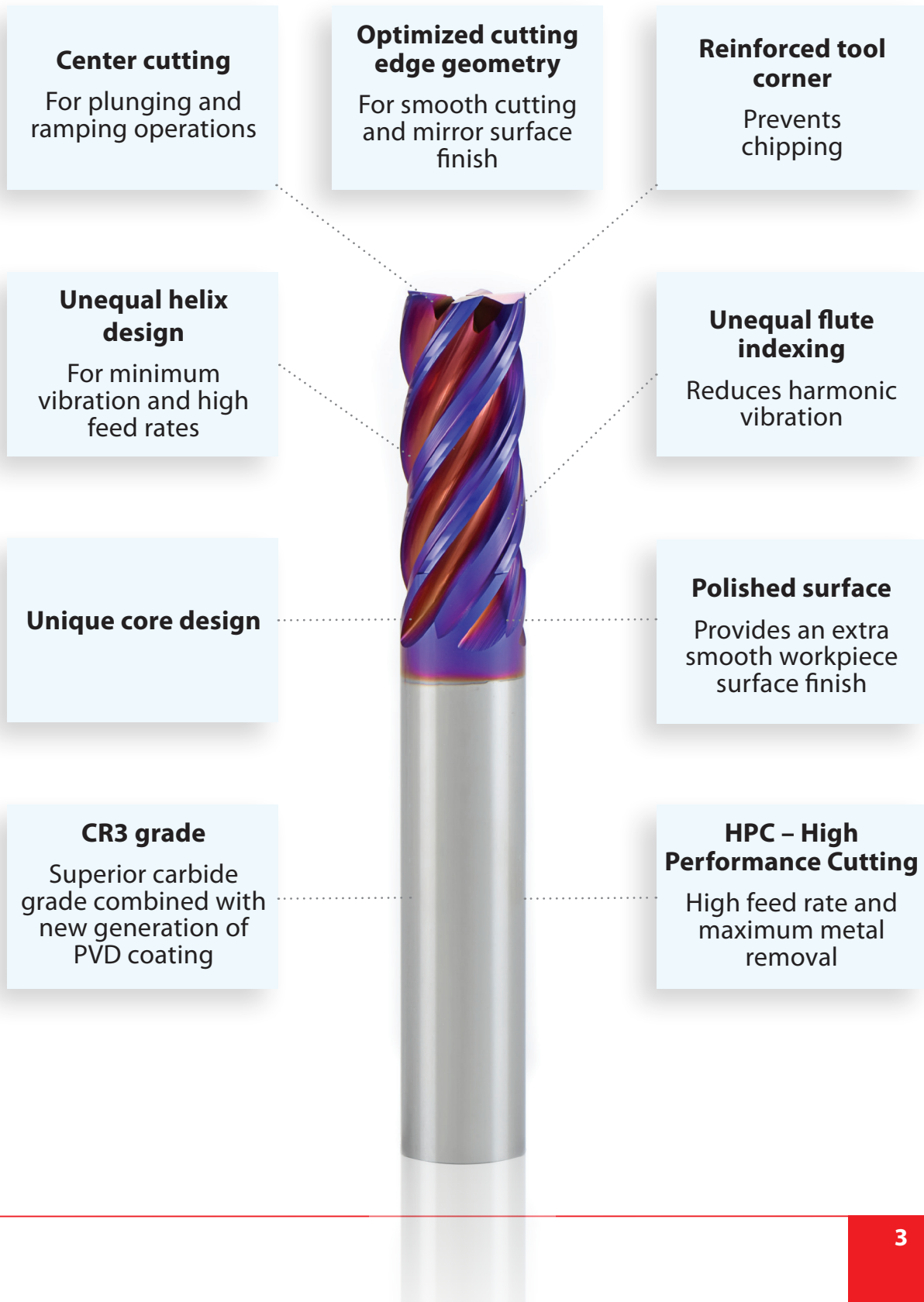
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Cutting data

66

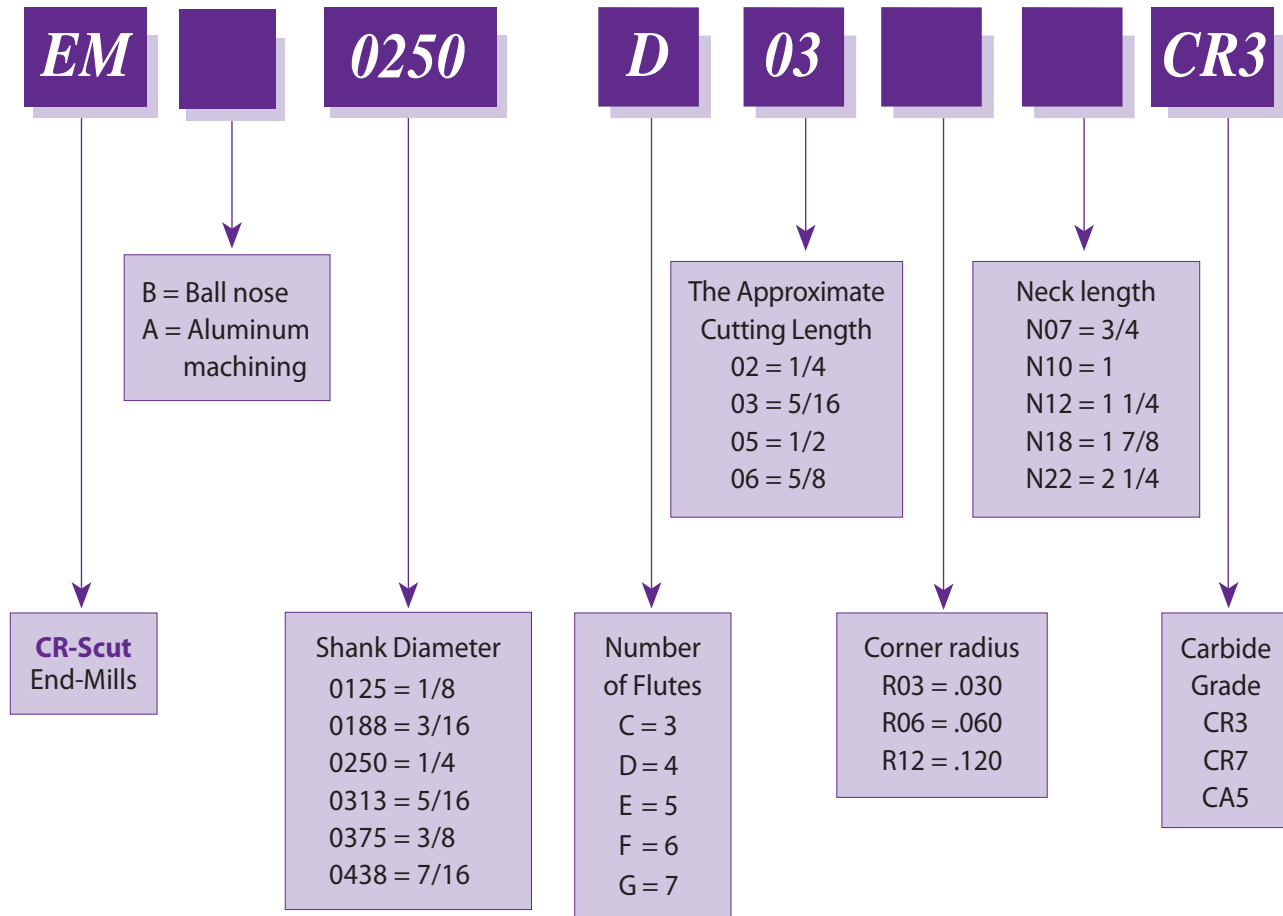


End-Mills Features



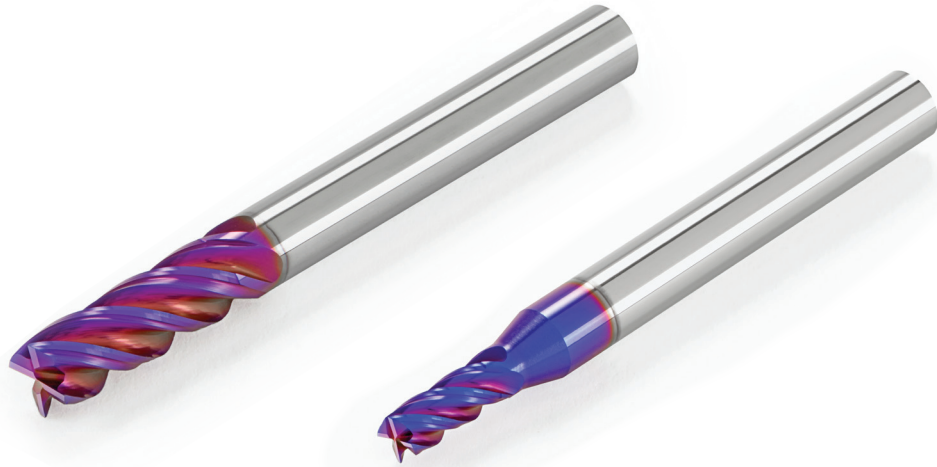
Product Identification

Ordering Codes



CR-Supercut End-Mills

High Performance Solid Carbide End-Mills



High Performance CR-Supercut End-Mills, designed for high feed machining and high metal removal rate for a wide range of materials. Innovative tool geometry delivers high performance with low vibration machining in one pass. One tool for semi-finishing and fine-finishing operation with sharp corner or radii.

- High Performance Cutting (HPC)
- Center cutting
- Low vibration machining
- High metal removal rates in Slotting, Shouldering and Helical Plunging operations.
- 3-7 flutes

Carbide grade: CR3

Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.

A New Generation of PVD Coating for High-Performance Cutting Applications.

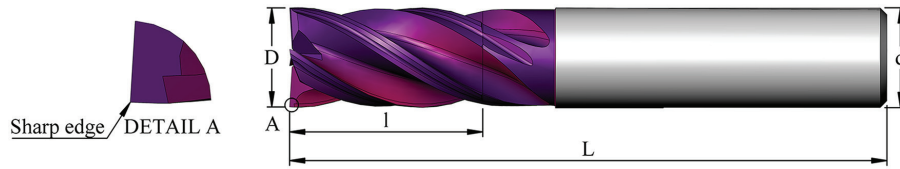
Carbide grade: CR7

Optimal combination of high hardness and excellent wear resistance grade, both in dry or wet machining. Suitable for finishing and semi-finishing of steels, stainless steels and super alloys.

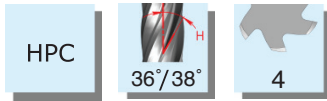
A New Generation of PVD Coating for High-Performance Cutting Applications.

High Performance Solid Carbide End-Mills

Solid Carbide End-Mills 4 flutes



Short Design

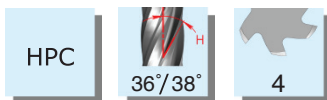


Grade	P	M	K	N	S	H
CR3	●	○	●		○	≤48 HRc
CR7	●	●			●	≤58 HRc

Ordering Code	d	D	No. of Flutes	I	L
EM 0125 D02	1/8	1/8	4	1/4	1 1/2
EM 0188 D03	3/16	3/16	4	5/16	2
EM 0250 D03	1/4	1/4	4	3/8	2
EM 0313 D05	5/16	5/16	4	1/2	2
EM 0375 D05	3/8	3/8	4	1/2	2
EM 0438 D06	7/16	7/16	4	5/8	2 1/2
EM 0500 D06	1/2	1/2	4	5/8	2 1/2
EM 0625 D07	5/8	5/8	4	3/4	3
EM 0750 D08	3/4	3/4	4	7/8	3 1/2
EM 1000 D15	1	1	4	1 1/2	4

Order example: EM 0250 D03 CR7

Long Design



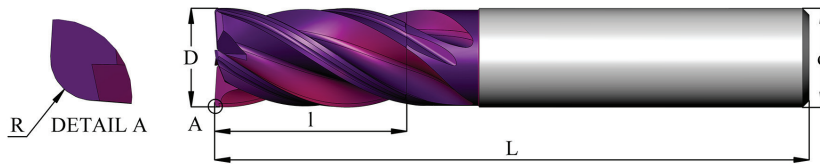
Grade	P	M	K	N	S	H
CR3	●	○	●		○	≤48 HRc
CR7	●	●			●	≤58 HRc

Ordering Code	d	D	No. of Flutes	I	L
EM 0125 D03	1/8	1/8	4	3/8	1 1/2
EM 0188 D05	3/16	3/16	4	1/2	2
EM 0250 D07	1/4	1/4	4	3/4	2
EM 0313 D07	5/16	5/16	4	3/4	2 1/2
EM 0375 D08	3/8	3/8	4	7/8	2 1/2
EM 0438 D08	7/16	7/16	4	7/8	2 1/2
EM 0500 D10	1/2	1/2	4	1	3
EM 0500 D12	1/2	1/2	4	1 1/4	3
EM 0625 D12	5/8	5/8	4	1 1/4	3 1/2
EM 0750 D15	3/4	3/4	4	1 1/2	4
EM 0750 D16	3/4	3/4	4	1 5/8	4
EM 1000 D20	1	1	4	2	5

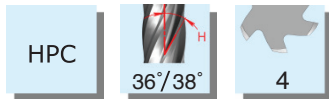
Order example: EM 0750 D15 CR3

● First choice ○ Alternative

Solid Carbide End-Mills 4 flutes with corner radius



Short Design



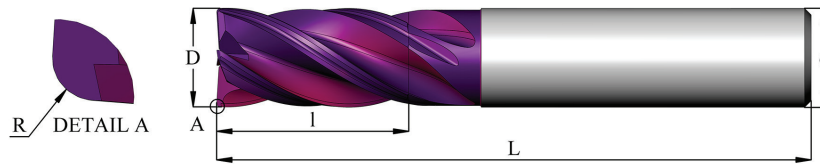
Grade	P	M	K	N	S	H
CR3	●	○	●		○	≤48 HRc
CR7	●	●			●	≤58 HRc

Ordering Code	d	D	No. of Flutes	R	I	L
EM 0250 D03 R03	1/4	1/4	4	.030	3/8	2
EM 0313 D05 R03	5/16	5/16	4	.030	1/2	2
EM 0375 D05 R03	3/8	3/8	4	.030	1/2	2
EM 0500 D06 R03	1/2	1/2	4	.030	5/8	2 1/2
EM 0500 D06 R06	1/2	1/2	4	.060	5/8	2 1/2
EM 0625 D07 R06	5/8	5/8	4	.060	3/4	3
EM 0625 D07 R12	5/8	5/8	4	.120	3/4	3
EM 0750 D08 R03	3/4	3/4	4	.030	7/8	3 1/2
EM 0750 D08 R06	3/4	3/4	4	.060	7/8	3 1/2
EM 0750 D08 R12	3/4	3/4	4	.120	7/8	3 1/2
EM 1000 D15 R03	1	1	4	.030	1 1/2	4
EM 1000 D15 R06	1	1	4	.060	1 1/2	4
EM 1000 D15 R12	1	1	4	.120	1 1/2	4

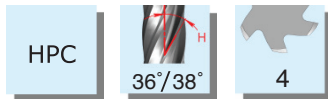
Order example: EM 0313 D05 R03 CR3

● First choice ○ Alternative

Solid Carbide End-Mills 4 flutes with corner radius



Long Design



Grade	P	M	K	N	S	H
CR3	●	○	●		○	≤48 HRc
CR7	●	●			●	≤58 HRc

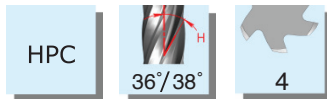
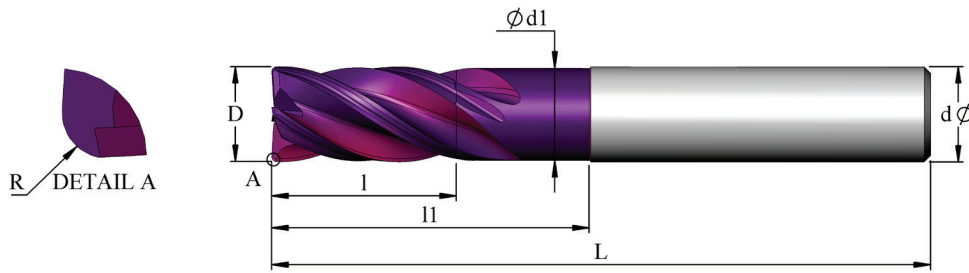
Ordering Code	d	D	No. of Flutes	R	I	L
EM 0125 D05 R01	1/8	1/8	4	.015	1/2	2
EM 0188 D06 R01	3/16	3/16	4	.015	5/8	2
EM 0188 D06 R03	3/16	3/16	4	.030	5/8	2
EM 0250 D07 R01	1/4	1/4	4	.015	3/4	2
EM 0250 D07 R03	1/4	1/4	4	.030	3/4	2
EM 0250 D07 R06	1/4	1/4	4	.060	3/4	2
EM 0313 D07 R01	5/16	5/16	4	.015	3/4	2 1/2
EM 0313 D07 R03	5/16	5/16	4	.030	3/4	2 1/2
EM 0313 D07 R06	5/16	5/16	4	.060	3/4	2 1/2
EM 0375 D08 R01	3/8	3/8	4	.015	7/8	2 1/2
EM 0375 D08 R03	3/8	3/8	4	.030	7/8	2 1/2
EM 0375 D08 R06	3/8	3/8	4	.060	7/8	2 1/2
EM 0375 D08 R09	3/8	3/8	4	.090	7/8	2 1/2
EM 0500 D12 R01	1/2	1/2	4	.015	1 1/4	3
EM 0500 D12 R03	1/2	1/2	4	.030	1 1/4	3
EM 0500 D12 R06	1/2	1/2	4	.060	1 1/4	3
EM 0500 D12 R09	1/2	1/2	4	.090	1 1/4	3
EM 0500 D12 R12	1/2	1/2	4	.120	1 1/4	3
EM 0625 D12 R03	5/8	5/8	4	.030	1 1/4	3 1/2
EM 0625 D12 R06	5/8	5/8	4	.060	1 1/4	3 1/2
EM 0625 D12 R09	5/8	5/8	4	.090	1 1/4	3 1/2
EM 0625 D12 R12	5/8	5/8	4	.120	1 1/4	3 1/2
EM 0750 D15 R03	3/4	3/4	4	.030	1 1/2	4
EM 0750 D15 R06	3/4	3/4	4	.060	1 1/2	4
EM 0750 D15 R09	3/4	3/4	4	.090	1 1/2	4
EM 0750 D15 R12	3/4	3/4	4	.120	1 1/2	4
EM 1000 D22 R03	1	1	4	.030	2 1/4	5
EM 1000 D22 R06	1	1	4	.060	2 1/4	5

