

Solid End Mill

Carbide material

L1~L48

L

Tool Selection Guide L2~L9

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Ball-nose End Mill L24~L27

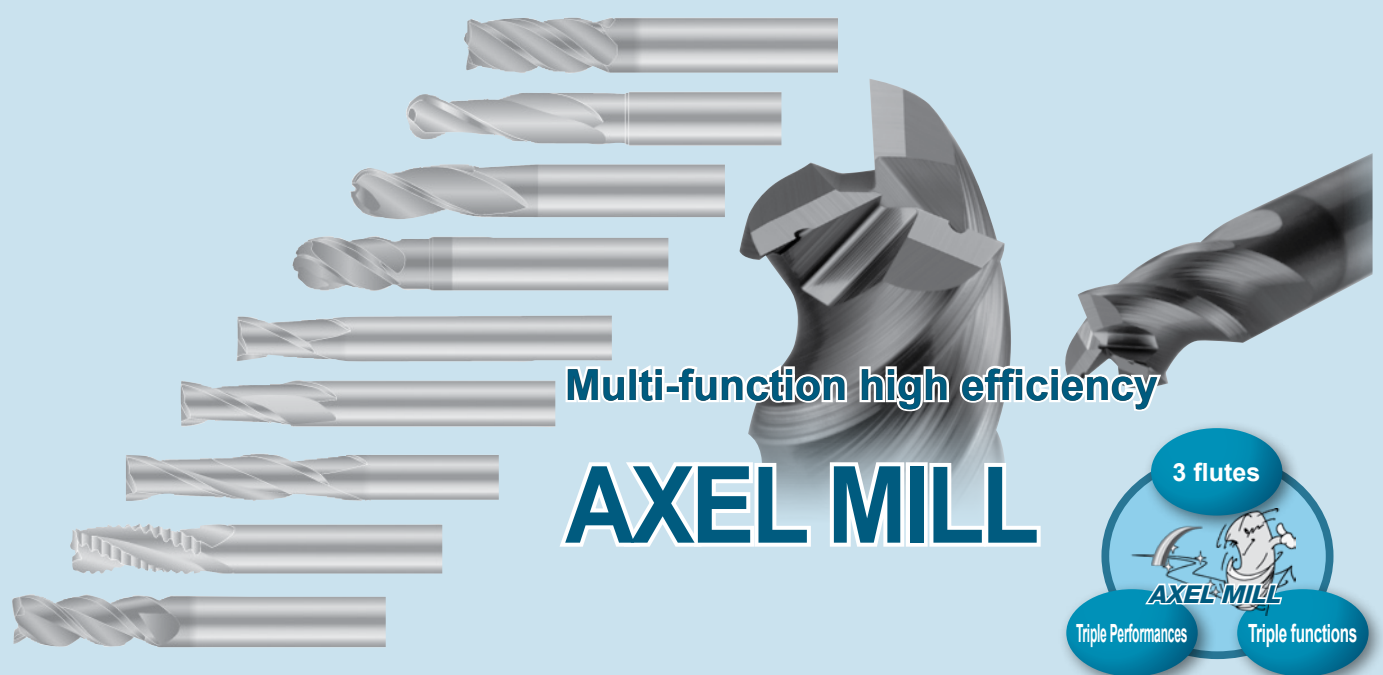
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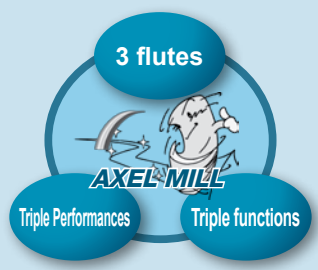
Square (Unequally partitioned flute design, With wiper edge)	3NESM	L30
Roughing		L32

Recommended Cutting Conditions L33~L48







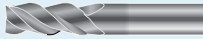







Multi-function high efficiency

AXEL MILL



Tool Selection Guide

Application and selection of type distinctions

Ref. Page	Applications	Description	Features	Shape	Coating	No. of Flutes	Helix Angle	Outside Dia. ϕD_c (mm)		
L10	Surface finish oriented	2FESS	2 flutes, Corner sharp edge		MEGACOAT	2	30°	$\phi 1 \sim \phi 16$		
		2FESM				2		$\phi 0.2 \sim \phi 16$		
L11		2FESL				2		$\phi 1 \sim \phi 16$		
L12		2FEKS	2 flutes, Tough corner edge			2		$\phi 3 \sim \phi 16$		
		2FEKM				2		$\phi 3 \sim \phi 16$		
L13		4FESM	4 flutes, Corner sharp edge			4		$\phi 1 \sim \phi 16$		
		4FEKM	4 flutes, Tough corner edge			4		$\phi 3 \sim \phi 16$		
L14		2FESW	For Automatic Lathes			2	35°	$\phi 3 \sim \phi 13$		
		3FESW				3				
		4FESW				4				
L15	Multi-Purpose	3UFSM	3 flutes, Multi-purpose		TiAlN	3	45°	$\phi 1 \sim \phi 20$		
L16		4PGSS	Multi-edge type Slotting, Shouldering Multi-Purpose High feed rate finishing			4	50°	$\phi 3 \sim \phi 25$		
		5PGSS				5		$\phi 6 \sim \phi 25$		
		4PGSM				4				
		5PGSM				5		$\phi 6 \sim \phi 25$		
		6PGSM				6				
		4PGSL				4				
		5PGSL				5				
		6PGSL				6				
L17		4PGRM (Radius)		4			$\phi 3 \sim \phi 20$			
L18	High efficiency chip evacuation	3ZFKS		MEGACOAT	3	40°	$\phi 6 \sim \phi 12$			
		3ZFKM			3		$\phi 3 \sim \phi 12$			
L20		4YEKM	4/5 flutes, High efficiency Difficult-to-cut Materials Unequally partitioned flute design		TiAlN	4	38°	$\phi 4 \sim \phi 25$		
		4YECM				4				
		4YERM (Radius)				4				
L21		5DEKM	Difficult-to-cut Materials, Finishing		AlTiN	5	45°	$\phi 4 \sim \phi 25$		
		5DERM (Radius)				5				
		L22	4YFSM	Roughing, Large flat surface		TiAlN	4	20°	$\phi 4 \sim \phi 25$	
6YFSM			6				$\phi 6 \sim \phi 25$			
3RDSM			3							
4RDSM			4							
5RDSM			5							
3RDSL			3							
4RDSL		4								
L23		5RDSL	Roughing, Notched surface			5	45°	$\phi 6 \sim \phi 25$		
		4RFSM				4		$\phi 4 \sim \phi 12$		
		6RFSM				6				
		3RFRS (Radius)				3				
		4RFRS (Radius)				4				

L

Solid End Mill

Carbide material

Substrate of all solid endmills is carbide.