Order example: EM 0188 D06 R01 CR7

● First choice

○ Alternative

Solid Carbide End-Mills 4 flutes with corner radius and neck



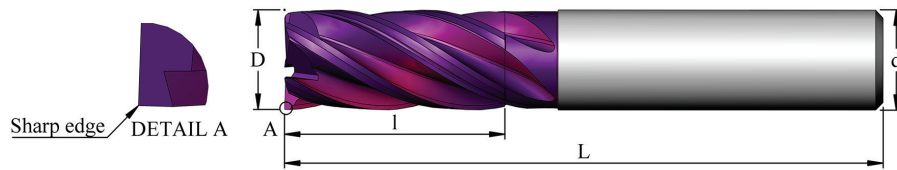
Grade	P	M	K	N	S	H
CR7	●	●			●	≤58 HRc

Ordering Code	d	D	l	l1	d1	R	No. of Flutes	L
EM 0188 D02 R01 N07	3/16	3/16	1/4	3/4	.18	.010	4	3
EM 0188 D02 R03 N07	3/16	3/16	1/4	3/4	.18	.030	4	3
EM 0250 D03 R01 N12	1/4	1/4	3/8	1 1/4	.24	.015	4	4
EM 0250 D03 R03 N12	1/4	1/4	3/8	1 1/4	.24	.030	4	4
EM 0375 D05 R03 N18	3/8	3/8	1/2	1 7/8	.35	.030	4	4
EM 0375 D05 R06 N18	3/8	3/8	1/2	1 7/8	.35	.060	4	4
EM 0500 D06 R03 N22	1/2	1/2	5/8	2 1/4	.47	.030	4	4
EM 0500 D06 R06 N22	1/2	1/2	5/8	2 1/4	.47	.060	4	4
EM 0500 D06 R12 N22	1/2	1/2	5/8	2 1/4	.47	.120	4	4
EM 0625 D07 R06 N22	5/8	5/8	3/4	2 1/4	.59	.060	4	5
EM 0625 D07 R12 N22	5/8	5/8	3/4	2 1/4	.59	.120	4	5

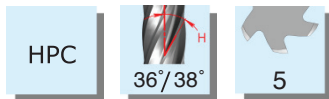
Order example: EM 0625 D07 R06 N22 CR7

● First choice ○ Alternative

Solid Carbide End-Mills 5 flutes



Long Design



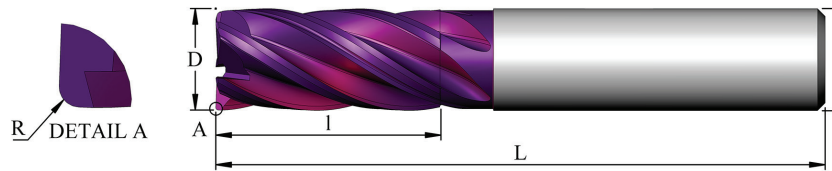
Grade	P	M	K	N	S	H
CR3	●	○	●		○	≤48 HRc
CR7	●	●			●	≤58 HRc

Ordering Code	d	D	No. of Flutes	I	L
EM 0188 E06	3/16	3/16	5	5/8	2
EM 0250 E07	1/4	1/4	5	3/4	2
EM 0313 E07	5/16	5/16	5	3/4	2 1/2
EM 0375 E08	3/8	3/8	5	7/8	2 1/2
EM 0500 E12	1/2	1/2	5	1 1/4	3 1/2
EM 0625 E12	5/8	5/8	5	1 1/4	3 1/2
EM 0750 E15	3/4	3/4	5	1 1/2	4

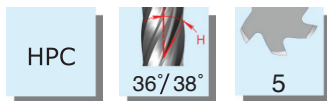
Order example: EM 0188 E06 CR3

● First choice ○ Alternative

Solid Carbide End-Mills 5 flutes with corner radius



Long Design



Grade	P	M	K	N	S	H
CR3	●	○	●		○	≤48 HRc
CR7	●	●			●	≤58 HRc

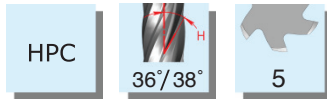
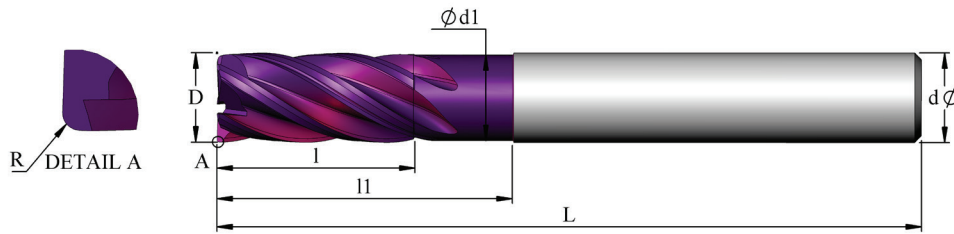
Ordering Code	d	D	No. of Flutes	R	l	L
EM 0188 E06 R01	3/16	3/16	5	.015	5/8	2
EM 0188 E06 R03	3/16	3/16	5	.030	5/8	2
EM 0250 E07 R01	1/4	1/4	5	.015	3/4	2
EM 0250 E07 R03	1/4	1/4	5	.030	3/4	2
EM 0250 E07 R06	1/4	1/4	5	.060	3/4	2
EM 0313 E07 R01	5/16	5/16	5	.015	3/4	2 1/2
EM 0313 E07 R03	5/16	5/16	5	.030	3/4	2 1/2
EM 0313 E07 R06	5/16	5/16	5	.060	3/4	2 1/2
EM 0375 E08 R01	3/8	3/8	5	.015	7/8	2 1/2
EM 0375 E08 R03	3/8	3/8	5	.030	7/8	2 1/2
EM 0375 E08 R06	3/8	3/8	5	.060	7/8	2 1/2
EM 0500 E12 R01	1/2	1/2	5	.015	1 1/4	3 1/2
EM 0500 E12 R03	1/2	1/2	5	.030	1 1/4	3 1/2
EM 0500 E12 R06	1/2	1/2	5	.060	1 1/4	3 1/2
EM 0500 E12 R09	1/2	1/2	5	.090	1 1/4	3 1/2
EM 0500 E12 R12	1/2	1/2	5	.120	1 1/4	3 1/2
EM 0625 E12 R03	5/8	5/8	5	.030	1 1/4	3 1/2
EM 0625 E12 R06	5/8	5/8	5	.060	1 1/4	3 1/2
EM 0625 E12 R09	5/8	5/8	5	.090	1 1/4	3 1/2
EM 0750 E15 R03	3/4	3/4	5	.030	1 1/2	4
EM 0750 E15 R06	3/4	3/4	5	.060	1 1/2	4
EM 0750 E15 R09	3/4	3/4	5	.090	1 1/2	4
EM 0750 E15 R12	3/4	3/4	5	.120	1 1/2	4
EM 0750 E16 R12	3/4	3/4	5	.120	1 5/8	4

Order example: EM 0500 E12 R01 CR7

● First choice

○ Alternative

Solid Carbide End-Mills 5 flutes with corner radius and neck



Grade	P	M	K	N	S	H
CR7	●	●			●	≤58 HRc

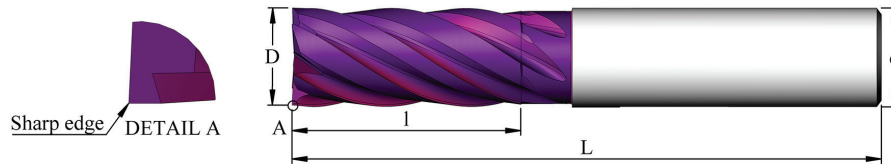
Ordering Code	d	D	I	I1	d1	R	No. of Flutes	L
EM 0250 E05 R01 N12	1/4	1/4	1/2	1 1/4	.24	.015	5	4
EM 0250 E05 R03 N12	1/4	1/4	1/2	1 1/4	.24	.030	5	4
EM 0375 E08 R01 N18	3/8	3/8	7/8	1 7/8	.35	.015	5	4
EM 0375 E08 R03 N18	3/8	3/8	7/8	1 7/8	.35	.030	5	4
EM 0500 E12 R03 N22	1/2	1/2	1 1/4	2 1/4	.47	.030	5	4
EM 0500 E12 R06 N22	1/2	1/2	1 1/4	2 1/4	.47	.060	5	4
EM 0625 E12 R03 N22	5/8	5/8	1 1/4	2 1/4	.59	.030	5	4
EM 0625 E12 R06 N22	5/8	5/8	1 1/4	2 1/4	.59	.060	5	4
EM 0750 E15 R03 N32	3/4	3/4	1 1/2	3 1/4	.71	.030	5	6
EM 0750 E15 R06 N32	3/4	3/4	1 1/2	3 1/4	.71	.060	5	6

Order example: EM 0250 E05 R01 N12 CR7

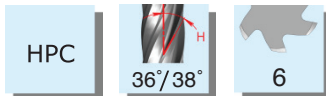
● First choice

○ Alternative

Solid Carbide End-Mills 6 flutes



Extra-long Design



Grade	P	M	K	N	S	H
CR3	●	○	●		○	≤ 48 HRc
CR7	●	●			●	≤ 58 HRc

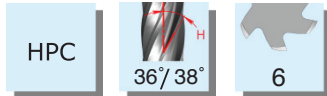
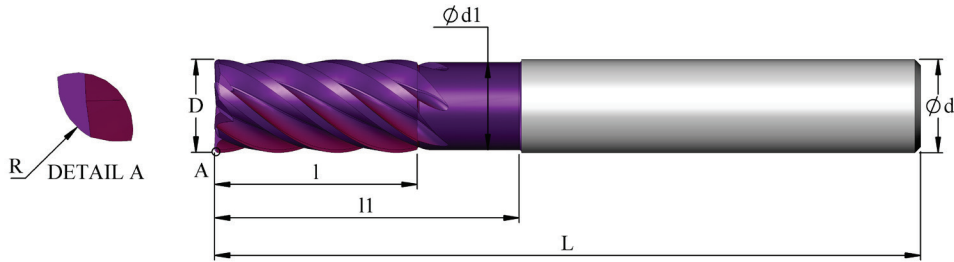
Ordering Code	d	D	No. of Flutes	l	L
EM 0250 F05	1/4	1/4	6	1/2	2
EM 0250 F07	1/4	1/4	6	3/4	2 1/2
EM 0313 F07	5/16	5/16	6	3/4	2 1/2
EM 0313 F10	5/16	5/16	6	1	2 1/2
EM 0375 F10	3/8	3/8	6	1	3
EM 0375 F12	3/8	3/8	6	1 1/4	3
EM 0500 F12	1/2	1/2	6	1 1/4	3 1/2
EM 0500 F16	1/2	1/2	6	1 5/8	4
EM 0625 F16	5/8	5/8	6	1 5/8	4
EM 0625 F20	5/8	5/8	6	2	5
EM 0750 F22	3/4	3/4	6	2 1/4	6

Order example: EM 0375 F10 CR3

● First choice

○ Alternative

Solid Carbide End-Mills 6 flutes with corner Radius and neck



Grade	P	M	K	N	S	H
CR7	●	●			●	≤ 58 HRc

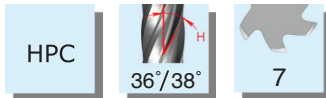
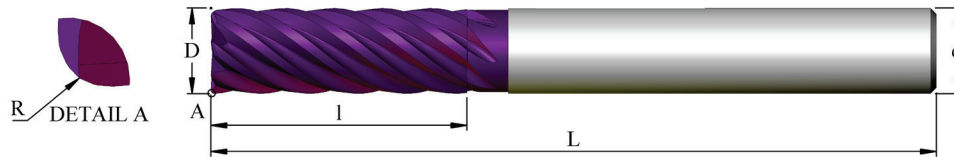
Ordering Code	d	D	l	l1	d1	R	No. of Flutes	L
EM 0375 F08 R01 N18	3/8	3/8	7/8	1 7/8	.35	.015	6	4
EM 0375 F08 R03 N18	3/8	3/8	7/8	1 7/8	.35	.030	6	4
EM 0500 F12 R03 N22	1/2	1/2	1 1/4	2 1/4	.47	.030	6	4
EM 0500 F12 R06 N22	1/2	1/2	1 1/4	2 1/4	.47	.060	6	4
EM 0625 F12 R03 N22	5/8	5/8	1 1/4	2 1/4	.59	.030	6	5
EM 0625 F12 R06 N22	5/8	5/8	1 1/4	2 1/4	.59	.060	6	5
EM 0750 F15 R03 N32	3/4	3/4	1 1/2	3 1/4	.71	.030	6	6
EM 0750 F15 R06 N32	3/4	3/4	1 1/2	3 1/4	.71	.060	6	6

Order example: EM 0625 F12 R06 N22 CR7

● First choice

○ Alternative

Solid Carbide End-Mills 7 flutes with corner radius

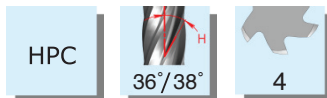
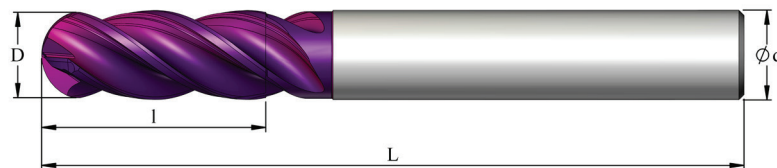


Grade	P	M	K	N	S	H
CR7	●	●			●	≤58 HRc

Ordering Code	d	D	No. of Flutes	R	I	L
EM 0375 G11 R01	3/8	3/8	7	.015	1 1/8	3
EM 0375 G11 R03	3/8	3/8	7	.030	1 1/8	3
EM 0375 G18 R01	3/8	3/8	7	.015	1 7/8	4
EM 0375 G18 R03	3/8	3/8	7	.030	1 7/8	4
EM 0500 G15 R03	1/2	1/2	7	.030	1 1/2	3 1/2
EM 0500 G15 R06	1/2	1/2	7	.060	1 1/2	3 1/2
EM 0500 G15 R12	1/2	1/2	7	.120	1 1/2	3 1/2
EM 0625 G18 R03	5/8	5/8	7	.030	1 7/8	4
EM 0625 G18 R06	5/8	5/8	7	.060	1 7/8	4

Order example: EM 0375 G11 R01 CR7

Solid Carbide Ball nose End-Mills 4 flutes



Grade	P	M	K	N	S	H
CR7	●	●			●	≤58 HRc

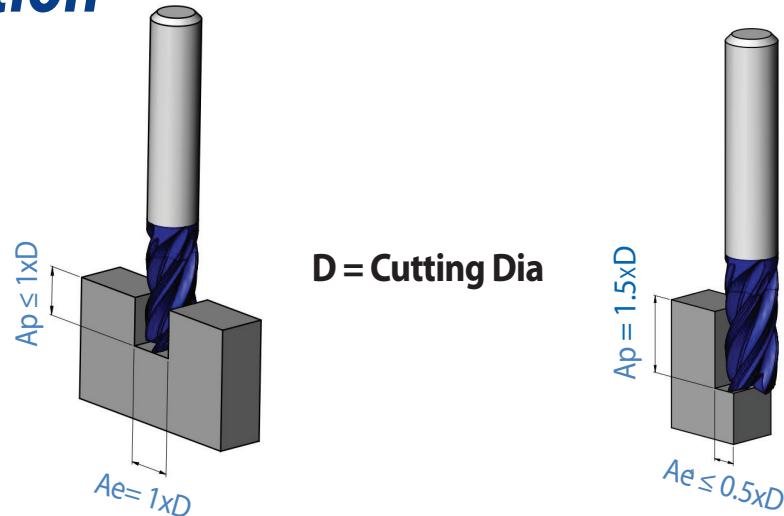
Ordering Code	d	D	I	No. of Flutes	L
EMB 0188 D06	3/16	3/16	5/8	4	2 1/2
EMB 0250 D07	1/4	1/4	3/4	4	2 1/2
EMB 0313 D07	5/16	5/16	3/4	4	2 1/2
EMB 0375 D08	3/8	3/8	7/8	4	2 1/2
EMB 0438 D08	7/16	7/16	7/8	4	2 1/2
EMB 0500 D10	1/2	1/2	1	4	3
EMB 0500 D12	1/2	1/2	1 1/4	4	3
EMB 0625 D12	5/8	5/8	1 1/4	4	3 1/2

Order example: EMB 0188 D06 CR7

● First choice

○ Alternative

Technical Section



Cutting Data

4 fluted End-Mills and Ball nose

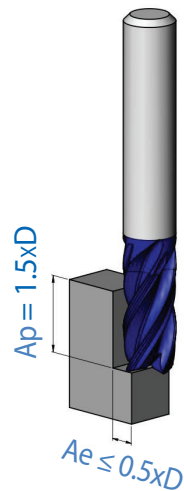
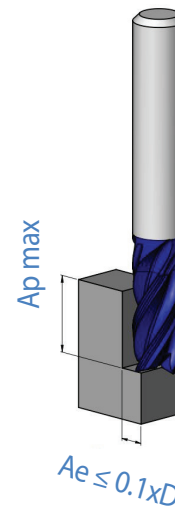
ISO	Materials Class	Vc [SFM]	Fz [IPT]							
			Cutting Diameter							
			Ø1/8	Ø3/16	Ø1/4	Ø5/16	Ø3/8-7/16	Ø1/2	Ø5/8	Ø3/4
P	Low & Medium Carbon Steels <0.55%C	390-525	.0003	.0008	.0010	.0016	.0019	.0022	.0025	.0031
	High Carbon Steels ≥0.55%C	390-525	.0003	.0008	.0010	.0016	.0019	.0022	.0025	.0031
	Alloy Steels, Treated Steels	330-460	.0002	.0005	.0008	.0010	.0015	.0019	.0021	.0026
M	Stainless Steel-Free Cutting	260-460	.0002	.0007	.0008	.0010	.0016	.0019	.0021	.0026
	Stainless Steel-Austenitic	230-430	.0002	.0005	.0008	.0009	.0013	.0016	.0018	.0022
	Cast Steels	230-430	.0002	.0005	.0008	.0009	.0013	.0016	.0018	.0022
K	Cast Iron	260-460	.0002	.0007	.0009	.0011	.0015	.0019	.0021	.0026
S	Heat-resistant alloys	65-130	.0002	.0004	.0007	.0012	.0019	.0022	.0025	.0030
	Titanium alloys	165-230	.0002	.0004	.0007	.0012	.0019	.0022	.0025	.0030
H	Hardened Steel <48 HRc	130-230	.0003	.0004	.0007	.0008	.0009	.0010	.0011	.0011
	Hardened Steel 48-58 HRc	115-200	.0002	.0003	.0005	.0006	.0007	.0007	.0008	.0008