Workpiece Material										Description	Ref. Page
	Steel		Hardened Steel		Stainless steel	Titanium Alloys	Heat-resistant Alloys	Cast Iron	Aluminum & Non-ferrous metals		
	UP to 30HRC	UP to 40HRC	UP to 55HRC	UP to 68HRC							
	<div>P</div> <div>~30HRC</div>	<div>P</div> <div>30 ~ 40HRC</div>	<div>H</div> <div>~ 55HRC</div>	<div>H</div> <div>~ 68HRC</div>	<div>M</div> <div>Stainless steel</div>	<div>S</div> <div>Titanium Alloys</div>	<div>S</div> <div>Heat-resistant Alloys</div>	<div>K</div> <div>Cast Iron</div>	<div>N</div> <div>Aluminum & Non-ferrous Metals</div>		
										2FESS	L10
										2FESM	
										2FESL	
										2FEKS	L12
										2FEKM	
										4FESM	L13
										4FEKM	
										2FESW	L14
										3FESW	
										4FESW	
										3UFSM	L15
										4PGSS	L16
										5PGSS	
										4PGSM	
										5PGSM	
										6PGSM	
										4PGSL	
										5PGSL	
										6PGSL	
										4PGRM (Radius)	L17
										3ZFKS	L18
										3ZFKM	
										4YEKM	L20
										4YECM	
										4YERM (Radius)	
										5DEKM	L21
										5DERM (Radius)	
										4YFSM	
										6YFSM	
										3RDSM	L22
										4RDSM	
										5RDSM	
										3RDSL	
										4RDSL	
										5RDSL	
										4RFSM	L23
										6RFSM	
										3RFRS (Radius)	
										4RFRS (Radius)	

○ : 1st Choice ○ : 2nd Choice






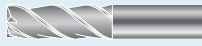


L



Solid End Mill

Tool Selection Guide

Application and selection of type distinctions

Ref. Page	Applications	Description	Features	Shape	Coating	No. of Flutes	Helix Angle	Outside Dia. øDc (mm)		
L24	Ball nose	2UEBS	Ball-nose End Mill with 2 Flutes		TiAlN	2	30°	ø1 ~ ø20		
		3UEBS	Ball-nose End Mill with 3 Flutes			3	30°	ø3 ~ ø12		
L25		4YEBS	Ball-nose End Mill with 4 Flutes			4	38°	ø5 ~ ø20		
L26	Special corner-R shape	6PDRS	6 flutes, High feed rate		AlTiN	6	20°	ø6 ~ ø12		
L28	Hardened metals	4HFSS	Multi-edge type Negative rake angle Hardened metals Finishing		MEGACOAT HARD	4	45°	ø1 ~ ø12		
		5HFSS				5				
		6HFSS				6				
		7HFSS				7				
		4HFSM				4				
		5HFSM				5		ø1 ~ ø25		
		6HFSM				6				
		7HFSM				7				
		8HFSM				8				
		L29				4UGSM				
6UGSM	6									
L30	Aluminum & Non-ferrous metals	3NESM	Unequally partitioned flute design, With wiper edge			3	38°	ø3 ~ ø20		
L31		2NFMS	Sharpness oriented Smooth chip evacuation			2	45°	ø1 ~ ø20		
		3NFMS				3		ø3 ~ ø20		
		3NFSL				3		ø3 ~ ø20		
L32		3AESM	Roughing			3	30°	ø6 ~ ø25		
		3AESL				3		ø6 ~ ø25		

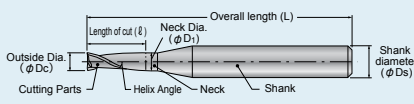
Solid End Mill Identification System

2 F E S M 020 - 060 - 04 XXXXXXXXX

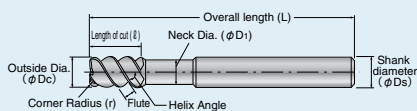
① No. of Flutes	② Series	③ Helix Angle	④ Application	⑤ Length of cut	⑥ Outside Dia.	⑦ Length of cut	⑧ Shank diameter	⑨ Others
2	F : Surface finish oriented	D : 20-29°	S : Square	S : Short	020	060	04	Corner
3	U (UF) / P (PG): Multi-purpose	E : 30-39°	B : Ball Nose	M : Medium	↓	↓	↓	Radius
4	Z : Multi-function high efficiency	F : 40-49°	R : Radius	L : Long	2.0mm	6.0mm	4.0mm	C width
5	Y/D : High efficiency	G : 50-59°	K : Tough corner	W : For				etc...
6	(Difficult-to-cut Material)		edge	Automatic				
7	R : Roughing		C : with Corner	Lathe				
8	H/U (UG): Hardened metals		Chamfering					
	N/A : Aluminum & Non-ferrous metals							

Name of parts

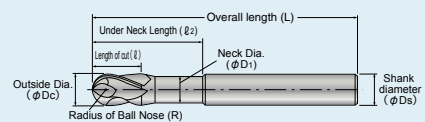
● Square Type



● Radius Type



● Ball-nosed Type



Carbide material

Substrate of all solid endmills is carbide.

	Steel		Hardened Steel		Stainless steel	Titanium Alloys	Heat-resistant Alloys	Cast Iron	Aluminum & Non-ferrous metals	Description	Ref. Page
	UP to 30HRC	UP to 40HRC	UP to 55HRC	UP to 68HRC							
	P ~30HRC	P 30~40HRC	H ~55HRC	H ~68HRC	M Stainless steel	S Titanium Alloys	S Heat-resistant Alloys	K Cast Iron	N Aluminum & Non-ferrous Metals		
	○	○						○		2UEBS	L24
	○	○			○	○		○	○	3UEBS	
	○	○			○	○	○	○		4YEBM	L25
	○	○	○	○						6PDRS	L26
	○	○	○	○						4HFSS 5HFSS 6HFSS 7HFSS 4HFSM 5HFSM 6HFSM 7HFSM 8HFSM	L28
			○	○						4UGSM 6UGSM	
										3NESM	L30
									○	2NFSM 3NFSM 3NFSL 3AESM 3AESL	L31 L32

○ : 1st Choice ○ : 2nd Choice

L



Solid End Mill



How to read icon

Super Micro-grain carbide

The products made from super micro-grain cemented carbide

Coating



MEGACOAT Hard



MEGACOAT



TiAlN Coating



AlTiN Coating



Non-coating

Corner Form



Radius



Corner sharp edge



with Corner land



with Corner Chamfering

Corner Radius Tolerance



0~-0.02mm
Corner Radius Tolerance is 0/-0.02mm.

Ball-nose Radius Tolerance



0~-0.02mm
The R tolerance of ball end mill is 0/-0.02mm.

Flutes



3 edge design

Helix Angle



Helix Angle 30°

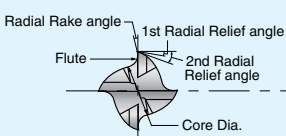
Cutting edge shape



Roughing

Cutting parts shape

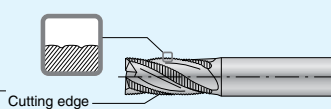
● End cutting edge



※ Square 4 flutes

● Core Diameter Ratio (%)=(Core Diameter / Outside Diameter)×100

● Cutting edge shape



● with Corner land

● Tough Corner edge (with Corner land)

[General shape]



End Gash

[with Corner land]



End Gash

Corner land

Guide for tool selection

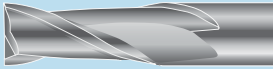
Introduction

Surface finish oriented

L10~L14

F Series

MEGACOAT is applied



(FES)

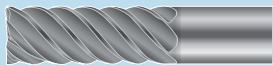
MEGACOAT and sharp cutting edge achieves high precision finishing by excellent wear resistance and heat-resistance. Total length 35mm and 45mm are available for automatic lathe.

L10~L14

Multi-purpose

L15~L17

P Series
(PGS)



(PGS)

Multi-purpose endmill for slotting and shouldering. Core diameter ratio is 60% for 1D distance from the bottom edge, and 80% for the longer distance. Smooth chip evacuation and high rigidity.

L16

High efficiency chip evacuation

L18~L23

L

Z Series

MEGACOAT is applied



(3ZEKS)

Multi-function high efficiency "AXEL MILL". Applicable for plunge milling, slotting and finishing with one endmill. Smooth chip evacuation because sub-groove on gash breaks chips at plunge milling.

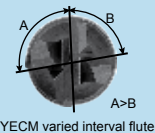
L18

Y Series



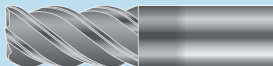
(4YEKM, 4YECM, 4YERM)

Varied interval flute design reduces vibration and improve efficiency at slotting and shouldering. Applicable for stainless steel and heat resistant steel with 3 types of cutting edge. (corner land, chamfered, radius)



L20

D Series



(5DEKM, 5DERM)

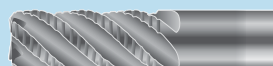
Varied interval flute design with 5 flutes. For high efficiency slotting and shouldering. Applicable for difficult-to-cut materials like stainless steel and heat resistant steel.

L21

R Series



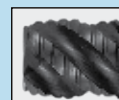
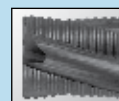
(RDS)



(RFS)

RDS type is for general use with large flat surface edge of 20 degrees helix angle.

RFS has notched surface edge of 45 degrees helix angle. RFS type is applicable for hardened materials and titanium alloy with strong edge.

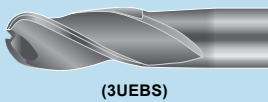


L22~L23

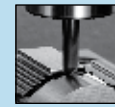
Solid End Mill

Ball-nose end mill

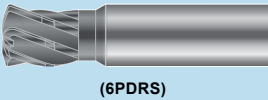
L24~L27



Ball-nose end mill with 2 / 3 / 4 flutes.



L24~L25



High efficiency radius. Achieves large cutting allowance and high efficiency cutting with special corner radius shape. Ramping and arc cutting are possible.

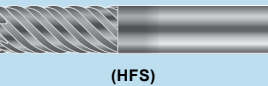
L26

Hardened metals

L28~L29



MEGACOAT Hard is applied

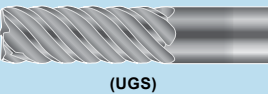


New PVD coating MEGACOAT Hard for hardened metals is applied.

Large core diameter and negative rake angle improves edge strength.

Helix angle 45 degrees. High efficiency cutting and long tool life with wide lineup of 4, 5, 6, 7 and 8 flute types.

L28



For hardened metals with negative rake angle. Helix angle is 50 degrees.

L29

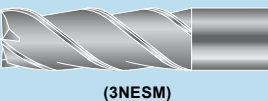
L



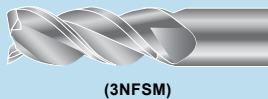
Solid End Mill

Aluminum & Non-ferrous metals

L30~L32

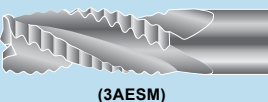


NES type realizes good surface finish with wiper cutting edge. Varied interval flute design prevents chatter and improves cutting efficiency and surface finish quality of side wall of workpiece.



MFS type improves chip evacuation by special rake face design and 45 degrees helix angle.

L30~L31

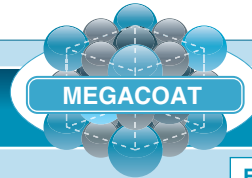


Roughing endmill for high efficiency cutting of aluminum and non-ferrous metals.

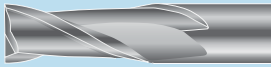
L32

New PVD technology, MEGACOAT

For high precision finishing, MEGACOAT



F-series
L10~L14



MEGACOAT achieves high precision finishing and a sharp cutting edge.

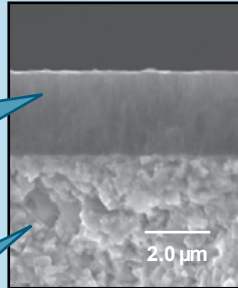
Wear resistance and high heat-resistance

MEGACOAT

Nitride solid solution of high melting point metal
High hardness and oxidation resistant
Smooth surface

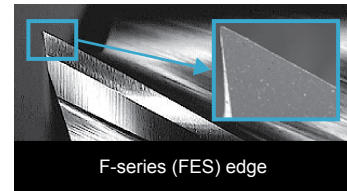
Fracture resistance and stable cutting

Super Micro-grain cemented carbide



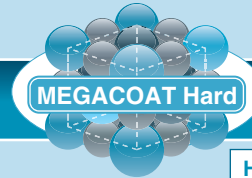
High-quality, sharp edge

Smooth surface quality

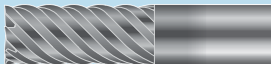


F-series (FES) edge

MEGACOAT Hard - A new coating for hardened metals



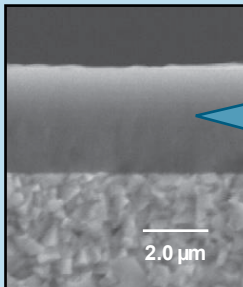
H-series
L28



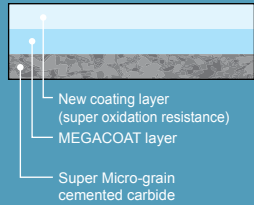
Achieves longer tool life and stable cutting of hardened metals with a special multi-layer coating.

Excellent wear resistance and heat resistance

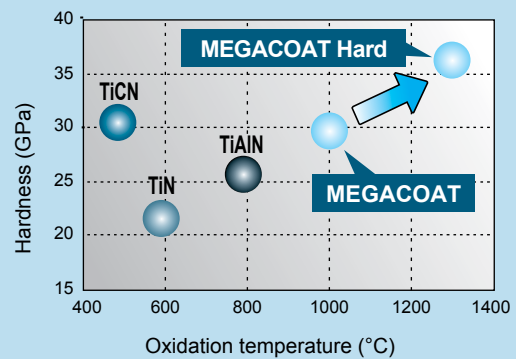
MEGACOAT Hard structure



Special multi-layer coating

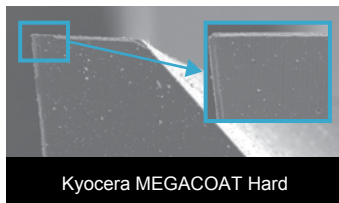


Achieves super hardness to control abrasion of the edge coating



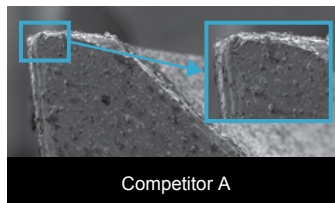
Smooth cutting edge quality with a unique coating technology

Smooth surface quality



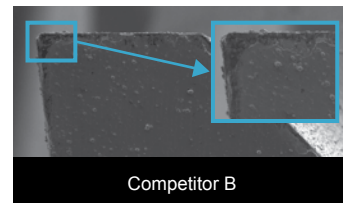
Kyocera MEGACOAT Hard

Smooth and sharp to the tip of the cutting edge.
Longer tool life and improved surface finish.



Competitor A

Coating surface is rough and there is much cutter abrasion.
The cutter edge is rounded.