* Fz values are recommended for side milling. For slotting, reduce Fz by 20%

5 fluted End-Mills

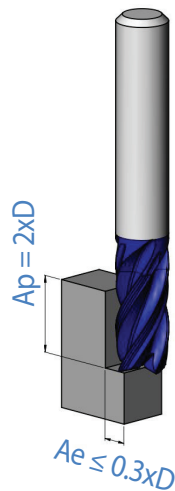
ISO	Materials Class	Vc [SFM]	Fz [IPT]						
			Cutting Diameter						
			3/16	Ø1/4	Ø5/16	Ø3/8	Ø1/2	Ø5/8	Ø3/4
P	Low & Medium Carbon Steels <0.55%C	390-525	.0010	.0013	.0016	.0020	.0025	.0030	.0035
	High Carbon Steels ≥0.55%C	390-525	.0010	.0013	.0016	.0020	.0025	.0030	.0035
	Alloy Steels, Treated Steels	330-460	.0010	.0013	.0015	.0020	.0025	.0030	.0035
M	Stainless Steel-Free Cutting	260-460	.0009	.0012	.0013	.0018	.0025	.0027	.0030
	Stainless Steel-Austenitic	230-430	.0009	.0012	.0013	.0018	.0025	.0027	.0030
	Cast Steels	230-430	.0009	.0012	.0013	.0018	.0025	.0027	.0030
K	Cast Iron	260-460	.0011	.0014	.0015	.0019	.0027	.0029	.0031
S	Heat-resistant alloys	65-130	.0005	.0007	.0012	.0019	.0022	.0025	.0030
	Titanium alloys	165-230	.0005	.0007	.0012	.0019	.0022	.0025	.0030
H	Hardened Steel <48 HRc	130-230	.0007	.0008	.0008	.0010	.0011	.0014	.0016
	Hardened Steel 48-58 HRc	115-200	.0005	.0006	.0006	.0007	.0008	.0010	.0012

* Fz values are recommended for side milling. For slotting, reduce Fz by 20%

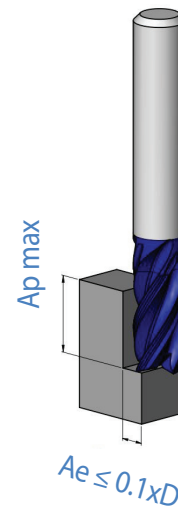

A

B

6 fluted End-Mills

ISO	Materials Class	Vc [SFM]	Fz [IPT]					
			Cutting Diameter					
			Ø1/4	Ø5/16	Ø3/8	Ø1/2	Ø5/8	Ø3/4
P	Low & Medium Carbon Steels <0.55%C	A: 395-525 B: 790-1050	A: .0016 B: .0019	A: .0018 B: .0021	A: .0022 B: .0026	A: .0027 B: .0032	A: .0032 B: .0038	A: .0035 B: .0042
	High Carbon Steels ≥0.55%C	A: 395-525 B: 790-1050	A: .0016 B: .0019	A: .0018 B: .0021	A: .0022 B: .0026	A: .0027 B: .0032	A: .0032 B: .0038	A: .0035 B: .0042
	Alloy Steels, Treated Steels	A: 325-460 B: 650-920	A: .0016 B: .0019	A: .0018 B: .0021	A: .0022 B: .0026	A: .0027 B: .0032	A: .0032 B: .0038	A: .0035 B: .0042
M	Stainless Steel-Free Cutting	A: 265-460 B: 530-920	A: .0014 B: .0017	A: .0015 B: .0017	A: .0020 B: .0024	A: .0027 B: .0031	A: .0029 B: .0035	A: .0032 B: .0038
	Stainless Steel-Austenitic	A: 230-425 B: 460-850	A: .0014 B: .0017	A: .0015 B: .0017	A: .0020 B: .0024	A: .0027 B: .0031	A: .0029 B: .0035	A: .0032 B: .0038
	Cast Steels	A: 230-425 B: 460-850	A: .0014 B: .0017	A: .0015 B: .0017	A: .0020 B: .0024	A: .0027 B: .0031	A: .0029 B: .0035	A: .0032 B: .0038
K	Cast Iron	A: 260-460 B: 320-920	A: .0015 B: .0018	A: .0016 B: .0019	A: .0021 B: .0025	A: .0028 B: .0032	A: .0030 B: .0036	A: .0033 B: .0039
S	Heat-resistant alloys	A: 65-130 B: 130-260	A: .0007 B: .0009	A: .0012 B: .0015	A: .0019 B: .0023	A: .0022 B: .0026	A: .0025 B: .0030	A: .0030 B: .0039
	Titanium alloys	A: 165-230 B: 230-330	A: .0007 B: .0009	A: .0012 B: .0015	A: .0019 B: .0023	A: .0022 B: .0026	A: .0025 B: .0030	A: .0030 B: .0039
H	Hardened Steel <48 HRc	A: 130-230 B: 260-460	A: .0009 B: .0011	A: .0010 B: .0012	A: .0012 B: .0014	A: .0013 B: .0016	A: .0016 B: .0019	A: .0018 B: .0021
	Hardened Steel 48-58 HRc	A: 115-200 B: 230-400	A: .0007 B: .0008	A: .0007 B: .0009	A: .0009 B: .0010	A: .0009 B: .0012	A: .0012 B: .0014	A: .0013 B: .0016



A



B

7 fluted End-Mills

ISO	Materials Class	Vc [SFM]	Fz [IPT] Cutting Diameter		
			Ø3/8	Ø1/2	Ø5/8
P	Low & Medium Carbon Steels <0.55%C	A:395-525 B:790-1050	A: .0022 B: .0026	A: .0027 B: .0032	A: .0032 B: .0038
	High Carbon Steels ≥0.55%C	A:395-525 B:790-1050	A: .0022 B: .0026	A: .0027 B: .0032	A: .0032 B: .0038
	Alloy Steels, Treated Steels	A:330-460 B:660-920	A: .0022 B: .0026	A: .0027 B: .0032	A: .0032 B: .0038
M	Stainless Steel-Free Cutting	A:260-460 B:520-920	A: .0020 B: .0024	A: .0027 B: .0031	A: .0029 B: .0035
	Stainless Steel-Austenitic	A:230-425 B:460-850	A: .0020 B: .0024	A: .0027 B: .0031	A: .0029 B: .0035
	Cast Steels	A:230-425 B:460-850	A: .0020 B: .0024	A: .0027 B: .0031	A: .0029 B: .0035
S	Heat-resistant alloys	A:65-130 B:130-260	A: .0019 B: .0023	A: .0022 B: .0026	A: .0025 B: .0030
	Titanium alloys	A:165-230 B: 230-330	A: .0019 B: .0023	A: .0022 B: .0026	A: .0025 B: .0030
H	Hardened Steel <48 HRc	A:130-230 B:260-460	A: .0012 B: .0014	A: .0013 B: .0016	A: .0016 B: .0019
	Hardened Steel 48-58 HRc	A:115-200 B:230-400	A: .0009 B: .0010	A: .0010 B: .0012	A: .0012 B: .0014

CR-Supercut End-Mills

High Performance Solid Carbide End-Mills for Aluminum machining

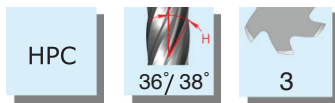
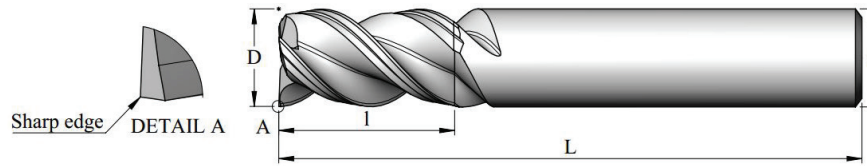


- High Performance Cutting (HPC)
- Center cutting
- Low vibration machining
- High metal removal rates in Slotting, Shouldering and Helical Plunging operations.
- Smooth polished flutes, more flute space and open flute design for better chip flow away from cutting area.
- 3 flutes

Carbide Grade: CA5

Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.

Solid Carbide End-Mills 3 flutes



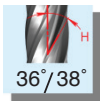
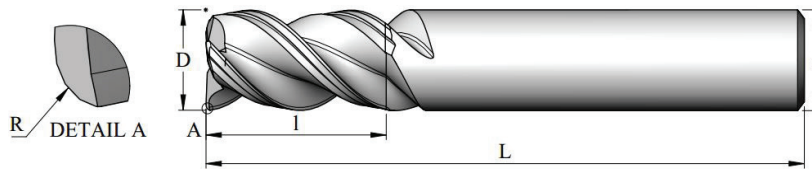
Grade	P	M	K	N	S	H
CA5				●		

Ordering Code	d	D	No. of Flutes	I	L
EMA 0250 C03	1/4	1/4	3	3/8	2
EMA 0250 C07	1/4	1/4	3	3/4	2
EMA 0313 C04	5/16	5/16	3	7/16	2
EMA 0313 C08	5/16	5/16	3	13/16	2 1/2
EMA 0375 C05	3/8	3/8	3	1/2	2
EMA 0375 C08	3/8	3/8	3	7/8	2 1/2
EMA 0500 C06	1/2	1/2	3	5/8	2 1/2
EMA 0500 C10	1/2	1/2	3	1	3
EMA 0500 C12	1/2	1/2	3	1 1/4	3
EMA 0625 C07	5/8	5/8	3	3/4	3
EMA 0625 C12	5/8	5/8	3	1 1/4	3 1/2
EMA 0625 C16	5/8	5/8	3	1 5/8	4
EMA 0750 C15	3/4	3/4	3	1 1/2	4

Order example: EMA 0313 C08 CA5

● First choice ○ Alternative

Solid Carbide End-Mills 3 flutes with corner radius



Grade	P	M	K	N	S	H
CA5				●		

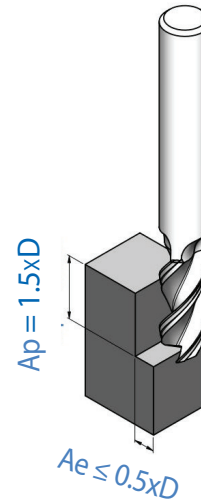
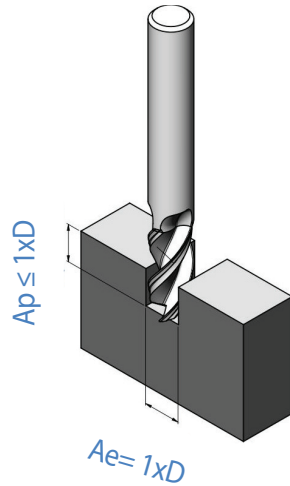
Ordering Code	d	D	No. of Flutes	R	I	L
EMA 0250 C03 R03	1/4	1/4	3	.030	3/8	2
EMA 0250 C07 R01	1/4	1/4	3	.015	3/4	2
EMA 0250 C07 R03	1/4	1/4	3	.030	3/4	2
EMA 0313 C04 R03	5/16	5/16	3	.030	7/16	2
EMA 0313 C08 R03	5/16	5/16	3	.030	13/16	2 1/2
EMA 0313 C08 R06	5/16	5/16	3	.060	13/16	2 1/2
EMA 0375 C05 R03	3/8	3/8	3	.030	1/2	2
EMA 0375 C08 R03	3/8	3/8	3	.030	7/8	2 1/2
EMA 0375 C08 R06	3/8	3/8	3	.060	7/8	2 1/2
EMA 0500 C06 R03	1/2	1/2	3	.030	5/8	2 1/2
EMA 0500 C06 R06	1/2	1/2	3	.060	5/8	2 1/2
EMA 0500 C12 R03	1/2	1/2	3	.030	1 1/4	3
EMA 0500 C12 R06	1/2	1/2	3	.060	1 1/4	3
EMA 0500 C12 R12	1/2	1/2	3	.120	1 1/4	3
EMA 0625 C07 R06	5/8	5/8	3	.060	3/4	3
EMA 0625 C07 R12	5/8	5/8	3	.120	3/4	3
EMA 0625 C12 R06	5/8	5/8	3	.060	1 1/4	3 1/2
EMA 0625 C16 R06	5/8	5/8	3	.060	1 5/8	4
EMA 0750 C15 R03	3/4	3/4	3	.030	1 1/2	4
EMA 0750 C15 R06	3/4	3/4	3	.060	1 1/2	4
EMA 0750 C15 R12	3/4	3/4	3	.120	1 1/2	4

Order example: EMA 0500 C12 R12 CA5

● First choice

○ Alternative

Technical Section



Cutting Data

Cutting conditions for side milling

ISO	Materials Class	Vc [SFM]	Fz [IPT]					
			Cutting Diameter					
			Ø1/4	Ø5/16	Ø3/8	Ø1/2	Ø5/8	Ø3/4
N	Aluminum ≤12%Si, Copper	1650-3300	.0022	.0028	.0035	.0041	.0057	.0071
	Aluminum >12%Si	1650-3300	.0019	.0025	.0032	.0038	.0051	.0063
	Synthetics, duroplastics, thermoplastics	1650-3300	.0022	.0028	.0035	.0041	.0057	.0071

For slotting, reduce the Fz by 15%-25% depending on the application

Case Study

Application

Plunging, Slotting, Helical Profiling

Workpiece material

Die Steel 57HRc

Tool description

EM 0313 D07 R01 CR3

Shank diameter (d): Ø5/16

Cutting diameter (D): Ø5/16

Number of flutes: 4

Cutting length (l): 3/4

Total length (L): 2.5



Machine

VMC 15Kw

Control: Fanuc

Coolant: Emulsion 5%

Parameter	Competitor's tool	EM 0313 D07 R01 CR3
Cutting speed (SFM)	495	495
Rotational speed (RPM)	6000	6000
Feed per tooth (IPT)	.006	.006
Feed (IPM)	138	138
Depth of cut (Ae)	.002	.009
Tool life (minutes)	85	105
Surface Finish	Good	Good

Case Study

Application

Side milling

$A_e = .08$

$A_p = .23$

Workpiece material

Steel SAE 4340

Tool description

EM 0188 D03 CR3

Shank diameter (d): $\varnothing 3/16$

Cutting diameter (D): $\varnothing 3/16$

Number of flutes: 4

Cutting length (l): 5/16

Total length (L): 2



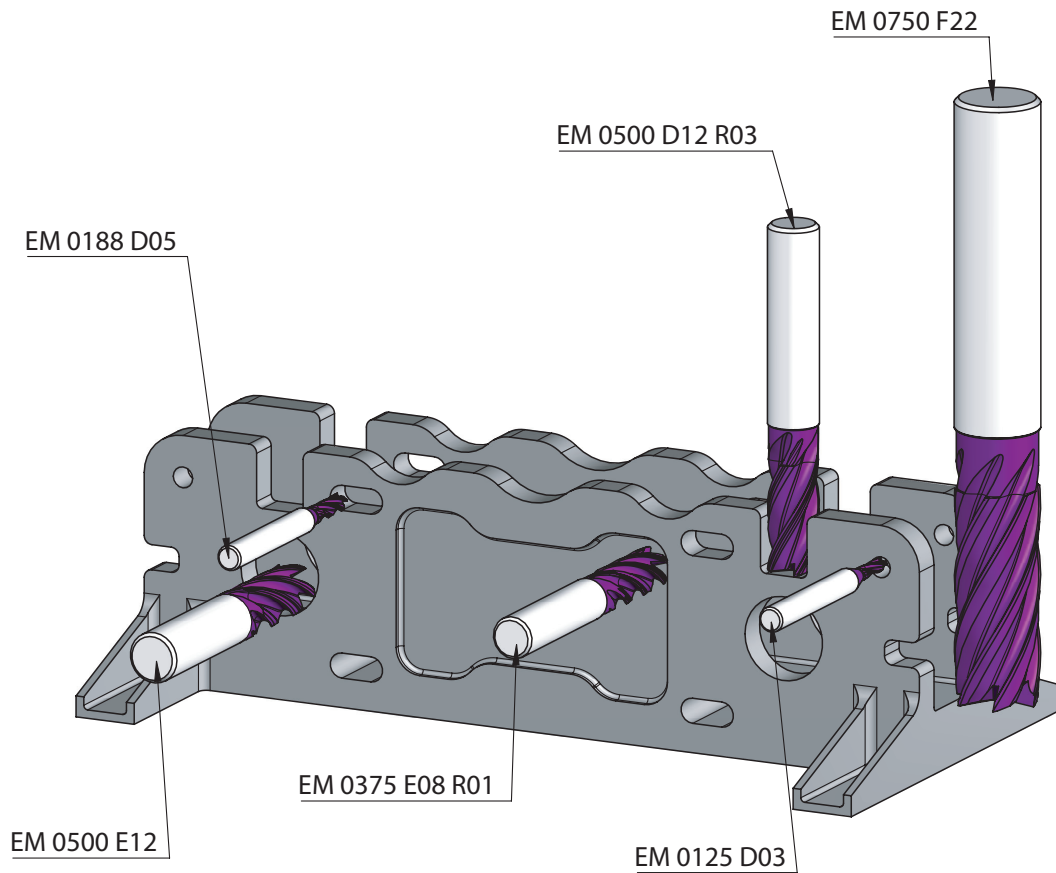
Machine

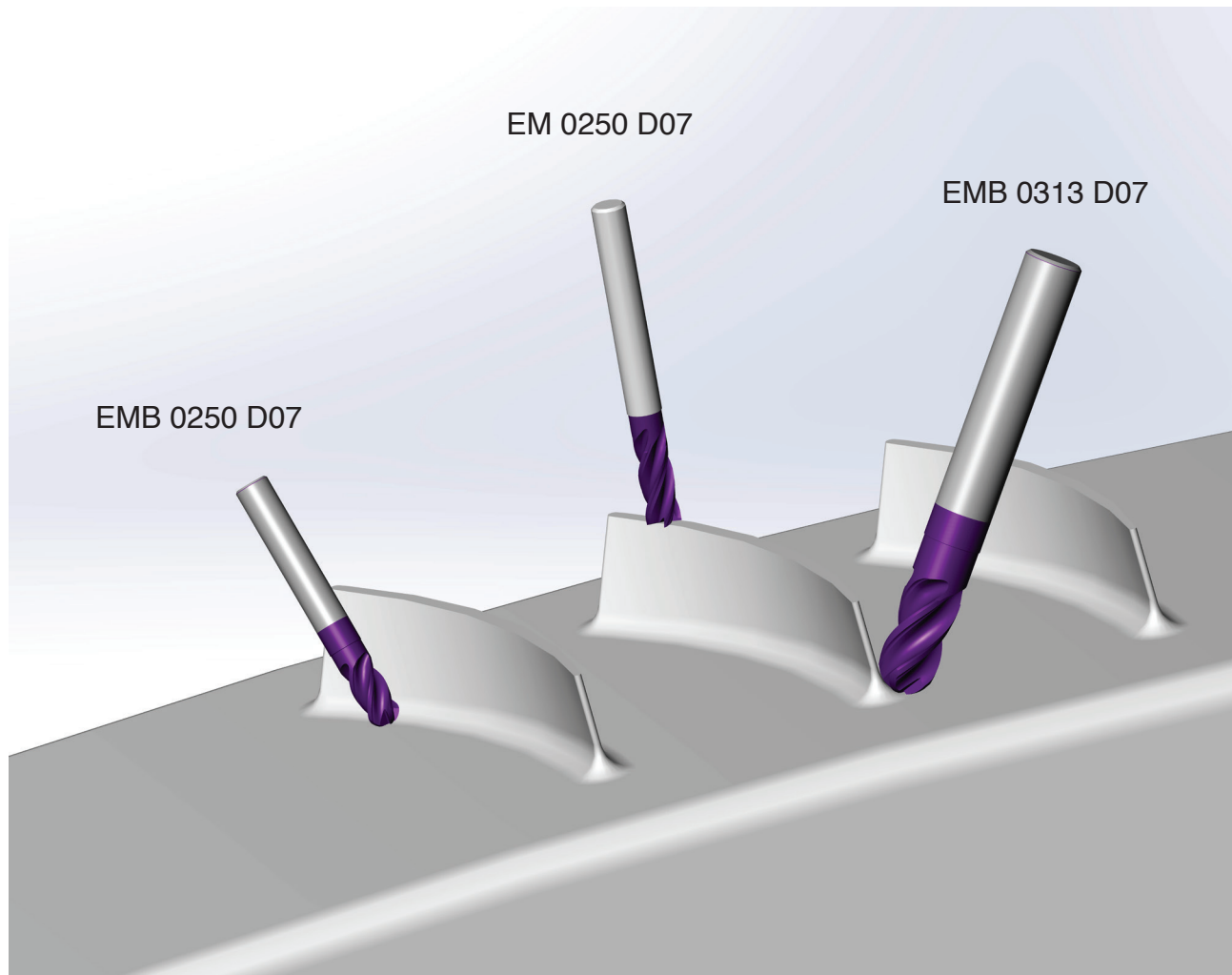
Mori Seiki NV5000

Coolant: Emulsion 5%

Parameter	EM 0188 D03 CR3
Cutting speed (SFM)	460
Feed per tooth (IPT)	.002
A_e	.08
A_p	.23
Total machining time (min)	67

Application Examples

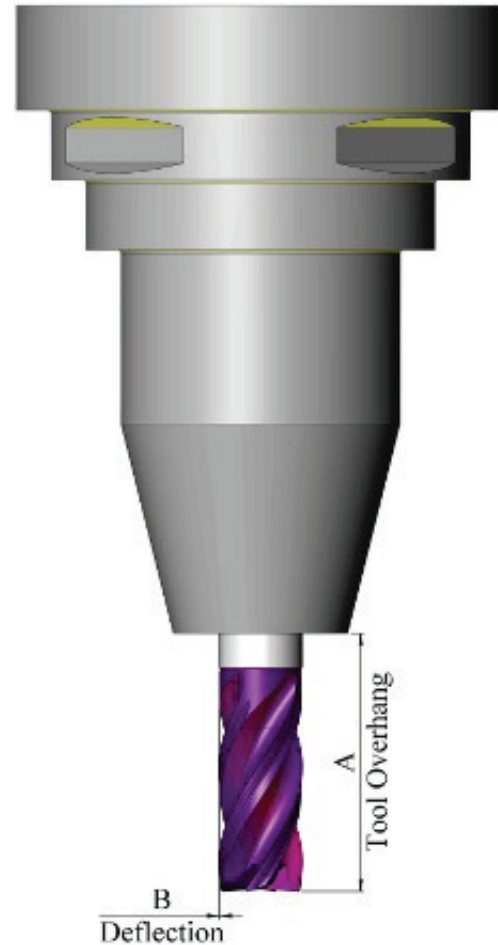




Machining Tips

Tip #1: Overhang

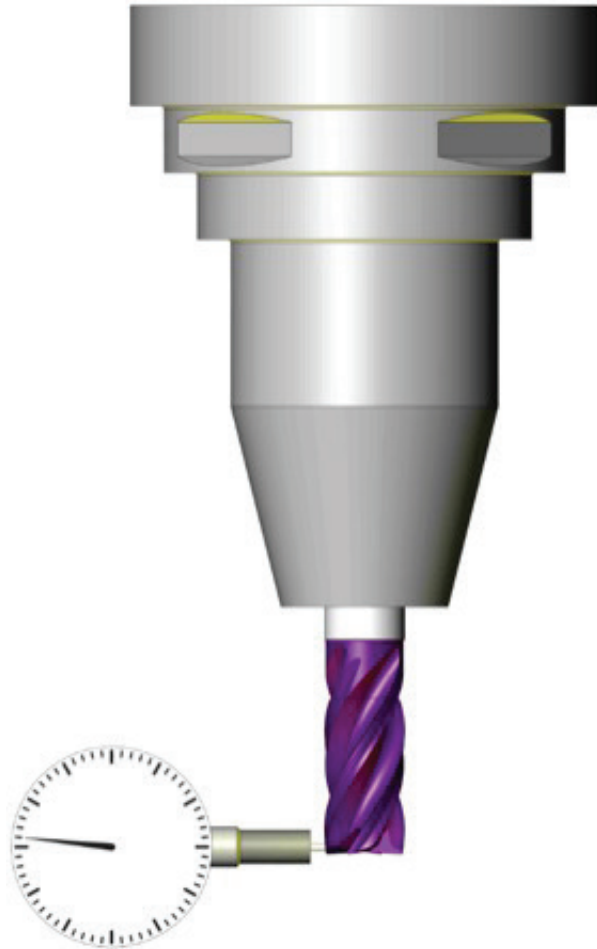
Tool should be used with the smallest possible overhang, to increase stability and reduce deflection, for better surface quality and tool life.



A reduction of only 20% in overhang (A) can reduce deflection (B) by as much as 50%

Tip #2: Tool run-out

- Run out should be as minimal as possible.
- Every 0.01mm run-out can lead to up to 50% decrease in tool life.
- As tool diameter is smaller, avoiding run-out becomes more critical.



Tip #3: Ball nose

When using a Ball nose End-Mills, the most critical area of the cutting edge is the tool center. At that point the cutting speed is close to zero which is not recommended for the tool cutting.



Therefore, tilting the spindle or the workpiece by 10° to 15° is recommended, which moves the cutting zone away from the tool center.

This provides:

- Better chip evacuation
- Better surface finish
- Improved tool life



Tip #4: Coolant

- Coolant can dramatically affect the performance of cutting tools, and the cost of your operation.
- Cutting fluids perform two basic functions:
 - 1) To reduce heat generated during the cut
 - 2) Lubricate the tool and reduce friction between the chip and the tool
- Water-based coolant (emulsion) is the best option.
- Coolant improves the surface finish and helps force chips out of the flutes.

General milling tips

- Less flutes = more chip space, allows a deeper cuts (bigger A_e), suitable for roughing/semi-finishing, slotting.
- More flutes – stronger core, higher stability, less chip space, shallower cut must be used, suitable for super finishing especially for titanium, nickel and super-alloys.
- For best surface quality and tool life, run-out of the machine and the holder must be reduced as close to zero, minimum overhang should be used.
- Climb vs. conventional milling – rule of thumb is “thick to thin” (chip thickness), so most of the time climb milling would be the first choice.

Multi-Function Milling Tools (MF)

Advantages

- Performs multiple operations with one tool
- Eliminates tool changes
- Reduces programming and setup times
- Reduces tool inventories
- Ideal for machines with a limited number of tool stations

Applications

- Spotting and Drilling
- Side milling
- Chamfering
- Slotting
- Grooving
- Engraving



Demonstration



Carbide grades

CR3

Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.

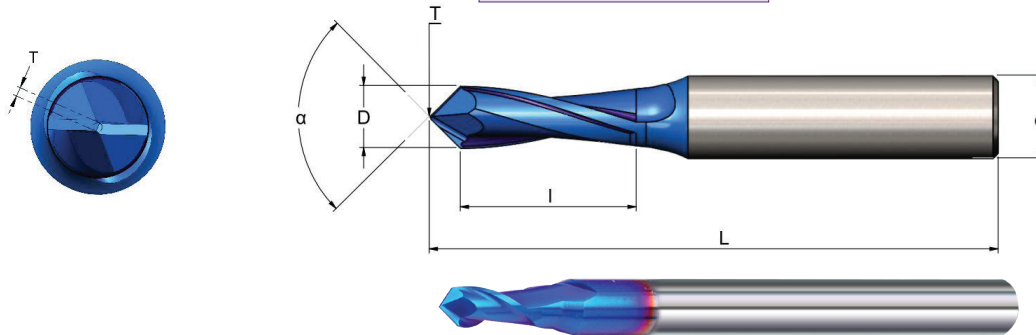
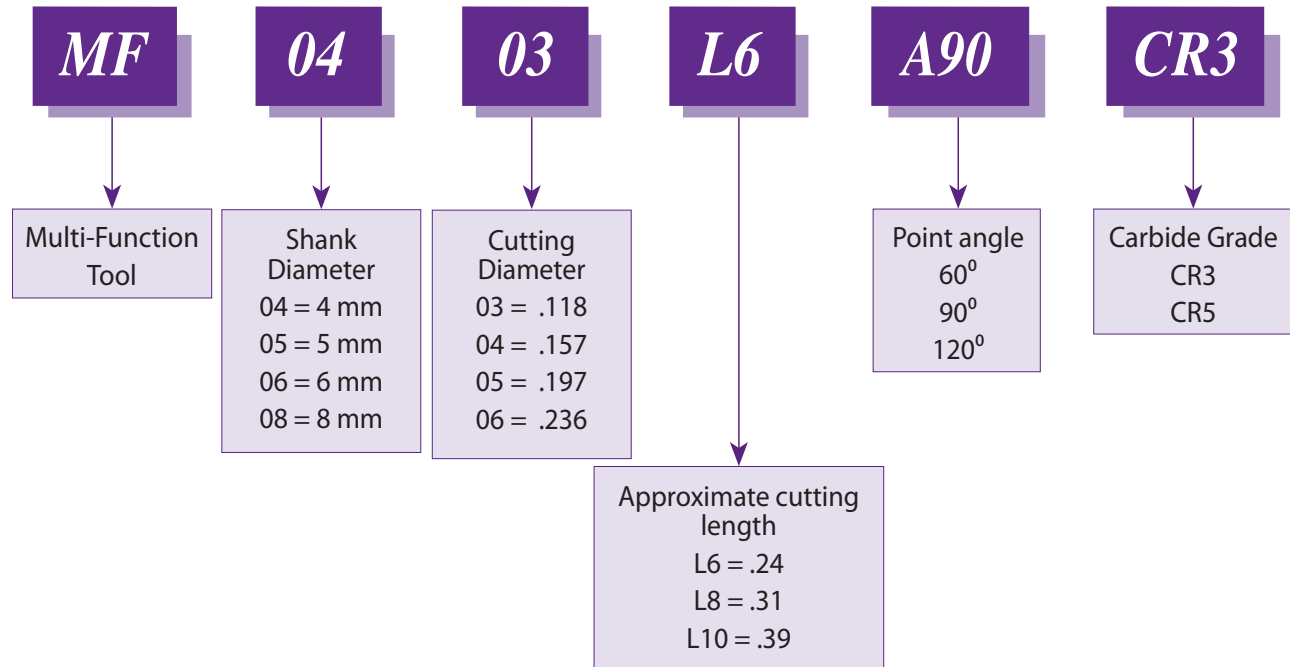
A **New Generation** of PVD Coating for High-Performance Cutting Applications.

CR5

PVD coated **New** grade for machining hardened materials up to 56 HRC and Super alloys.

Product Identification

Ordering Codes



Grade	P	M	K	N	S	H
CR3	●	●	●	●	●	○
CR5	○		○		●	≤ 56 HRC

Ordering Code	d mm	D	α	*T	I	L
MF 0403 L6 A90	4	.118	90°	.012	.24	2.0
MF 0504 L8 A90	5	.157	90°	.016	.31	2.0
MF 0605 L10 A90	6	.197	90°	.020	.39	2.3
MF 0806 L12 A90	8	.236	90°	.024	.47	2.5
MF 1008 L16 A90	10	.315	90°	.031	.63	2.9
MF 1210 L18 A90	12	.394	90°	.039	.71	3.3
MF 1212 L20 A90	12	.472	90°	.047	.79	3.3

* T = Web thickness No. of Flutes: 2

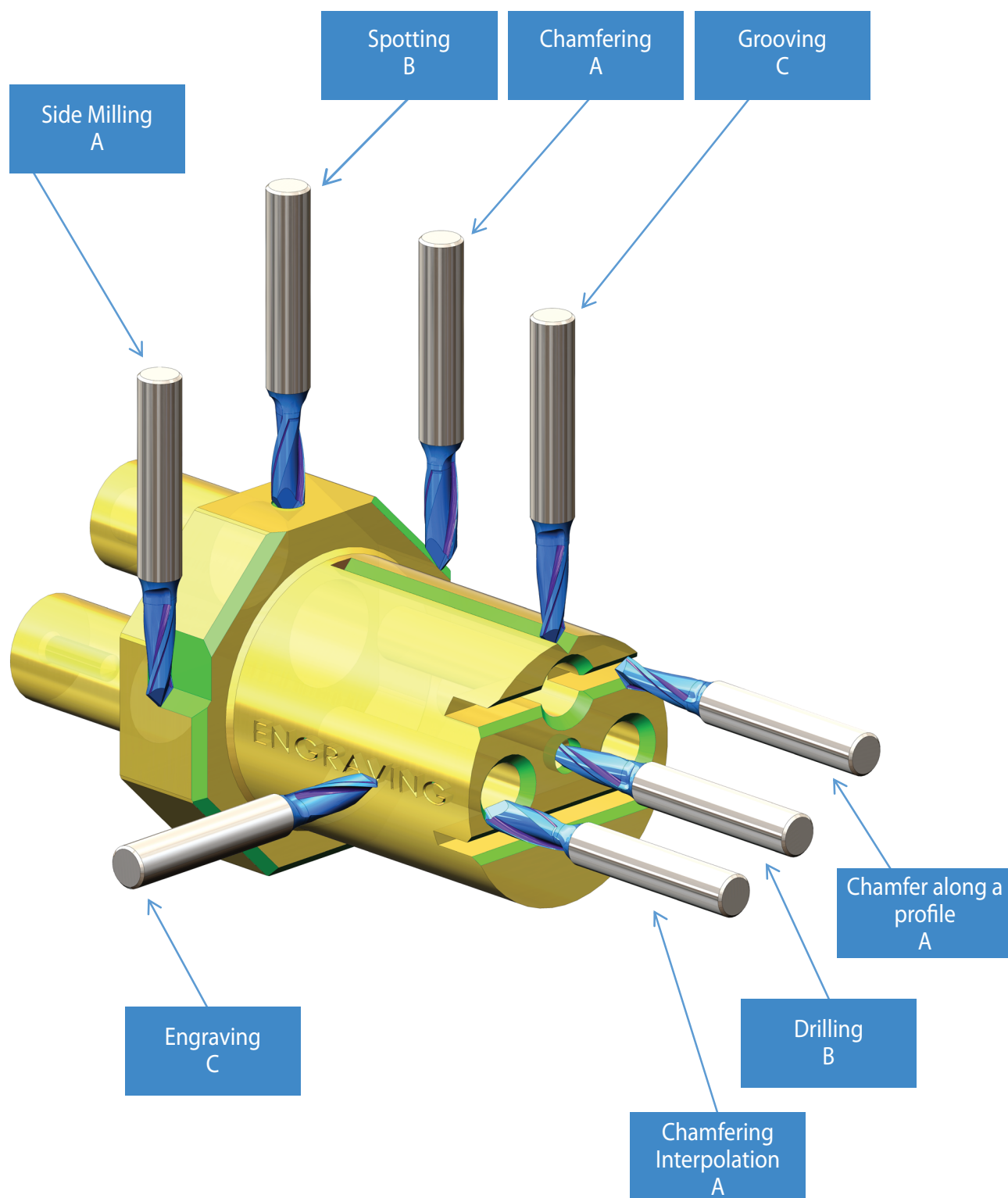
For 60°, specify MF...A60

For 120°, specify MF...A120

Order example: MF 1210 L18 A90 CR3

● First choice ○ Alternative

Working Methods



* A, B, C refers to cutting data on next page.