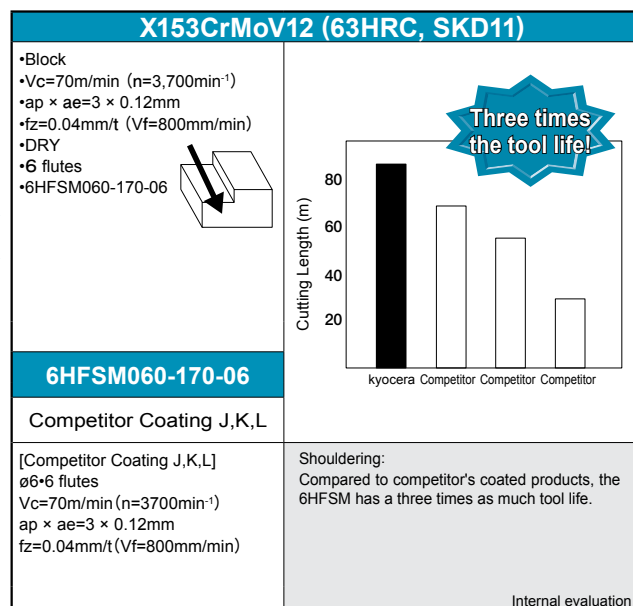
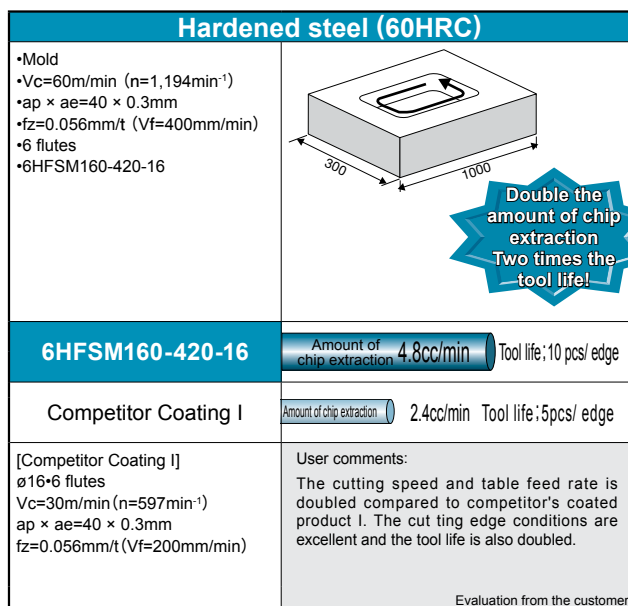
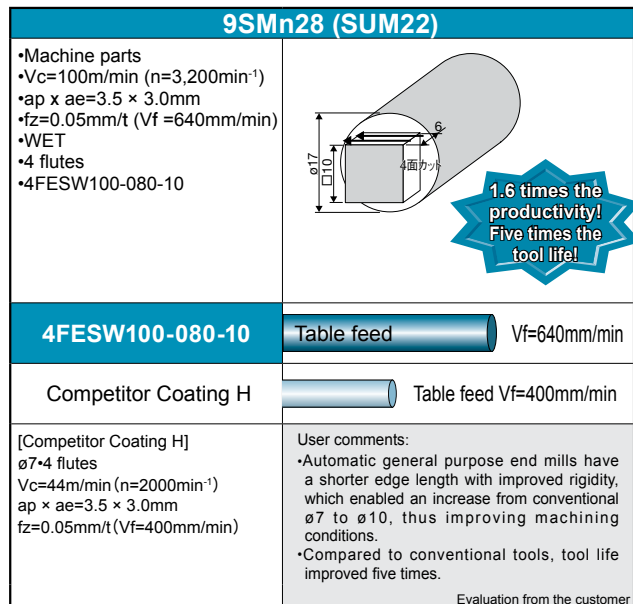
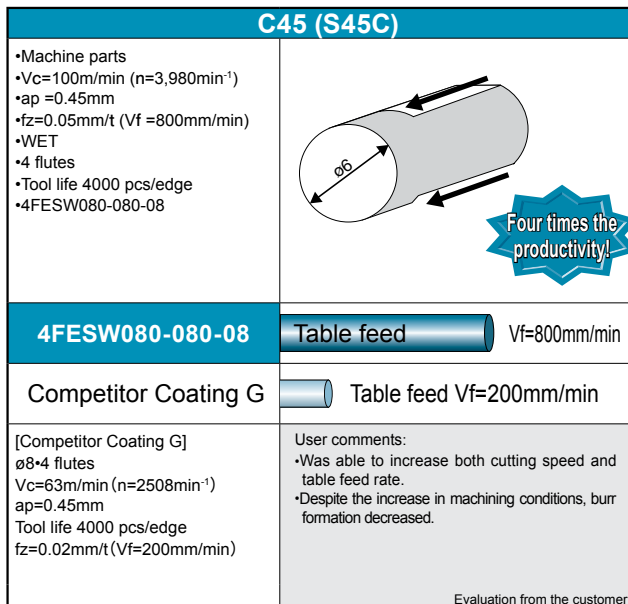
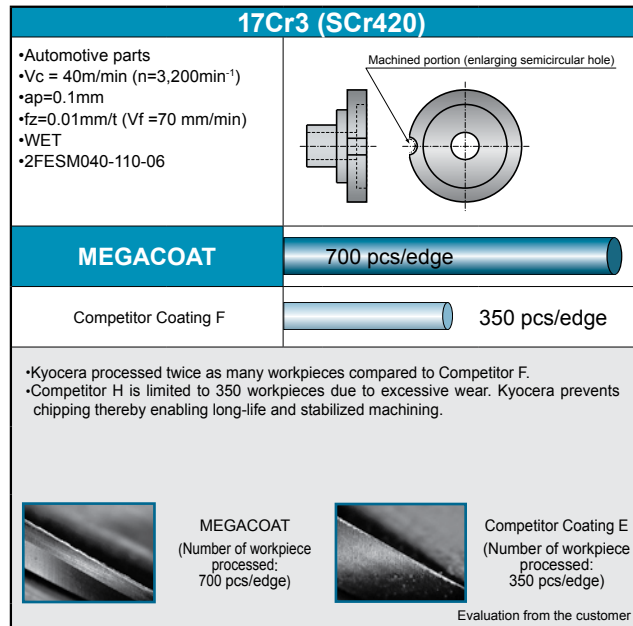
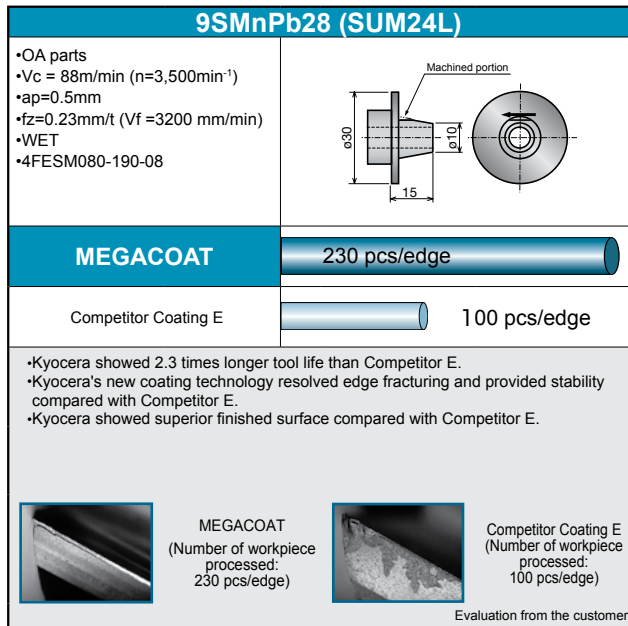


Competitor B

Major abrasion of cutter and exposed material is noticeable.

Smooth endmill surface reduces welding and allows stable cutting

Case studies



L



Solid End Mill

Surface finish oriented, 2 flutes, Corner sharp edge

No. of Flutes: 2

2FESS, 2FESM, 2FESL

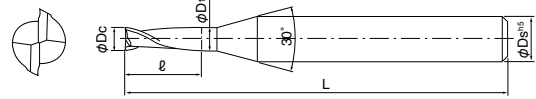


MEGACOAT is applied

Super Micro-grain carbide

Workpiece Materials

★ 1st choice



2FESS (Short)