Technical Section

Cutting Data

A: Side milling, Chamfering

B: Spotting, Drilling

C: Grooving, Engraving

ISO Standard	Materials Class	Vc [SFM]	Fz [IPT] Cutting Diameter		
			Ø.12- Ø.16	Ø.20- Ø.24	Ø.31- Ø.47
P	Low & Medium Carbon Steels <0.55%C	165-380	A: .0001-.0004 B: .0001-.0003 C: .0002-.0006	A: .0002-.0008 B: .0002-.0004 C: .0002-.0010	A: .0005-.0015 B: .0003-.0006 C: .0006-.0015
	High Carbon Steels ≥0.55%C	130-330	A: .0001-.0005 B: .0001-.0003 C: .0002-.0007	A: .0002-.0007 B: .0002-.0004 C: .0004-.0011	A: .0004-.0012 B: .0004-.0007 C: .0006-.0019
	Alloy Steels, Treated Steels	130-330	A: .0001-.0003 B: .0001-.0002 C: .0002-.0006	A: .0002-.0006 B: .0002-.0004 C: .0002-.0007	A: .0005-.0012 B: .0002-.0006 C: .0006-.0012
M	Stainless Steel-Free Cutting	100-280	A: .0002-.0005 B: .0001-.0003 C: .0002-.0007	A: .0003-.0007 B: .0002-.0006 C: .0002-.0007	A: .0001-.0019 B: .0001-.0009 C: .0006-.0019
	Stainless Steel-Austenitic	80-230	A: .0002-.0004 B: .0001-.0002 C: .0002-.0006	A: .0002-.0006 B: .0002-.0006 C: .0002-.0007	A: .0005-.0016 B: .0005-.0008 C: .0007-.0014
	Cast Steels	130-295	A: .0002-.0005 B: .0001-.0003 C: .0002-.0007	A: .0003-.0007 B: .0002-.0006 C: .0002-.0007	A: .0006-.0019 B: .0001-.0009 C: .0006-.0019
K	Cast Iron	100-390	A: .0001-.0004 B: .0001-.0003 C: .0002-.0006	A: .0002-.0008 B: .0002-.0004 C: .0002-.0010	A: .0005-.0015 B: .0003-.0006 C: .0006-.0015
N	Aluminum ≤12%Si, Copper	295-390	A: .0002-.0003 B: .0002-.0003 C: .0002-.0003	A: .0004-.0008 B: .0003-.0006 C: .0004-.0008	A: .0010-.0018 B: .0008-.0016 C: .0010-.0018
	Aluminum >12%Si	245-330	A: .0001-.0002 B: .0001-.0002 C: .0001-.0003	A: .0002-.0006 B: .0002-.0004 C: .0002-.0006	A: .0008-.0013 B: .0006-.0014 C: .0008-.0013
	Synthetics, Duroplastics, Thermoplastics	295-390	A: .0002-.0003 B: .0002-.0003 C: .0002-.0003	A: .0004-.0008 B: .0003-.0006 C: .0004-.0008	A: .0010-.0018 B: .0008-.0016 C: .0010-.0018
S	Nickel alloys, Titanium alloys	65-195	A: .0002-.0003 B: .0001-.0003 C: .0001-.0002	A: .0003-.0004 B: .0002-.0003 C: .0002-.0003	A: .0007-.0010 B: .0001-.0008 C: .0005-.0006
H	Hardened Steel 40-45 HRc	65-195	A: .0002-.0004 B: .0002-.0003 C: .0001-.0002	A: .0003-.0006 B: .0003-.0004 C: .0002-.0003	A: .0006-.0012 B: .0004-.0010 C: .0003-.0008
	Hardened Steel 45-56 HRc	35-165	A: .0002-.0004 B: .0001-.0003 C: .0001-.0002	A: .0003-.0006 B: .0002-.0004 C: .0002-.0003	A: .0006-.0012 B: .0003-.0010 C: .0003-.0008

CR - Supercut Roughers

Carmex solid carbide **Roughers** are innovative high performance mills, specifically designed for high volume machining applications.

Multi-flute, semi-finish profile and center cutting.

Provides high metal removal rates in Slotting, Shouldering and Helical Plunging operations.



Features

- High Performance Cutting (HPC)
- Innovative roughing geometry produces smaller chips
- Low cutting forces
- Extremely high material removal rate
- Reinforced corner chamfer, promotes additional strength for longer tool life
- Designed to machine difficult and abrasive materials

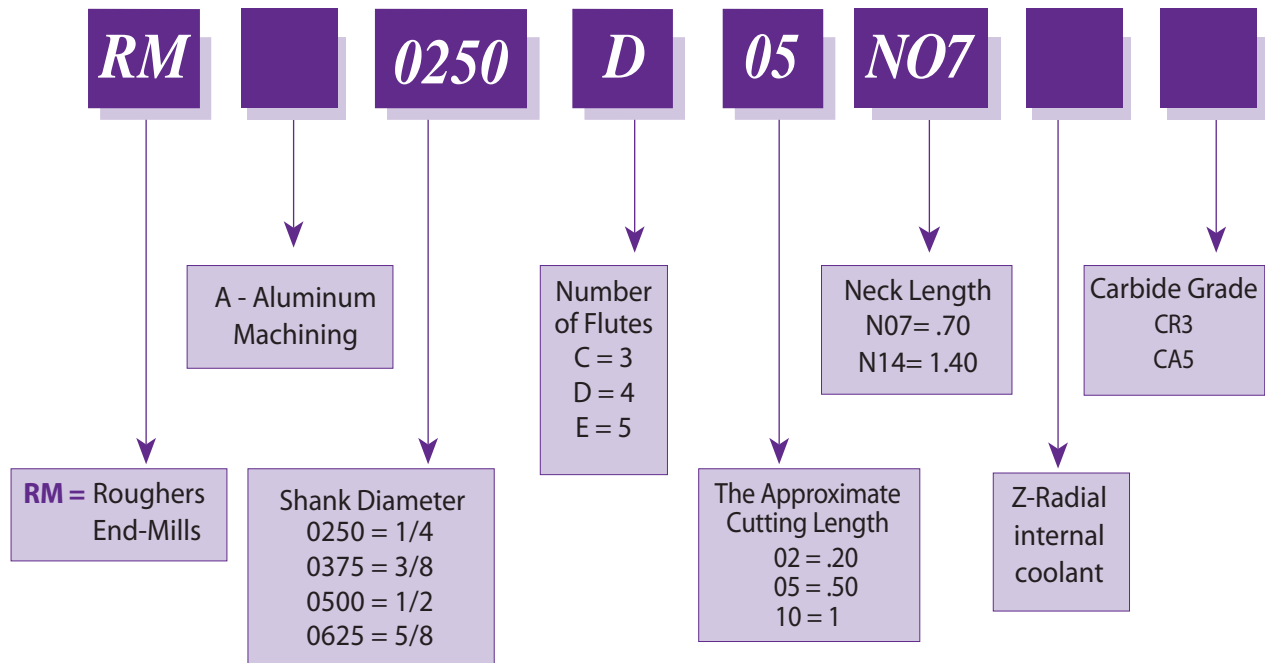
Carbide Grade: CR3

Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.

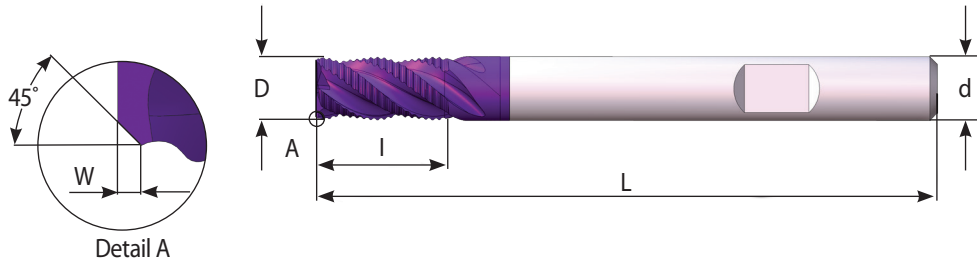
A **New Generation** of PVD Coating for High-Performance Cutting Applications.

Product Identification

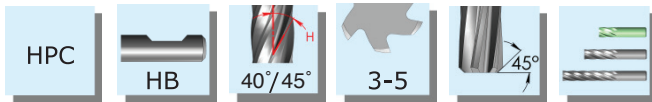
Ordering Codes



Solid Carbide Roughers



Short Design

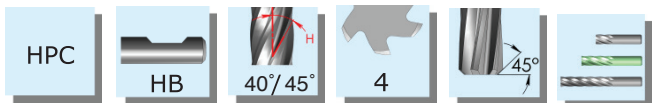


Grade	P	M	K	N	S	H
CR3	●	●	●	○	●	≤ 56 HRc

Ordering Code	d	D	W	No. of Flutes	I	L
RM 0250 C02	1/4	.118	.008	3	.20	2 1/2
RM 0250 C03	1/4	.157	.012	3	.35	2 1/2
RM 0250 D03	1/4	.197	.012	4	.39	2 1/2
RM 0250 D04	1/4	.250	.012	4	.39	2 1/2
RM 0312 D04	5/16	.312	.012	4	.47	2 1/2
RM 0375 D05	3/8	.375	.012	4	.55	3
RM 0500 D06	1/2	.500	.016	4	.63	3 1/2
RM 0625 E10	5/8	.625	.020	5	1.06	4

Order example: RM 0250 C02 CR3

Long Design

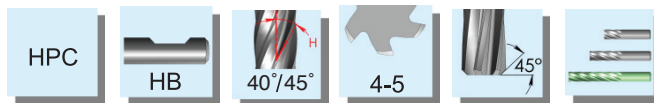
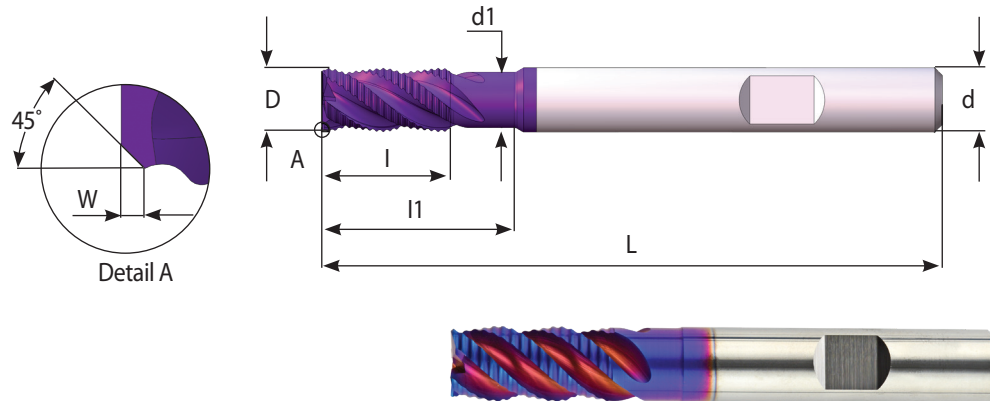


Grade	P	M	K	N	S	H
CR3	●	●	●	○	●	≤ 56 HRc

Ordering Code	d	D	W	No. of Flutes	I	L
RM 0250 D06	1/4	.250	.012	4	.63	2 1/2
RM 0312 D06	5/16	.276	.012	4	.63	2 1/2
RM 0312 D07	5/16	.312	.012	4	.71	2 1/2
RM 0375 D08	3/8	.375	.012	4	.87	3
RM 0500 D10	1/2	.500	.016	4	1.02	3 1/2

Order example: RM 0312 D07 CR3

Solid Carbide Roughers with Neck



Grade	P	M	K	N	S	H
CR3	●	●	●	○	●	≤56 HRc

Ordering Code	d	D	I	I1	d1	W	No. of Flutes	L
RM 0250 D05 N07	1/4	.250	.51	.71	.23	.012	4	2 1/2
RM 0312 D06 N09	5/16	.312	.67	.94	.30	.012	4	2 1/2
RM 0375 D08 N11	3/8	.375	.83	1.18	.38	.012	4	3
RM 0500 D09 N14	1/2	.500	.98	1.42	.46	.016	4	3 1/2
RM 0625 E13 N18	5/8	.625	1.30	1.89	.61	.020	5	4

Order example: RM 0625 E13 N18 CR3

● First choice

○ Alternative

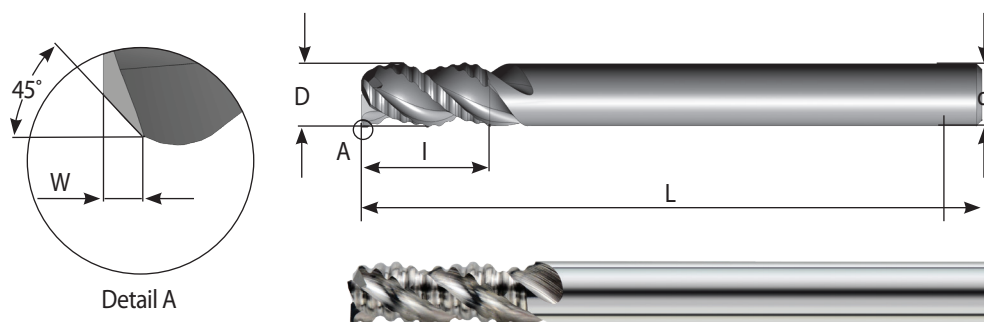
Solid Carbide Roughers - Aluminum Machining

Features

- High Performance Cutting (HPC)
- Optimal flute geometry delivers maximum metal removal rates and better chip evacuation
- Low cutting forces
- Reinforced corner chamfer, promotes additional strength for longer tool life
- Uncoated smooth polished surface finish

Carbide Grade: CA5

Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.



Grade	P	M	K	N	S	H
CA5		○	○	●	○	

Ordering Code	d	D	W	No. of Flutes	I	L
RMA 0250 C03	1/4	.157	.012	3	.31	2 1/2
RMA 0250 C06	1/4	.250	.012	3	.63	2 1/2
RMA 0312 C07	5/16	.312	.012	3	.75	2 1/2
RMA 0375 C08	3/8	.375	.012	3	.87	3
RMA 0500 C10	1/2	.500	.016	3	1.02	3 1/2

Order example: RMA 0375 C08 CA5

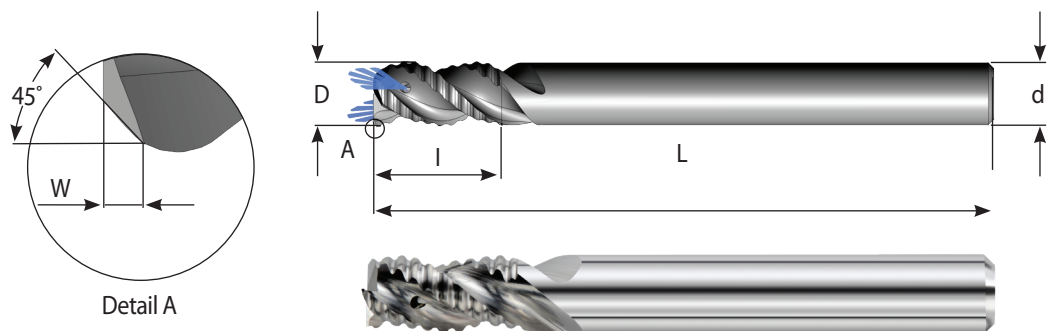
● First choice ○ Alternative

Solid Carbide Roughers - Aluminum Machining

with internal coolant through the flutes

The coolant bores provides high coolant pressure through the tool into the application pre-hole, and wash the chips away.

Carbide Grade: CA5



Grade	P	M	K	N	S	H
CA5		○	○	●	○	

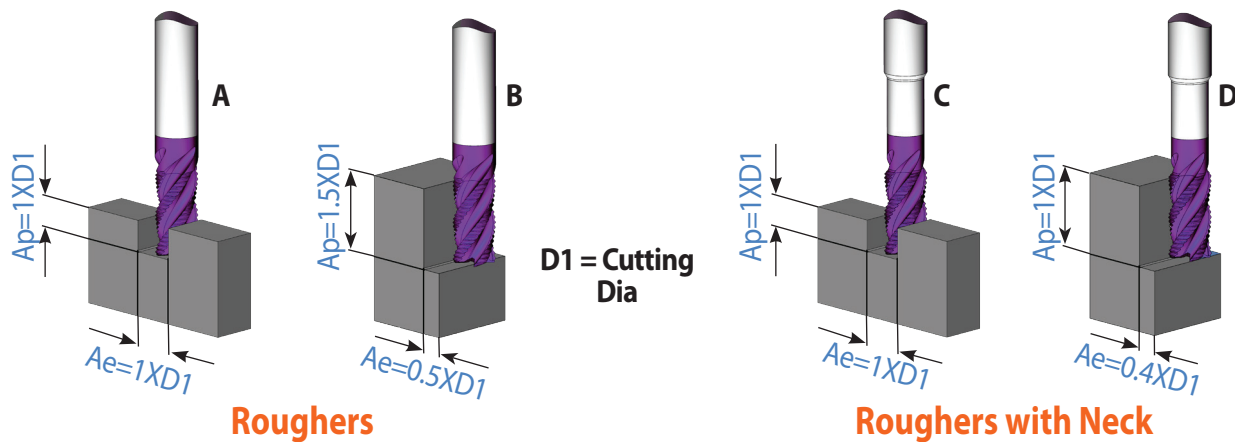
Ordering Code	d mm	D	W	No. of Flutes	I	L
RMA 0606 C16 Z	6	.236	.012	3	.63	2.3
RMA 0808 C19 Z	8	.315	.012	3	.75	2.5
RMA 1010 C22 Z	10	.394	.012	3	.87	2.9
RMA 1212 C26 Z	12	.472	.016	3	1.02	3.3

Order example: RMA 1010 C22 Z CA5

● First choice

○ Alternative

Technical Section



Cutting Data

Roughers with neck (C, D) can be used with same feed and speed as below.

ISO	Materials	Cutting speed Vc [SFM]	Fz [IPT]			
			Ø.12 - Ø.16	Ø.20 - Ø.25	Ø.28 - Ø.38	Ø.50 - Ø .79
P	Low & Medium Carbon Steels <0.55%C	A: 390-590 B: 460-660	A: .0005-.0008 B: .0007-.0009	A: .0010-.0012 B: .0012-.0014	A: .0014-.0020 B: .0019-.0024	A: .0022-.0031 B: .0028-.0038
	High Carbon Steels ≥0.55%C	A: 360-520 B: 460-590	A: .0004-.0006 B: .0006-.0008	A: .0006-.0008 B: .0010-.0012	A: .0012-.0016 B: .0014-.0018	A: .0016-.0022 B: .0024-.0031
	Alloy Steels, Treated Steels	A: 330-460 B: 430-530	A: .0004-.0005 B: .0004-.0005	A: .0006-.0007 B: .0006-.0007	A: .0009-.0012 B: .0009-.0012	A: .0014-.0019 B: .0014-.0019
M	Stainless Steel-Free Cutting	A: 330-460 B: 430-490	A: .0004-.0005 B: .0005-.0006	A: .0006-.0007 B: .0008-.0009	A: .0009-.0012 B: .0013-.0016	A: .0014-.0019 B: .0019-.0025
	Stainless Steel-Austenitic	A: 230-330 B: 290-430	A: .0003-.0004 B: .0004-.0006	A: .0004-.0006 B: .0006-.0009	A: .0008-.0010 B: .0010-.0016	A: .0010-.0016 B: .0018-.0024
	Cast Steels	A: 390-530 B: 460-590	A: .0004-.0005 B: .0005-.0006	A: .0006-.0007 B: .0008-.0009	A: .0009-.0012 B: .0013-.0016	A: .0014-.0019 B: .0019-.0025
K	Cast Iron	A: 330-530 B: 460-590	A: .0005-.0008 B: .0007-.0009	A: .0010-.0012 B: .0012-.0014	A: .0014-.0020 B: .0019-.0024	A: .0022-.0031 B: .0028-.0038
N	Aluminum ≤12%Si, Copper	A: 590-820 B: 650-980	A: .0006-.0010 B: .0007-.0012	A: .0012-.0016 B: .0014-.0018	A: .0016-.0024 B: .0018-.0026	A: .0024-.0035 B: .0026-.0037
	Aluminum >12%Si	A: 330-650 B: 420-820	A: .0004-.0008 B: .0004-.0008	A: .0010-.0014 B: .0012-.0016	A: .0014-.0022 B: .0016-.0020	A: .0022-.0031 B: .0020-.0035
	Synthetics, Duroplastics, Thermoplastics	A: 590-820 B: 650-980	A: .0006-.0010 B: .0007-.0012	A: .0012-.0016 B: .0014-.0018	A: .0016-.0024 B: .0018-.0026	A: .0024-.0035 B: .0026-.0037
S	Nickel alloys, Titanium alloys	A: 160-230 B: 190-260	A: .0005-.0006 B: .0005-.0006	A: .0008-.0009 B: .0008-.0009	A: .0013-.0016 B: .0013-.0016	A: .0019-.0025 B: .0019-.0025
H	Hardened Steel 45-50 HRc	A: 160-230 B: 190-260	A: .0004-.0008 B: .0007-.0009	A: .0008-.0010 B: .0010-.0012	A: .0012-.0016 B: .0016-.0020	A: .0016-.0024 B: .0024-.0031
	Hardened Steel 51-56 HRc	A: 130-190 B: 160-230	A: .0004-.0006 B: .0006-.0008	A: .0006-.0010 B: .0008-.0012	A: .0008-.0014 B: .0010-.0016	A: .0012-.0022 B: .0014-.0026

Case Study

Application

Medical part- machining all around

Workpiece material

Titanium TA6V

Tool description

RM 0625 E10 CR3

Shank diameter (d): Ø5/8

Cutting diameter (D): Ø5/8

Chamfer width (W): .02

Number of flutes: 5

Cutting length (l): 1.06

Total length (L): 4



Machine

Milling machine-Mazak integrex I-2008

Coolant: Emulsion 7%



Competitors End-Mills

Leading European brands

Cutting Data

Vc= 164 SFM

Fz= .002 IPT

Ap= .83

Ae= .44



Carmex tool results

No tool vibrations or Noise

Machine load: 5%-7%

Total amount: 48 pcs

About 30% more than the competitors

Indexable CMT Roughers and Finishers

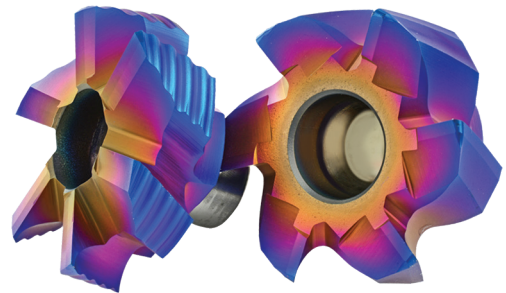
For excellent performance

- Solid and accurate clamping method enables full repeatability
- Working at high machining parameters
- Modular system using the standard CMT tool holders with various shank options
- Enables machining with large overhang

Carbide grade: CR3

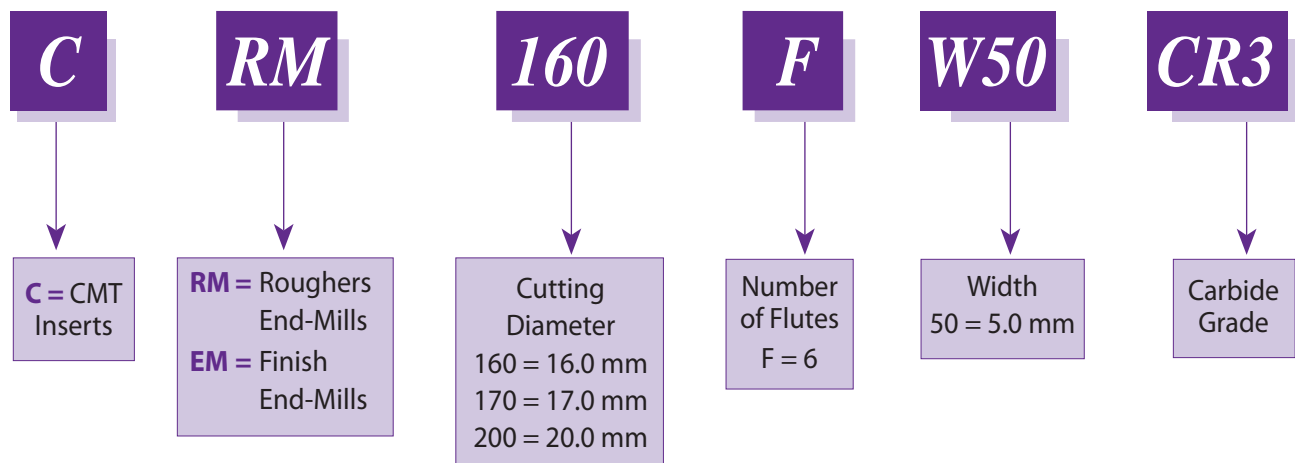
Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.

A New Generation of PVD Coating for High-Performance Cutting Applications.

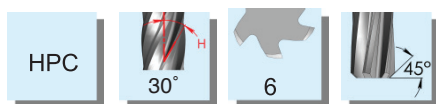
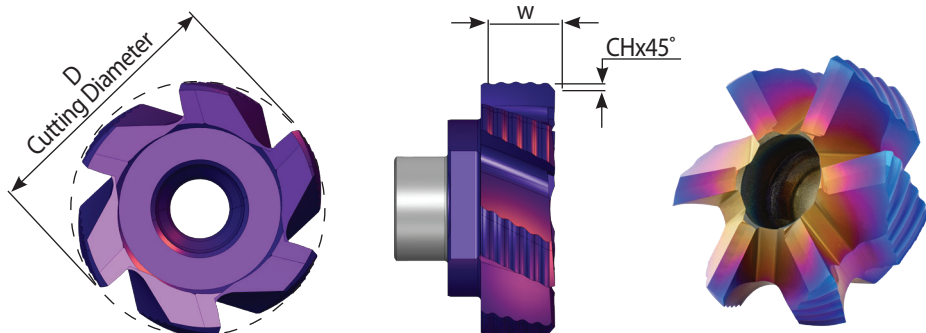


Product Identification

Ordering Codes



Roughers

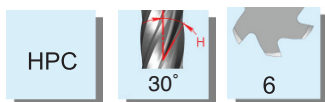
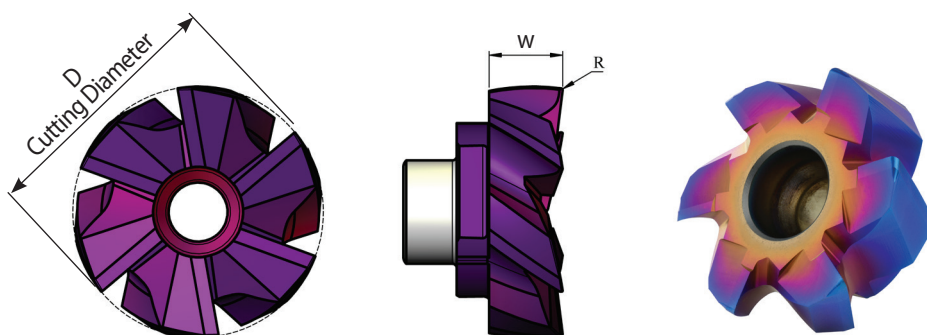


Grade	P	M	K	N	S	H
CR3	●	●	●	○	●	≤56 HRc

Insert Type	Ordering Code	D	No. of Flutes	W	CH
S20	CRM160 F W50	.63	6	.197	.016
S20	CRM170 F W50	.67	6	.197	.016
S20	CRM200 F W50	.79	6	.197	.016

Order example: CRM170 F W50 CR3

Finishers



Grade	P	M	K	N	S	H
CR3	●	●	●	○	●	≤56 HRc

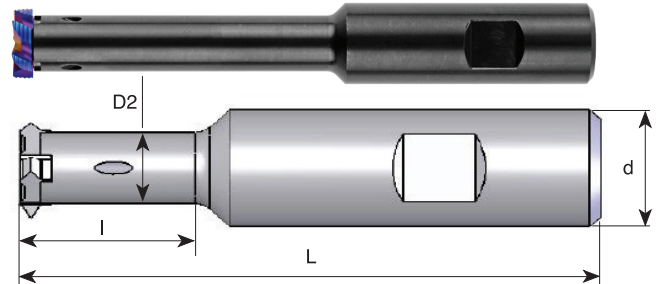
Insert Type	Ordering Code	D	No. of Flutes	W	R
S20	CEM160 F W50	.63	6	.197	.004
S20	CEM170 F W50	.67	6	.197	.004
S20	CEM200 F W50	.79	6	.197	.004

Order example: CEM200 F W50 CR3

The CMT Roughers should be used with the toolholders shown on page 47

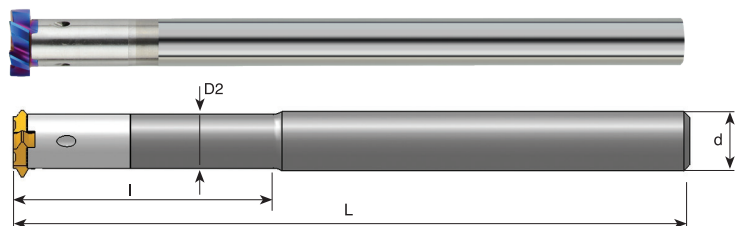
● First choice ○ Alternative

Steel Toolholders With internal coolant



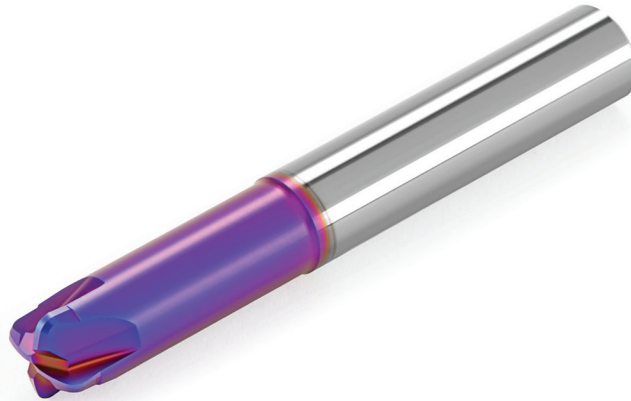
Ordering Code	Insert Type	d	D2	I	L	Insert Screw	Torx Key
SRC 0625 H18	S20	5/8	.54	1.89	4	S16	K16
SRC 0750 H18	S20	3/4	.54	1.26	4	S16	K16
SRC 0750 J18	S20	3/4	.54	1.89	4 1/2	S16	K16
SRC 0750 L18	S20	3/4	.54	2.91	5 5/5	S16	K16

Carbide Shank Toolholders With internal coolant



Ordering Code	Insert Type	d	D2	I	L	Insert Screw	Torx Key
CRC 0500 P18	S20	1/2	.500	---	7.0	S16	K16
CRC 0625 L18 R18	S20	5/8	.54	1.89	7.8	S16	K16
CRC 0625 L29 R18	S20	5/8	.54	2.91	7.8	S16	K16

CR-Supercut High Feed End-Mills



High Performance milling tools, designed for high feed rates with shallow cutting depths.

Innovative tool geometry enables extremely high **M**aterial **R**emoval **R**ate (MRR) and high machine productivity.

High feed machining is the first choice for applications with deep and shallow workpiece features, 3D profiling, mold & die applications and machining in unstable conditions.

- High Performance Cutting (HPC)
- Up to 3xD neck length allowing ramping or helical interpolation working techniques
- High rates of material removal, provides a reduced cycle time
- Same tool for roughing or semi-finishing operations
- For a wide range of materials up to 62 HRc

Carbide grade: CR3

Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.

A New Generation of PVD Coating for High-Performance Cutting Applications.

CR-Supercut High Feed End-Mills Features

Optimized cutting-edge geometry

For maximum material removal rate

Multi-function operation

Ramping,
Helical interpolation
Face milling

Long neck

Allows extended reach to deep applications

Short flutes and large core

For high rigidity

HPC – High Performance Cutting

High feed rate for maximum material removal rate

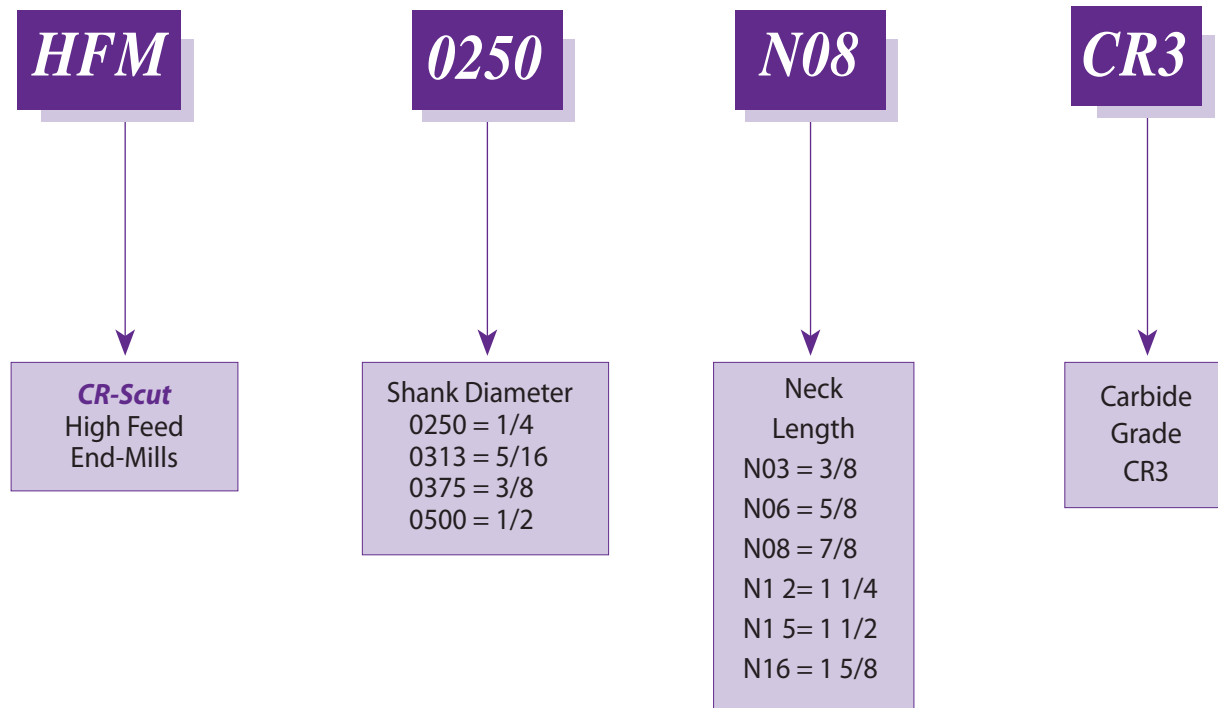
CR3 grade

Superior carbide grade combined with new generation of PVD coating

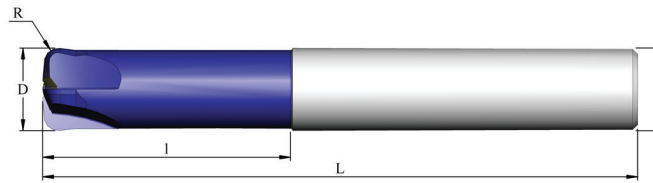


Product Identification

Ordering Codes



Solid Carbide High Feed End-Mills



Grade	P	M	K	N	S	H
CR3	●	●	●		●	≤62 HRc

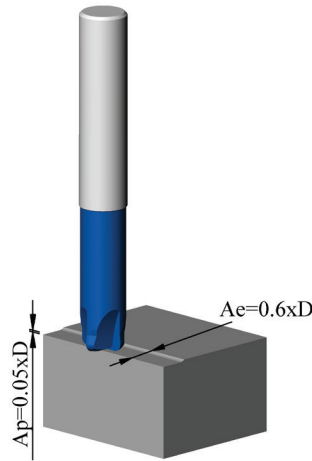
Ordering Code	d	D	No. of Flutes	R	l	L
HFM 0125 N03	1/8	1/8	4	.016	3/8	1 1/2
HFM 0188 N06	3/16	3/16	4	.031	5/8	2
HFM 0250 N08	1/4	1/4	4	.035	7/8	2 1/2
HFM 0313 N12	5/16	5/16	4	.051	1 1/4	3
HFM 0375 N12	3/8	3/8	4	.067	1 1/4	3 1/2
HFM 0500 N15	1/2	1/2	4	.083	1 1/2	4
HFM 0625 N16	5/8	5/8	4	.106	1 5/8	4 1/2

Order example: HFM 0188 N06 CR3

● First choice

○ Alternative

Technical Section

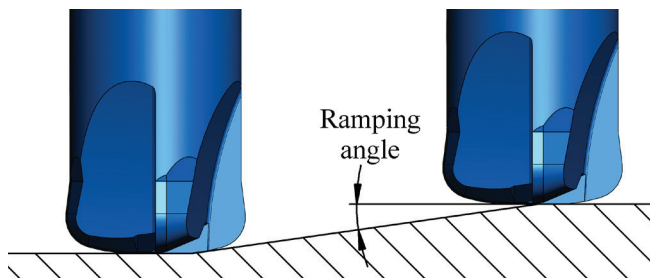


D = Cutting Dia

Cutting Data

ISO	Materials	Cutting Speed Vc [SFM]	Feed Fz [IPT]						
			Tool Cutting Diameter						
			Ø1/8	Ø3/16	Ø1/4	Ø5/16	Ø3/8	Ø1/2	Ø5/8
P	Low & Medium Carbon Steels <0.55%C	460-655	.010	.012	.014	.014	.018	.022	.024
	High Carbon Steels ≥0.55%C	460-655	.010	.012	.014	.014	.018	.022	.024
	Alloy Steels, Treated Steels	395-655	.008	.010	.012	.012	.016	.020	.022
M	Stainless Steel-Free Cutting	330-460	.004	.008	.008	.012	.012	.016	.020
	Stainless Steel-Austenitic	295-425	.004	.006	.006	.008	.008	.012	.016
	Cast Steels	295-425	.004	.006	.006	.008	.008	.012	.016
K	Cast Iron	330-460	.004	.008	.008	.012	.012	.016	.020
S	Heat-resistant alloys	230-295	.004	.004	.006	.006	.008	.008	.010
	Titanium alloys	260-330	.004	.004	.006	.006	.008	.008	.010
H	Hardened Steel 45-50 HRc	260-625	.006	.008	.010	.010	.014	.018	.020
	Hardened Steel 51-55 HRc	260-590	.004	.004	.008	.008	.012	.016	.016
	Hardened Steel 56-62 HRc	130-260	.004	.004	.006	.006	.008	.010	.012