Shouldering

Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance øD1	Length of cut l	Neck Dia. øD1	Shank diameter øDs	Overall length L	No. of Flutes Z
2FESS010-015-04	●	1.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	1.5	1.1	4	45	2
2FESS015-023-04	●	1.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	2.3	1.6	4	45	2
2FESS020-030-04	●	2.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	3.0	2.1	4	45	2
2FESS025-037-04	●	2.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	3.7	2.6	4	45	2
2FESS030-045-06	●	3.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	4.5	3.2	6	50	2
2FESS035-052-06	●	3.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	5.2	3.7	6	50	2
2FESS040-060-06	●	4.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	6.0	4.2	6	50	2
2FESS045-067-06	●	4.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	6.7	4.7	6	50	2
2FESS050-075-06	●	5.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	7.5	5.2	6	50	2
2FESS055-082-06	●	5.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	8.2	5.7	6	50	2
2FESS060-090-06	●	6.0	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	9.0	-	6	50	2
2FESS080-120-08	●	8.0	$\begin{smallmatrix} 0 \\ -0.005 \\ -0.025 \end{smallmatrix}$	12.0	-	8	60	2
2FESS100-150-10	●	10.0	$\begin{smallmatrix} 0 \\ -0.005 \\ -0.025 \end{smallmatrix}$	15.0	-	10	70	2
2FESS120-180-12	●	12.0	$\begin{smallmatrix} 0 \\ -0.010 \\ -0.030 \end{smallmatrix}$	18.0	-	12	75	2
2FESS140-210-16	●	14.0	$\begin{smallmatrix} 0 \\ -0.010 \\ -0.030 \end{smallmatrix}$	21.0	14.2	16	75	2
2FESS150-230-16	●	15.0	$\begin{smallmatrix} 0 \\ -0.010 \\ -0.030 \end{smallmatrix}$	23.0	15.2	16	90	2
2FESS160-240-16	●	16.0	$\begin{smallmatrix} 0 \\ -0.010 \\ -0.030 \end{smallmatrix}$	24.0	-	16	90	2

2FESM (Medium)

Shouldering

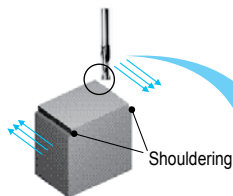
Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance øD1	Length of cut l	Neck Dia. øD1	Shank diameter øDs	Overall length L	No. of Flutes Z
2FESM002-004-04	●	0.2	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	0.4	0.22	4	45	2
2FESM003-006-04	●	0.3	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	0.6	0.32	4	45	2
2FESM004-008-04	●	0.4	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	0.8	0.42	4	45	2
2FESM005-010-04	●	0.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	1.0	0.53	4	45	2
2FESM006-012-04	●	0.6	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	1.2	0.63	4	45	2
2FESM007-014-04	●	0.7	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	1.4	0.74	4	45	2
2FESM008-016-04	●	0.8	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	1.6	0.84	4	45	2
2FESM009-020-04	●	0.9	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	2.0	0.95	4	45	2
2FESM010-025-04	●	1.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	2.5	1.1	4	45	2
2FESM011-025-04	●	1.1	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	2.5	1.2	4	45	2
2FESM012-040-04	●	1.2	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	4.0	1.3	4	45	2
2FESM013-040-04	●	1.3	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	4.0	1.4	4	45	2
2FESM014-040-04	●	1.4	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	4.0	1.5	4	45	2
2FESM015-040-04	●	1.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	4.0	1.6	4	45	2
2FESM016-050-04	●	1.6	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	5.0	1.7	4	45	2
2FESM017-050-04	●	1.7	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	5.0	1.8	4	45	2
2FESM018-050-04	●	1.8	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	5.0	1.9	4	45	2
2FESM019-050-04	●	1.9	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	5.0	2.0	4	45	2
2FESM020-060-04	●	2.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	6.0	2.1	4	45	2
2FESM021-060-04	●	2.1	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	6.0	2.2	4	45	2
2FESM022-060-04	●	2.2	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	6.0	2.3	4	45	2
2FESM023-060-04	●	2.3	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	6.0	2.4	4	45	2
2FESM024-080-04	●	2.4	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	8.0	2.5	4	45	2
2FESM025-080-04	●	2.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	8.0	2.6	4	45	2
2FESM026-080-04	●	2.6	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	8.0	2.7	4	45	2
2FESM027-080-04	●	2.7	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	8.0	2.8	4	45	2
2FESM028-080-04	●	2.8	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	8.0	2.9	4	45	2
2FESM029-080-04	●	2.9	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	8.0	3.1	4	45	2
2FESM030-100-06	●	3.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.2	6	50	2
2FESM031-100-06	●	3.1	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.3	6	50	2
2FESM032-100-06	●	3.2	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.4	6	50	2
2FESM033-100-06	●	3.3	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.5	6	50	2

Sharp Cutting Edge Reduced Burrs

X5CrNi18 10 (SUS304)



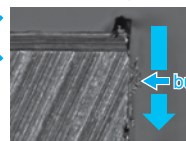
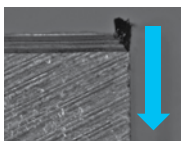
Block

- Vc=70m/min
(n=2,230min⁻¹)
- ap×ae=5.0mm×1.0mm
- fz=0.03mm/t
(Vf=134mm/min)

Upper workpiece area

2FESM100-220-10

Competitor Coating D



← burrs

Recommended Cutting Conditions **L33**

● : Std. Item

2FESM (Medium)

Shouldering

Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. øD1	Shank diameter øDs	Overall length L	No. of Flutes Z
2FESM034-100-06	●	3.4	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.6	6	50	2
2FESM035-100-06	●	3.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.7	6	50	2
2FESM036-100-06	●	3.6	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.8	6	50	2
2FESM037-100-06	●	3.7	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.9	6	50	2
2FESM038-110-06	●	3.8	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.0	6	50	2
2FESM039-110-06	●	3.9	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.1	6	50	2
2FESM040-110-06	●	4.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.2	6	50	2
2FESM041-110-06	●	4.1	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.3	6	50	2
2FESM042-110-06	●	4.2	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.4	6	50	2
2FESM043-110-06	●	4.3	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.5	6	50	2
2FESM044-110-06	●	4.4	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.6	6	50	2
2FESM045-110-06	●	4.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.7	6	50	2
2FESM046-110-06	●	4.6	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.8	6	50	2
2FESM047-110-06	●	4.7	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.9	6	50	2
2FESM048-130-06	●	4.8	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.0	6	50	2
2FESM049-130-06	●	4.9	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.1	6	50	2
2FESM050-130-06	●	5.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.2	6	50	2
2FESM051-130-06	●	5.1	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.3	6	50	2
2FESM052-130-06	●	5.2	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.4	6	50	2
2FESM053-130-06	●	5.3	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.5	6	50	2
2FESM054-130-06	●	5.4	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.6	6	50	2
2FESM055-130-06	●	5.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.7	6	50	2
2FESM056-130-06	●	5.6	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.8	6	50	2
2FESM057-130-06	●	5.7	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	-	6	50	2
2FESM058-130-06	●	5.8	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	-	6	50	2
2FESM059-130-06	●	5.9	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	-	6	50	2
2FESM060-130-06	●	6.0	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	13.0	-	6	50	2
2FESM061-160-08	●	6.1	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	6.3	8	60	2
2FESM062-160-08	●	6.2	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	6.4	8	60	2
2FESM063-160-08	●	6.3	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	6.5	8	60	2
2FESM064-160-08	●	6.4	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	6.6	8	60	2
2FESM065-160-08	●	6.5	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	6.7	8	60	2
2FESM066-160-08	●	6.6	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	6.8	8	60	2
2FESM067-160-08	●	6.7	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	6.9	8	60	2
2FESM068-160-08	●	6.8	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	7.0	8	60	2
2FESM069-160-08	●	6.9	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	7.1	8	60	2
2FESM070-160-08	●	7.0	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	7.2	8	60	2
2FESM071-160-08	●	7.1	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	7.3	8	60	2
2FESM072-160-08	●	7.2	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	7.4	8	60	2
2FESM073-160-08	●	7.3	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	7.5	8	60	2
2FESM074-160-08	●	7.4	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	16.0	7.6	8	60	2
2FESM075-190-08	●	7.5	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	19.0	7.7	8	60	2
2FESM076-190-08	●	7.6	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	19.0	-	8	60	2
2FESM077-190-08	●	7.7	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	19.0	-	8	60	2
2FESM078-190-08	●	7.8	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	19.0	-	8	60	2
2FESM079-190-08	●	7.9	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	19.0	-	8	60	2

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. øD1	Shank diameter øDs	Overall length L	No. of Flutes Z
2FESM080-190-08	●	8.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	-	8	60	2
2FESM081-190-10	●	8.1	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	8.3	10	70	2
2FESM082-190-10	●	8.2	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	8.4	10	70	2
2FESM083-190-10	●	8.3	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	8.5	10	70	2
2FESM084-190-10	●	8.4	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	8.6	10	70	2
2FESM085-190-10	●	8.5	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	8.7	10	70	2
2FESM086-190-10	●	8.6	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	8.8	10	70	2
2FESM087-190-10	●	8.7	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	8.9	10	70	2
2FESM088-190-10	●	8.8	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	9.0	10	70	2
2FESM089-190-10	●	8.9	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	9.1	10	70	2
2FESM090-190-10	●	9.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	9.2	10	70	2
2FESM091-190-10	●	9.1	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	9.3	10	70	2
2FESM092-190-10	●	9.2	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	9.4	10	70	2
2FESM093-190-10	●	9.3	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	9.5	10	70	2
2FESM094-190-10	●	9.4	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	9.6	10	70	2
2FESM095-190-10	●	9.5	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	9.7	10	70	2
2FESM096-220-10	●	9.6	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	-	10	70	2
2FESM097-220-10	●	9.7	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	-	10	70	2
2FESM098-220-10	●	9.8	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	-	10	70	2
2FESM099-220-10	●	9.9	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	-	10	70	2
2FESM100-220-10	●	10.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	-	10	70	2
2FESM105-220-12	●	10.5	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	10.7	12	75	2
2FESM110-220-12	●	11.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	11.2	12	75	2
2FESM115-220-12	●	11.5	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	11.7	12	75	2
2FESM120-260-12	●	12.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	26.0	-	12	75	2
2FESM130-260-16	●	13.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	26.0	13.2	16	75	2
2FESM140-260-16	●	14.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	26.0	14.2	16	75	2
2FESM150-300-16	●	15.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	30.0	15.2	16	90	2
2FESM160-320-16	●	16.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	32.0	-	16	90	2

2FESL (Long)

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. øD1	Shank diameter øDs	Overall length L	No. of Flutes Z
2FESL010-040-04	●	1.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	4.0	1.1	4	45	2
2FESL015-060-04	●	1.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	6.0	1.6	4	45	2
2FESL020-090-04	●	2.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	9.0	2.1	4	45	2
2FESL025-120-04	●	2.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	12.0	2.6	4	45	2
2FESL030-140-06	●	3.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	14.0	3.2	6	50	2
2FESL040-170-06	●	4.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	17.0	4.2	6	50	2
2FESL050-200-06	●	5.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	20.0	5.2	6	60	2
2FESL060-240-06	●	6.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	24.0	-	6	60	2
2FESL080-280-08	●	8.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	28.0	-	8	70	2
2FESL100-340-10	●	10.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	34.0	-	10	90	2
2FESL120-400-12	●	12.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	40.0	-	12	90	2
2FESL160-480-16	●	16.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	48.0	-	16	115	2

Recommended Cutting Conditions ● L33~L34

● : Std. Item

L



Solid End Mill

Surface finish oriented, 2 flutes, Tough corner edge

No. of Flutes: 2

2FEKS, 2FEKM

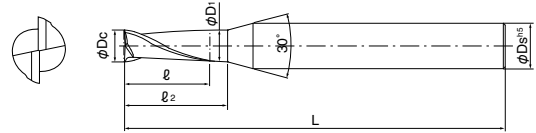


MEGACOAT is applied

Super Micro-grain carbide

Workpiece Materials

★ 1st choice



2FEKS (Short)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. φDc	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. φD1	Under Neck Length ℓ2	Shank diameter φDs	Overall length L	No. of Flutes Z
2FEKS030-045-06	●	3.0	⁰ _{-0.015}	4.5	3.15	6.5	6	49.8	2
2FEKS035-052-06	●	3.5	⁰ _{-0.015}	5.2	3.68	7.2	6	49.8	2
2FEKS040-060-06	●	4.0	⁰ _{-0.015}	6.0	4.2	8.2	6	49.8	2
2FEKS045-067-06	●	4.5	⁰ _{-0.015}	6.7	4.7	8.9	6	49.8	2
2FEKS050-075-06	●	5.0	⁰ _{-0.015}	7.5	5.2	10.1	6	49.8	2
2FEKS055-082-06	●	5.5	⁰ _{-0.015}	8.2	5.7	10.8	6	49.8	2
2FEKS060-090-06	●	6.0	⁰ _{-0.020}	9.0	-	-	6	49.8	2
2FEKS080-120-08	●	8.0	^{-0.005} _{-0.025}	12.0	-	-	8	59.8	2
2FEKS100-150-10	●	10.0	^{-0.005} _{-0.025}	15.0	-	-	10	69.8	2
2FEKS120-180-12	●	12.0	^{-0.010} _{-0.030}	18.0	-	-	12	74.8	2
2FEKS140-210-16	●	14.0	^{-0.010} _{-0.030}	21.0	14.2	31.4	16	74.8	2
2FEKS150-230-16	●	15.0	^{-0.010} _{-0.030}	23.0	15.2	35	16	89.8	2
2FEKS160-240-16	●	16.0	^{-0.010} _{-0.030}	24.0	-	-	16	89.8	2

2FEKM (Medium)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. φDc	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. φD1	Under Neck Length ℓ2	Shank diameter φDs	Overall length L	No. of Flutes Z
2FEKM030-100-06	●	3.0	⁰ _{-0.015}	10.0	3.15	12.0	6	49.8	2
2FEKM035-100-06	●	3.5	⁰ _{-0.015}	10.0	3.68	12.0	6	49.8	2
2FEKM040-110-06	●	4.0	⁰ _{-0.015}	11.0	4.2	13.2	6	49.8	2
2FEKM045-110-06	●	4.5	⁰ _{-0.015}	11.0	4.7	13.2	6	49.8	2
2FEKM050-130-06	●	5.0	⁰ _{-0.015}	13.0	5.2	15.6	6	49.8	2
2FEKM055-130-06	●	5.5	⁰ _{-0.015}	13.0	5.7	15.6	6	49.8	2
2FEKM060-130-06	●	6.0	⁰ _{-0.020}	13.0	-	-	6	49.8	2
2FEKM065-160-08	●	6.5	⁰ _{-0.020}	16.0	6.7	22.4	8	59.8	2
2FEKM070-160-08	●	7.0	⁰ _{-0.020}	16.0	7.2	22.4	8	59.8	2
2FEKM075-190-08	●	7.5	⁰ _{-0.020}	19.0	7.7	26.6	8	59.8	2
2FEKM080-190-08	●	8.0	^{-0.005} _{-0.025}	19.0	-	-	8	59.8	2
2FEKM085-190-10	●	8.5	^{-0.005} _{-0.025}	19.0	8.7	26.6	10	69.8	2
2FEKM090-190-10	●	9.0	^{-0.005} _{-0.025}	19.0	9.2	26.6	10	69.8	2
2FEKM095-190-10	●	9.5	^{-0.005} _{-0.025}	19.0	9.7	26.6	10	69.8	2
2FEKM100-220-10	●	10.0	^{-0.005} _{-0.025}	22.0	-	-	10	69.8	2
2FEKM110-220-12	●	11.0	^{-0.005} _{-0.025}	22.0	11.2	30.8	12	74.8	2
2FEKM120-260-12	●	12.0	^{-0.010} _{-0.030}	26.0	-	-	12	74.8	2
2FEKM130-260-16	●	13.0	^{-0.010} _{-0.030}	26.0	13.2	36.4	16	74.8	2
2FEKM140-260-16	●	14.0	^{-0.010} _{-0.030}	26.0	14.2	36.4	16	74.8	2
2FEKM150-300-16	●	15.0	^{-0.010} _{-0.030}	30.0	15.2	42.0	16	89.8	2
2FEKM160-320-16	●	16.0	^{-0.010} _{-0.030}	32.0	-	-	16	89.8	2

- MEGACOAT and sharp cutting edge achieves high precision finishing by excellent wear resistance and heat-resistance.