Ramping



Ramping angle	Feed
1°	100%
2°	80%
3°	70%
4°	60%
5°	50%

Case Study

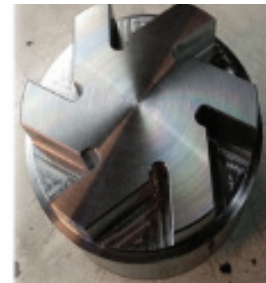
Application

Pocket machining by helical interpolation

Workpiece material

Tempered steel SAE 4340

Hardness: 45 HRc



End-Mill description

HFM 0188 N06 CR3

Shank diameter (d): Ø3/16

Cutting diameter (D): Ø3/16

Number of flutes: 4

Neck length (l): 5/8



Machine

Mazak Integrex

Coolant: emulsion 6%

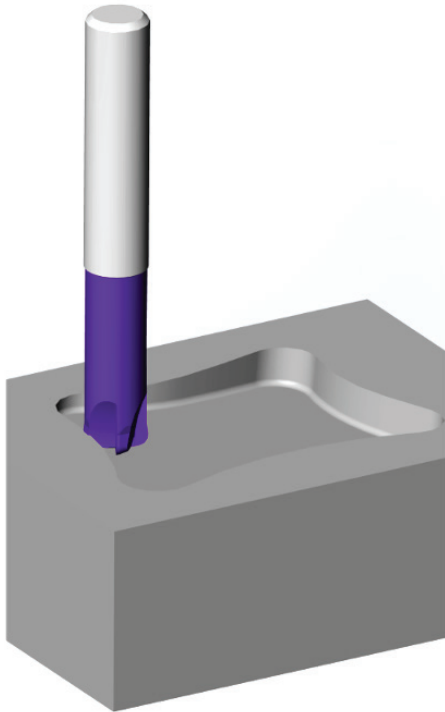
Parameter	HFM 0188 N06 CR3
Cutting speed (SFM)	557
Feed per tooth (IPT)	.006
Ae	.094
Ap	.008
Total Time in material (min)	124

Results

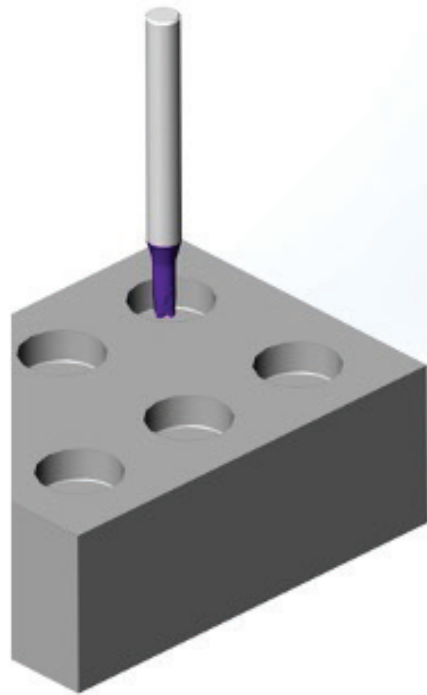
Tool life: The tool worked 124 minutes.

Application example

HFM 0375 N12



HFM 0188 N06



Solid Carbide radius fillet End-Mills

Features

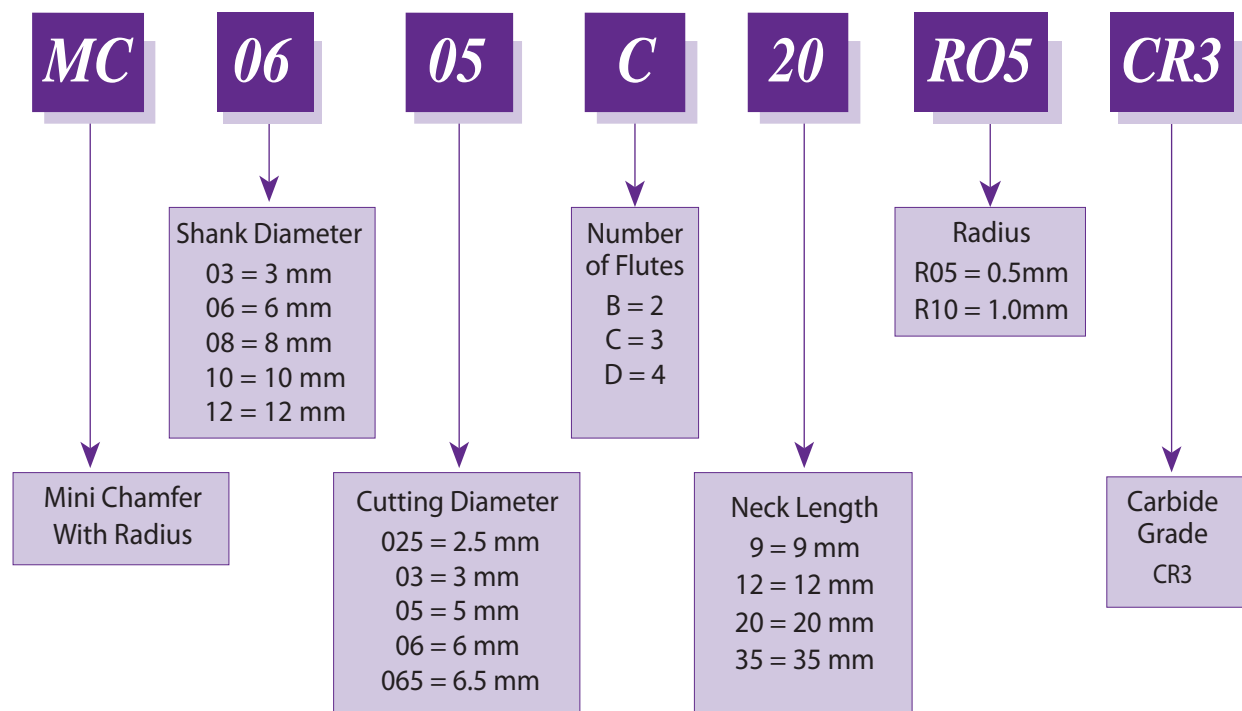
- Tools for different radius filleting
- Two, three and four flutes
- Cylindrical shank DIN6535-HA



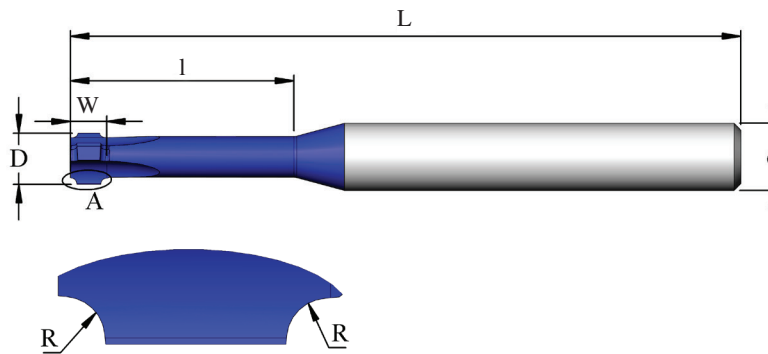
Carbide grade: CR3

Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.

A New Generation of PVD Coating for High-Performance Cutting Applications.



Solid Carbide radius fillet End-Mills



DETAIL A

Grade	P	M	K	N	S	H
CR3	●	●	●	○	●	≤50 HRc

Ordering Code	d mm	D	l	R	W	No. of Flutes	L
MC 0302 B8 R02	3	.079	.31	.008	.06	2	1.5
MC 03025 B9 R03	3	.098	.35	.012	.06	2	1.5
MC 03025 B10 R04	3	.098	.39	.016	.08	2	1.5
MC 0303 B12 R05	3	.118	.47	.020	.09	2	1.5
MC 0605 C20 R05	6	.197	.79	.020	.10	3	2.2
MC 0605 C25 R06	6	.197	.98	.024	.11	3	2.2
MC 0606 C30 R08	6	.236	1.18	.031	.13	3	2.2
MC 08065 C35 R10	8	.256	1.38	.039	.15	3	2.5
MC 08075 D35 R12	8	.295	1.38	.047	.16	4	2.5
MC 10085 D35 R15	10	.335	1.38	.059	.19	4	2.8
MC 1009 D35 R18	10	.354	1.38	.071	.22	4	2.8
MC 1010 D35 R20	10	.394	1.38	.079	.24	4	2.8
MC 1211 D35 R25	12	.433	1.38	.098	.30	4	3.3
MC 1212 D35 R30	12	.472	1.38	.118	.33	4	3.3

Order example: MC 0303 B12 R05 CR3

● First choice

○ Alternative

Countersink Solid Carbide chamfering End-Mills

Features

- Tools for 45° and 30° chamfering and deburring
- Four flutes
- Cylindrical shank DIN6535-HA (Weldon shank available upon request)

Carbide grades

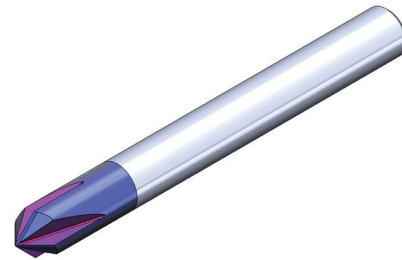
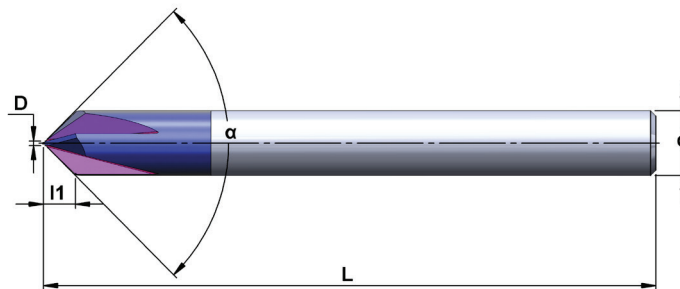
CR3

Ultra-Fine carbide grade with high hardness and toughness provides high cutting edge stability and wear resistance.

A **New Generation** of PVD Coating for High-Performance Cutting Applications

K20

Uncoated Sub-Micron carbide grade for Aluminum and non-ferrous materials, Stainless Steels and Titanium.



Grade	P	M	K	N	S	H
CR3	●	●	●	○	●	≤58 HRc
K20			●	●	○	

Ordering Code	d mm	D	l1	L	No. of Flutes	α
MC03 D A60	3	.008	.09	1.5	4	60°
MC04 D A60	4	.012	.12	2.0		
MC05 D A60	5	.016	.15	2.0		
MC06 D A60	6	.020	.19	2.2		
MC08 D A60	8	.023	.25	2.5		
MC10 D A60	10	.031	.31	2.8		
MC12 D A60	12	.039	.37	3.3		
MC03 D A90	3	.008	.05	1.5	4	90°
MC04 D A90	4	.012	.07	2.0		
MC05 D A90	5	.016	.09	2.0		
MC06 D A90	6	.020	.10	2.2		
MC08 D A90	8	.023	.14	2.5		
MC10 D A90	10	.031	.18	2.8		
MC12 D A90	12	.039	.21	3.3		

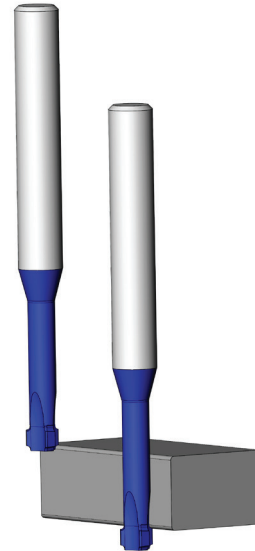
Order example: MC04 D A90 K20

● First choice

○ Alternative

Solid Carbide radius fillet End-Mills

Application example



Cutting Data

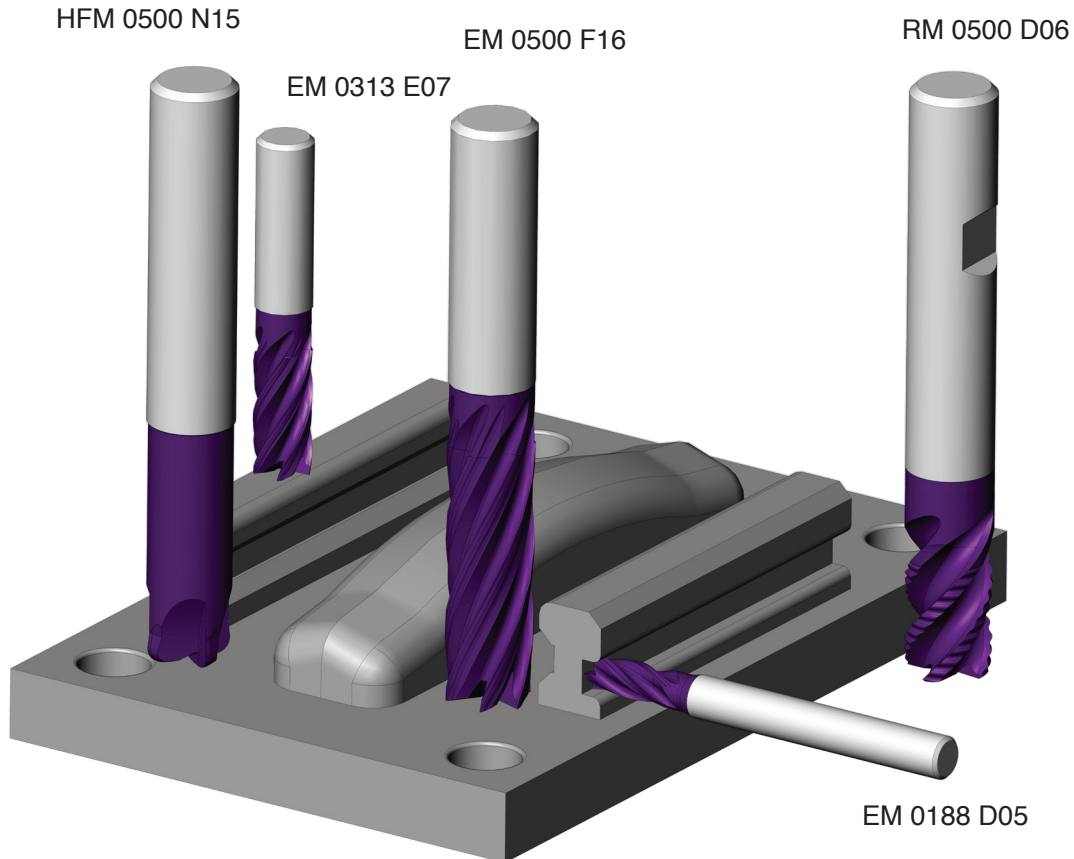
ISO	Materials	Cutting speed Vc [SFM]	Fz [IPT] cutting diameter				
			Ø.004-Ø.008	Ø.012-Ø.016	Ø.24-Ø.31	Ø.39-Ø.47	Ø.63
P	Low & Medium Carbon Steels <0.55%C	200-230	.0004	.0005	.0006	.0008	.0012
	High Carbon Steels ≥0.55%C	130-200	.0004	.0005	.0006	.0008	.0012
	Alloy Steels, Treated Steels	100-130	.0004	.0005	.0005	.0007	.0010
M	Stainless Steel-Free Cutting	65-100	.0003	.0004	.0004	.0006	.0008
	Stainless Steel-Austenitic	65-100	.0003	.0004	.0004	.0006	.0008
	Cast Steels	65-100	.0003	.0004	.0004	.0006	.0008
K	Cast Iron	100-130	.0004	.0005	.0005	.0007	.0010
N	Aluminum ≤6%Si, Copper	230-330	.0005	.0005	.0006	.0008	.0012
	Aluminum >6%Si	300-490	.0005	.0005	.0006	.0008	.0012
	Synthetics, duroplastics, thermoplastics	330-490	.0006	.0010	.0012	.0016	.0020
S	Nickel alloys, Titanium alloys.	50-100	.0003	.0004	.0004	.0006	.0008
H	Hardened Steel, ≤50 HRc	65-130	.0003	.0004	.0005	.0007	.0010