Recommended Cutting Conditions L34

● : Std. Item

4 flutes, Corner sharp edge

4FESM

Workpiece Materials ★ 1st choice

★ P ~30HRC
P 30~40HRC
H ~55HRC
★ M Stainless steel
K Cast Iron
N Aluminum & Non-ferrous Metals



MEGACOAT is applied

Super Micro-grain carbide

MEGACOAT
Sharp
h5 Shank Dia.
30°

4 flutes, Tough corner edge

4FEKM

Workpiece Materials ★ 1st choice

★ P ~30HRC
P 30~40HRC
H ~55HRC
★ M Stainless steel
K Cast Iron
N Aluminum & Non-ferrous Metals



MEGACOAT is applied

Super Micro-grain carbide

MEGACOAT
Land
h5 Shank Dia.
30°

4FESM

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. ϕD_c	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. ϕD_1	Shank diameter ϕD_s	Overall length L	No. of Flutes Z
4FESM010-025-04	●	1.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	2.5	1.1	4	45	4
4FESM015-040-04	●	1.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	4.0	1.6	4	45	4
4FESM020-060-04	●	2.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	6.0	2.1	4	45	4
4FESM025-080-04	●	2.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	8.0	2.6	4	45	4
4FESM030-100-06	●	3.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.2	6	50	4
4FESM035-100-06	●	3.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.7	6	50	4
4FESM040-110-06	●	4.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.2	6	50	4
4FESM045-110-06	●	4.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.7	6	50	4
4FESM050-130-06	●	5.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.2	6	50	4
4FESM055-130-06	●	5.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.7	6	50	4
4FESM060-130-06	●	6.0	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	13.0	-	6	50	4
4FESM080-190-08	●	8.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	-	8	60	4
4FESM100-220-10	●	10.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	-	10	70	4
4FESM120-260-12	●	12.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	26.0	-	12	75	4
4FESM140-260-16	●	14.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	26.0	14.2	16	75	4
4FESM150-300-16	●	15.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	30.0	15.2	16	90	4
4FESM160-320-16	●	16.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	32.0	-	16	90	4

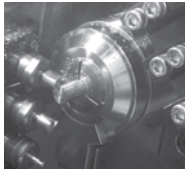
4FEKM

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. ϕD_c	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. ϕD_1	Under Neck Length ℓ_2	Shank diameter ϕD_s	Overall length L	No. of Flutes Z
4FEKM030-100-06	●	3.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.15	12	6	49.8	4
4FEKM035-100-06	●	3.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	10.0	3.68	12	6	49.8	4
4FEKM040-110-06	●	4.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.2	13.2	6	49.8	4
4FEKM045-110-06	●	4.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	11.0	4.7	13.2	6	49.8	4
4FEKM050-130-06	●	5.0	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.2	15.6	6	49.8	4
4FEKM055-130-06	●	5.5	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	13.0	5.7	15.6	6	49.8	4
4FEKM060-130-06	●	6.0	$\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$	13.0	-	-	6	49.8	4
4FEKM080-190-08	●	8.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	19.0	-	-	8	59.8	4
4FEKM100-220-10	●	10.0	$\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$	22.0	-	-	10	69.8	4
4FEKM120-260-12	●	12.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	26.0	-	-	12	74.8	4
4FEKM140-260-16	●	14.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	26.0	14.2	36.4	16	74.8	4
4FEKM150-300-16	●	15.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	30.0	15.2	42	16	89.8	4
4FEKM160-320-16	●	16.0	$\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$	32.0	-	-	16	89.8	4

2FESW, 3FESW, 4FESW



Workpiece Material: Kovar alloy		
2FES (ø3·2flutes) Smooth surface of shoulder wall		Facing of machine component ·Vc=20m/min (n=2150min ⁻¹) ·fz=0.023mm/t (Vf=100mm/min)
Competitor Coating C(ø3·2flutes) ×Large burrs		Large burrs

Comparison with competitor's endmill after 600 passes

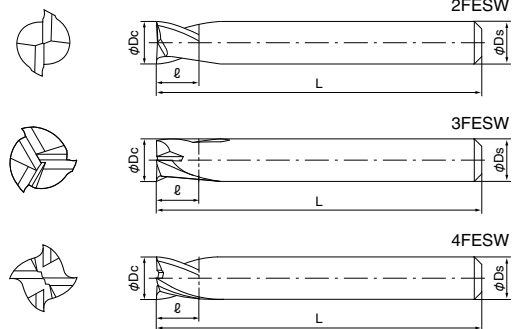


MEGACOAT is applied

Super Micro-grain carbide

Workpiece Materials

★ 1st choice



Sharp Cutting Edge Reduced Burrs

2FESW

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L	No. of Flutes Z
2FESW050-050-05A	●	5	⁰ _{-0.020}	5	5	35	2
2FESW060-060-05A	●	6	⁰ _{-0.020}	6	5	35	2
2FESW030-030-04	●	3	⁰ _{-0.020}	3	4	45	2
2FESW035-035-04	●	3.5	⁰ _{-0.020}	3.5	4	45	2
2FESW040-040-04	●	4	⁰ _{-0.020}	4	4	45	2
2FESW050-050-06	●	5	⁰ _{-0.020}	5	6	45	2
2FESW060-060-06	●	6	⁰ _{-0.020}	6	6	45	2
2FESW070-070-07	●	7	⁰ _{-0.025}	7	7	45	2
2FESW080-080-07	●	8	⁰ _{-0.025}	8	7	45	2
2FESW080-080-08	●	8	⁰ _{-0.025}	8	8	45	2
2FESW100-080-07	●	10	⁰ _{-0.025}	8	7	45	2
2FESW100-080-10	●	10	⁰ _{-0.025}	8	10	45	2
2FESW120-080-10	●	12	⁰ _{-0.025}	8	10	45	2
2FESW120-080-12	●	12	⁰ _{-0.030}	8	12	45	2
2FESW130-080-13	●	13	⁰ _{-0.030}	8	13	45	2

4FESW

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L	No. of Flutes Z
4FESW030-030-04	●	3	⁰ _{-0.020}	3	4	45	4
4FESW035-035-04	●	3.5	⁰ _{-0.020}	3.5	4	45	4
4FESW040-040-04	●	4	⁰ _{-0.020}	4	4	45	4
4FESW050-050-06	●	5	⁰ _{-0.020}	5	6	45	4
4FESW060-060-06	●	6	⁰ _{-0.020}	6	6	45	4
4FESW070-070-07	●	7	⁰ _{-0.025}	7	7	45	4
4FESW080-080-07	●	8	⁰ _{-0.025}	8	7	45	4