Countersink

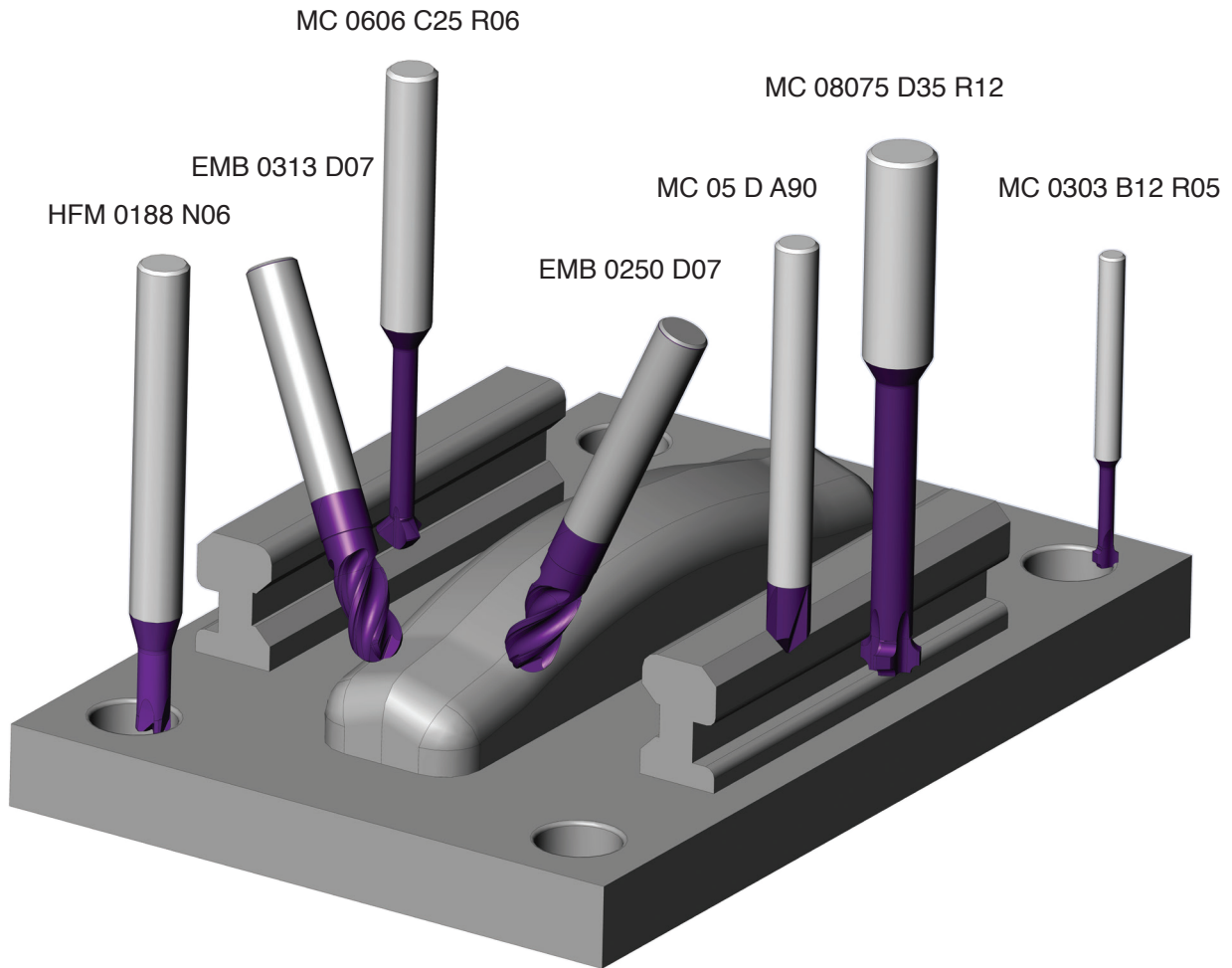
Cutting Data

ISO	Materials Class	Cutting Speed Vc [SFM]	d mm	Feed fz [IPT]
P	Low & Medium Carbon Steels <0.55%C	390-790	Ø3-Ø4	.0016-.0024
	High Carbon Steels ≥0.55%C	260-590	Ø5-Ø6	.0020-.0028
	Alloy Steels, Treated Steels	160-390		
M	Stainless Steel-Free Cutting	230-330	Ø8	.0024-.0031
	Stainless Steel-Austenitic	200-460	Ø10	.0028-.0039
	Cast Steels	230-330	Ø12	.0031-.0059
K	Cast Iron	260-520		
N	Aluminum ≤6%Si, Copper	490-1640		
	Aluminum >6%Si	330-820		
	Synthetics, duroplastics, thermoplastics	260-660		
S	Nickel alloys, Titanium alloys.	100-30		
H	Hardened Steel, ≤50 HRc	200-230		
	Hardened Steel, 51≤58 HRc	160-200		

Application example



Application example



Diamond End-Mills

Carmex CVD End-Mills are designed for high productivity and provide longer tool life when machining materials ranging from plastics (peek) to glass fiber and carbon fiber composites, ceramics, zirconium and aluminum casting alloys. The End-Mills provide faster machining times as compared to grinding, and outperform ceramics, reducing production costs.

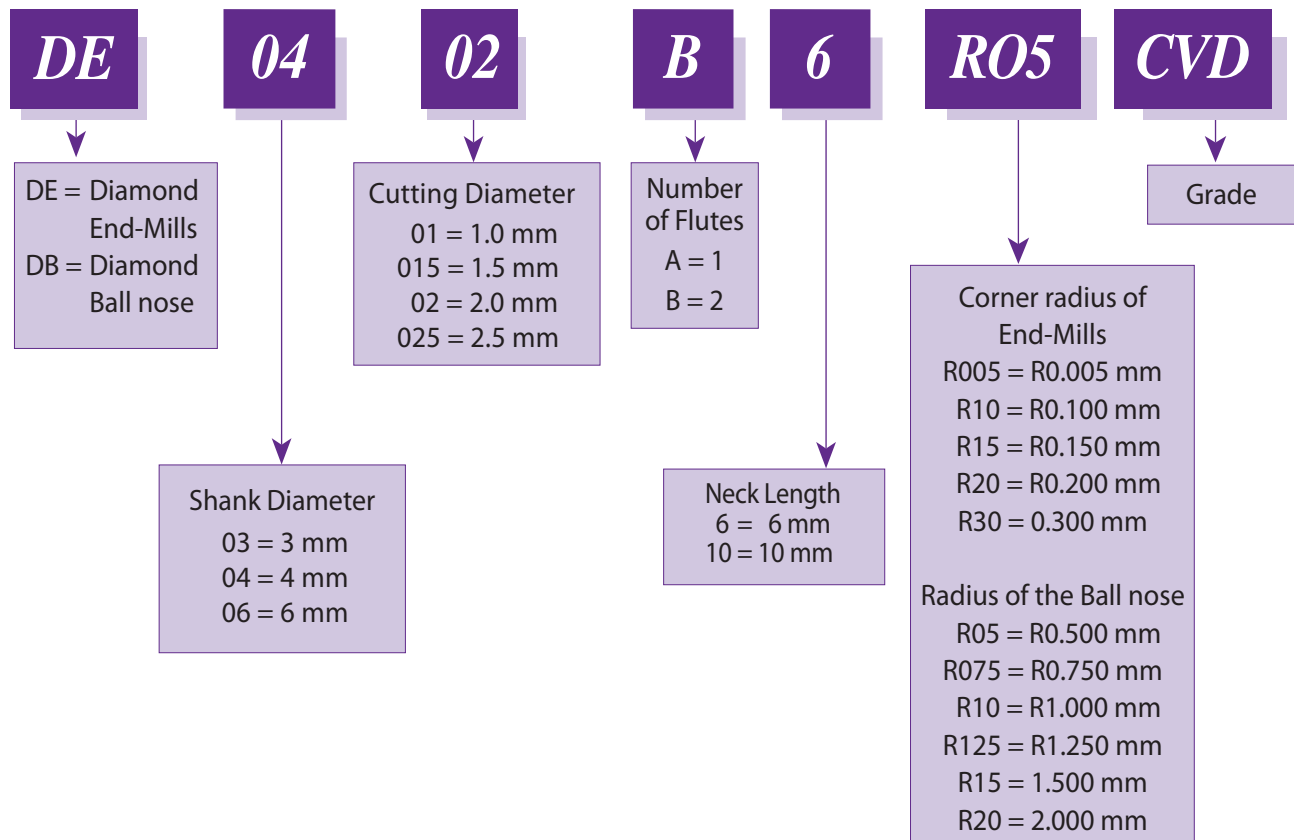
CVD

CVD delivers various benefits when machining long-chipping aluminum and magnesium alloys, high-silica aluminum as well as of precious metal alloys, plastics with abrasive fillers, tungsten carbide and ceramic green compacts.

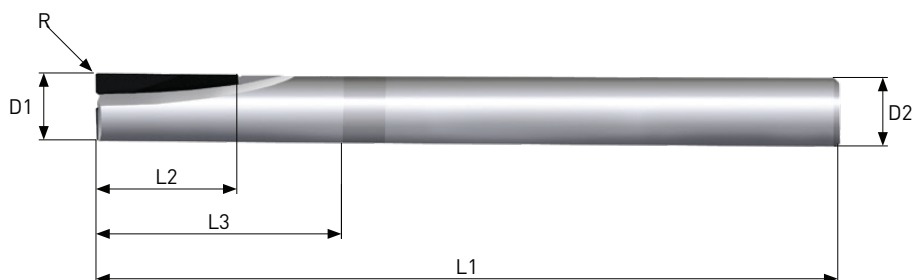
Laser equipment is used to cut out the segments from the CVD-thick film; these are then attached to an End-Mills by brazing under vacuum. The cutting edges are also laser formed.



Product Identification: End-Mills/Ball nose



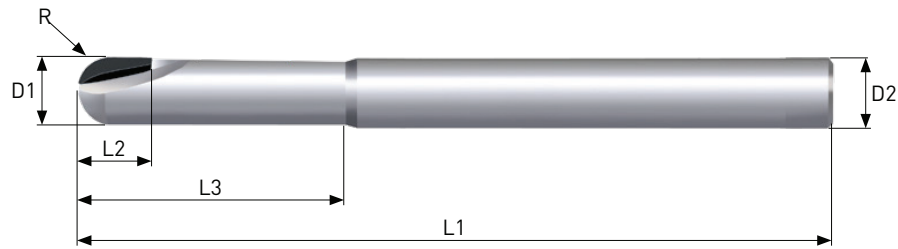
End-Mills - CVD



D1	Ordering Code	D2 (h5) mm	No. of Flutes	L2	L3	L1	R
.039	DE0401 A4 R05	4	1	.118	.157	1.97	.0020
	DE0601 A5 R10	6	1	.079	.197	1.97	.0039
	DE0601 A10 R10	6	1	.079	.394	1.97	.0039
	DE0601 A20 R10	6	1	.079	.787	1.97	.0039
.059	DE04015 B3 R005	4	2	.079	.118	1.97	.0002
	DE04015 B4 R05	4	2	.118	.157	1.97	.0020
	DE06015 B5 R15	6	2	.079	.197	1.97	.0059
	DE06015 B10 R15	6	2	.079	.394	1.97	.0059
	DE06015 B20 R15	6	2	.079	.787	1.97	.0059
.079	DE0402 B3 R005	4	2	.079	.118	1.50	.0002
	DE0402 B6 R005	4	2	.157	.236	1.50	.0002
	DE0402 B6 R05	4	2	.118	.236	1.50	.0020
	DE0402 B5 R10	4	2	.118	.197	1.97	.0039
	DE0402 B8 R10	4	2	.118	.315	1.97	.0039
	DE0602 B5 R15	6	2	.118	.197	1.97	.0059
	DE0602 B10 R15	6	2	.118	.394	1.97	.0059
	DE0602 B20 R15	6	2	.118	.787	1.97	.0059
.098	DE04025 B7 R005	4	2	.197	.276	1.50	.0002
	DE04025 B6 R10	4	2	.157	.236	1.97	.0039
	DE04025 B10 R10	4	2	.157	.394	1.97	.0039
.118	DE0403 B5 R005	4	2	.118	.197	1.50	.0002
	DE0403 B9 R005	4	2	.236	.354	1.50	.0002
	DE0603 B8 R20	6	2	.197	.315	1.97	.0079
	DE0603 B8 R50	6	2	.197	.315	1.97	.0197
	DE0603 B12 R10	6	2	.197	.472	2.36	.0039
	DE0603 B10 R30	6	2	.157	.394	2.95	.0118
	DE0603 B15 R30	6	2	.157	.591	2.95	.0118
	DE0603 B20 R30	6	2	.157	.787	2.95	.0118
.157	DE0404 B10 R01	4	2	.236	.394	1.50	.0004
	DE0604 B10 R10	6	2	.197	.394	2.36	.0039
	DE0604 B10 R30	6	2	.197	.394	2.36	.0118
	DE0604 B10 R50	6	2	.197	.394	2.36	.0197
	DE0604 B16 R10	6	2	.197	.630	2.56	.0039
	DE0604 B20 R30	6	2	.197	.787	2.95	.0118
	DE0604 B30 R30	6	2	.197	1.181	2.95	.0118

Center cutting

Ball nose - CVD



D1	Ordering Code	D2 (h5)	No. of Flutes	L2	L3	L1	R
.039	DB0301 A4 R05	3	1	.039	.157	1.26	.0197
	DB0401 A4 R05	4	1	.118	.157	1.97	.0197
	DB0601 A5 R05	6	1	.079	.197	1.97	.0197
	DB0601 A10 R05	6	1	.079	.394	1.97	.0197
	DB0601 A20 R05	6	1	.079	.787	1.97	.0197
.059	DB03015 B5 R075	3	2	.079	.197	1.26	.0295
	DB04015 B5 R075	4	2	.118	.197	1.97	.0295
	DB06015 B5 R075	6	2	.079	.197	1.97	.0295
	DB06015 B15 R075	6	2	.079	.591	1.97	.0295
	DB06015 B20 R075	6	2	.079	.787	1.97	.0295
.079	DB0302 B5 R10	3	2	.118	.197	1.26	.0394
	DB0302 B8 R10	3	2	.118	.315	1.26	.0394
	DB0402 B5 R10	4	2	.118	.197	1.97	.0394
	DB0402 B8 R10	4	2	.118	.315	1.97	.0394
	DB0602 B5 R10	6	2	.118	.197	1.97	.0394
	DB0602 B15 R10	6	2	.118	.591	1.97	.0394
	DB0602 B20 R10	6	2	.118	.787	1.97	.0394
.098	DB03025 B6 R125	3	2	.118	.236	1.26	.0492
	DB03025 B10 R125	3	2	.118	.394	1.26	.0492
	DB04025 B6 R125	4	2	.118	.236	1.97	.0492
	DB04025 B10 R125	4	2	.118	.394	1.97	.0492
.118	DB0303 B6 R15	3	2	.157	.236	1.26	.0590
	DB0303 B9 R15	3	2	.157	.354	1.26	.0590
	DB0603 B8 R15	6	2	.197	.315	1.97	.0590
	DB0603 B12 R15	6	2	.197	.492	2.36	.0590
	DB0603 B10 R15	6	2	.157	.394	1.97	.0590
	DB0603 B15 R15	6	2	.157	.591	1.97	.0590
	DB0603 B20 R15	6	2	.157	.787	1.97	.0590
.157	DB0404 B7 R20	4	2	.197	.276	1.50	.0787
	DB0404 B10 R20	4	2	.197	.394	1.50	.0787
	DB0604 B16 R20	6	2	.197	.630	2.56	.0787
	DB0604 B10 R20	6	2	.197	.394	2.95	.0787
	DB0604 B20 R20	6	2	.197	.787	2.95	.0787
	DB0604 B30 R20	6	2	.197	1.181	2.95	.0787

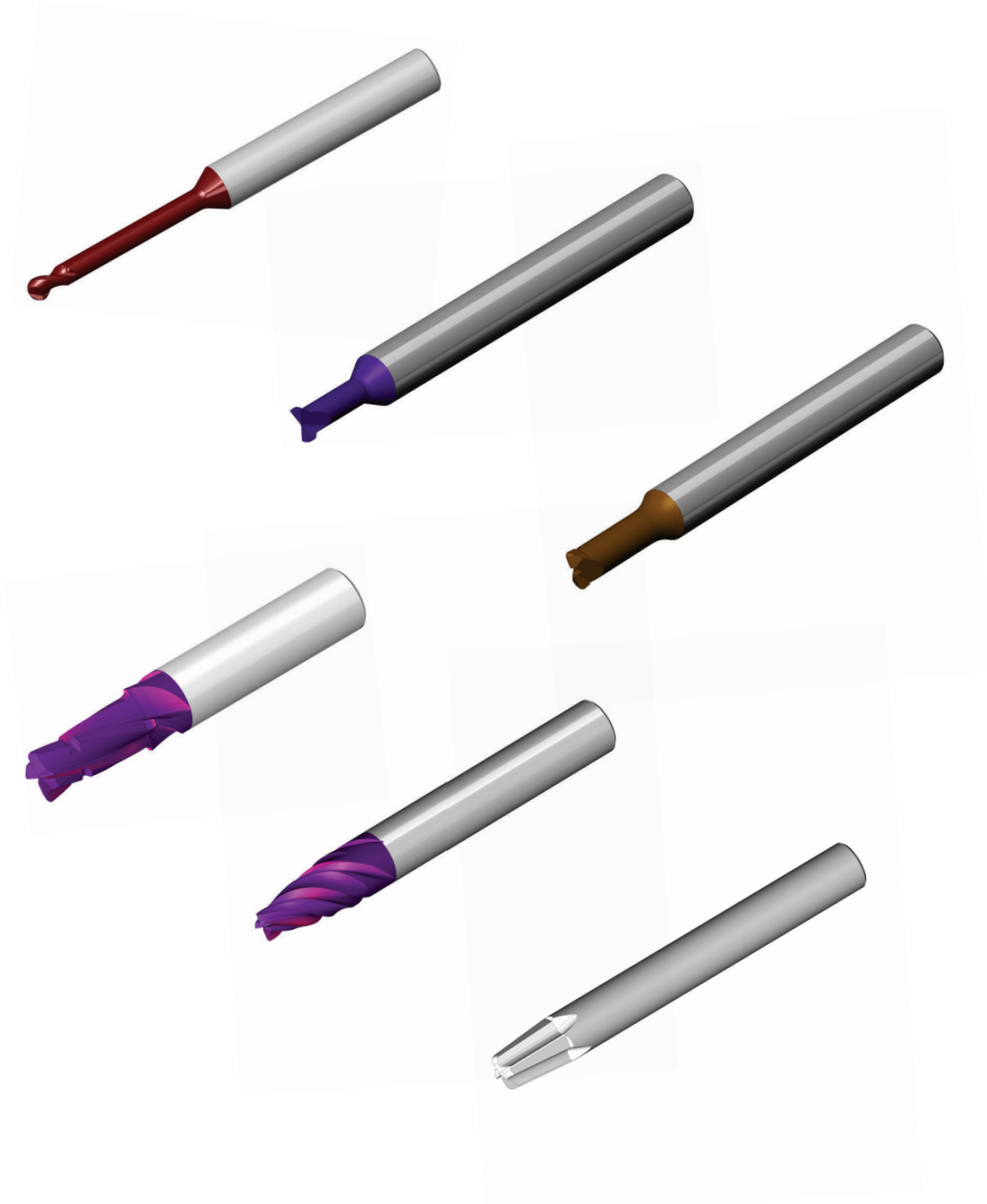
Cutting Data

ISO	Materials	Vc [SFM]	Fz [IPT] Cutting Diameter	
			Ø1-3 mm	Ø4 mm
N	Aluminum alloys Si < 1%	490-13120	.0003-.0020	.0008-.0059
	Aluminum Casting Alloys Si > 12%	490-6560	.0003-.0020	.0008-.0059
	Magnesium/Copper/ Brass	490-13120	.0003-.0020	.0008-.0059
	Ti alloys	165-13120	.0003-.0020	.0008-.0059
	Graphite	490-9840	.0003-.0020	.0008-.0059
	Glass fiber/Carbon fiber composites	490-9840	.0003-.0020	.0008-.0059
	Peek	490-6560	.0003-.0020	.0008-.0059
	Thermoplastics, Duroplastics	490-13120	.0003-.0020	.0008-.0059
	Ceramic/Zirconium	245-985	.0003-.0020	.0008-.0059
	Glass, Carbon fiber reinforced, Graphite	490-9840	.0003-.0020	.0008-.0059

Special tools

In addition to standard products, Carmex manufactures special tools according to customers' Application.

Special tools are supplied in short delivery times.





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