3FESW

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L	No. of Flutes Z
3FESW050-050-05A	●	5	⁰ _{-0.020}	5	5	35	3
3FESW060-060-05A	●	6	⁰ _{-0.020}	6	5	35	3
3FESW030-030-04	●	3	⁰ _{-0.020}	3	4	45	3
3FESW035-035-04	●	3.5	⁰ _{-0.020}	3.5	4	45	3
3FESW040-040-04	●	4	⁰ _{-0.020}	4	4	45	3
3FESW050-050-06	●	5	⁰ _{-0.020}	5	6	45	3
3FESW060-060-06	●	6	⁰ _{-0.020}	6	6	45	3
3FESW070-070-07	●	7	⁰ _{-0.025}	7	7	45	3
3FESW080-080-07	●	8	⁰ _{-0.025}	8	7	45	3
3FESW080-080-08	●	8	⁰ _{-0.025}	8	8	45	3
3FESW100-080-07	●	10	⁰ _{-0.025}	8	7	45	3
3FESW100-080-10	●	10	⁰ _{-0.025}	8	10	45	3
3FESW120-080-10	●	12	⁰ _{-0.025}	8	10	45	3
3FESW120-080-12	●	12	⁰ _{-0.030}	8	12	45	3
3FESW130-080-13	●	13	⁰ _{-0.030}	8	13	45	3

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L	No. of Flutes Z
4FESW080-080-08	●	8	⁰ _{-0.025}	8	8	45	4
4FESW100-080-07	●	10	⁰ _{-0.025}	8	7	45	4
4FESW100-080-10	●	10	⁰ _{-0.025}	8	10	45	4
4FESW120-080-10	●	12	⁰ _{-0.025}	8	10	45	4
4FESW120-080-12	●	12	⁰ _{-0.030}	8	12	45	4
4FESW130-080-13	●	13	⁰ _{-0.030}	8	13	45	4

Recommended Cutting Conditions ➡ L36-L37

● : Std. Item

3 Flutes, Multi-purpose

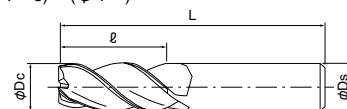
No. of Flutes: 3

3UF5M



Workpiece Materials

★ 1st choice



3UF5M

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia.	Mill Dia. tolerance	Length of cut	Shank diameter	Overall length	No. of Flutes
		φDc		ℓ	φDs	L	Z
3UF5M010-030-04	●	1	-0.014 -0.028	3	4	50	3
3UF5M015-030-04	●	1.5	-0.014 -0.028	3	4	50	3
3UF5M020-030-04	●	2	-0.014 -0.028	3	4	50	3
3UF5M025-040-04	●	2.5	-0.014 -0.028	4	4	50	3
3UF5M030-080-06	●	3	-0.014 -0.028	8	6	50	3
3UF5M040-120-06	●	4	-0.020 -0.038	12	6	50	3
3UF5M050-140-06	●	5	-0.020 -0.038	14	6	50	3
3UF5M060-160-06	●	6	-0.020 -0.038	16	6	50	3
3UF5M080-200-08	●	8	-0.025 -0.047	20	8	63	3
3UF5M100-220-10	●	10	-0.025 -0.047	22	10	76	3
3UF5M120-250-12	●	12	-0.032 -0.059	25	12	76	3
3UF5M160-320-16	●	16	-0.032 -0.059	32	16	89	3
3UF5M200-380-20	●	20	-0.040 -0.073	38	20	104	3

- Products emphasizing high efficiency cutting, three flutes type for general semi finishing. It is available for slotting and shouldering of wide range of workpiece materials.

Recommended Cutting Conditions ➡ L37

● : Std. Item

Multi-edge for Slotting / Shouldering, Multi-purpose (High feed finishing)

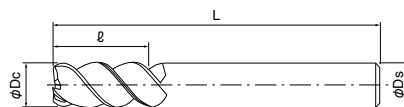
No. of Flutes: 4,5,6

4PGS, 5PGS, 6PGS



Workpiece Materials

★ 1st choice



4PGSS, 5PGSS

(Short)

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. φDc	Mill Dia. tolerance	Length of cut l	Shank diameter φDs	Overall length L	No. of Flutes Z
4PGSS030-045-06	●	3	-0.014 -0.028	4.5	6	57	4
4PGSS040-060-06	●	4	-0.020 -0.038	6	6	57	4
4PGSS050-075-06	●	5	-0.020 -0.038	7.5	6	76	4
4PGSS060-090-06	●	6	-0.020 -0.038	9	6	76	4
4PGSS080-120-08	●	8	-0.025 -0.047	12	8	100	4
4PGSS100-150-10	●	10	-0.025 -0.047	15	10	100	4
4PGSS120-180-12	●	12	-0.032 -0.059	18	12	125	4
4PGSS160-240-16	●	16	-0.032 -0.059	24	16	125	4
4PGSS200-300-20	●	20	-0.040 -0.073	30	20	150	4
5PGSS250-380-25	●	25	-0.040 -0.073	38	25	150	5

4PGSM, 5PGSM, 6PGSM

(Medium)

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. φDc	Mill Dia. tolerance	Length of cut l	Shank diameter φDs	Overall length L	No. of Flutes Z
4PGSM060-150-06	●	6	-0.020 -0.038	15	6	76	4
4PGSM080-200-08	●	8	-0.025 -0.047	20	8	100	4
5PGSM100-250-10	●	10	-0.025 -0.047	25	10	100	5
6PGSM120-300-12	●	12	-0.032 -0.059	30	12	125	6
6PGSM160-400-16	●	16	-0.032 -0.059	40	16	125	6
6PGSM200-500-20	●	20	-0.040 -0.073	50	20	150	6
6PGSM250-630-25	●	25	-0.040 -0.073	63	25	150	6

4PGSL, 5PGSL, 6PGSL

(Long)

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. φDc	Mill Dia. tolerance	Length of cut l	Shank diameter φDs	Overall length L	No. of Flutes Z
4PGSL060-210-06	●	6	-0.020 -0.038	21	6	76	4
4PGSL080-280-08	●	8	-0.025 -0.047	28	8	100	4
5PGSL100-350-10	●	10	-0.025 -0.047	35	10	100	5
6PGSL120-420-12	●	12	-0.032 -0.059	42	12	125	6
6PGSL160-560-16	●	16	-0.032 -0.059	56	16	125	6
6PGSL200-700-20	●	20	-0.040 -0.073	70	20	150	6
6PGSL250-880-25	●	25	-0.040 -0.073	88	25	150	6

- Web thickness ratio is 60% between the cutting edge and 1Dc and 80% for the rest. Good chip evacuation and high rigidity with Corner land.

Recommended Cutting Conditions ➡ L38-L39

● : Std. Item

Slotting, Shouldering Multi-purpose (Radius)

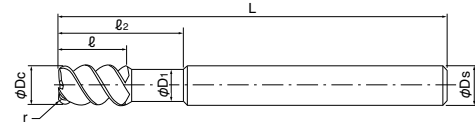
No. of Flutes: 4

4PGRM



Workpiece Materials

★ 1st choice



4PGRM

Shouldering

Slotting

(Unit : mm)

Description	Std.	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Under Neck Length	Shank diameter	Overall length	Spec of Corners
		ϕDc		l	$\phi D1$	$l2$	ϕDs	L	r
4PGRM030-045-06-R025	●	3	-0.014 -0.028	4.5	2.7	9	6	57	R 0.25
4PGRM030-045-06-R050	●	3	-0.014 -0.028	4.5	2.7	9	6	57	R 0.5
4PGRM040-060-06-R025	●	4	-0.020 -0.038	6	3.7	12	6	57	R 0.25
4PGRM040-060-06-R050	●	4	-0.020 -0.038	6	3.7	12	6	57	R 0.5
4PGRM050-075-06-R025	●	5	-0.020 -0.038	7.5	4.6	15	6	76	R 0.25
4PGRM050-075-06-R050	●	5	-0.020 -0.038	7.5	4.6	15	6	76	R 0.5
4PGRM060-090-06-R025	●	6	-0.020 -0.038	9	5.5	18	6	76	R 0.25
4PGRM060-090-06-R050	●	6	-0.020 -0.038	9	5.5	18	6	76	R 0.5
4PGRM060-090-06-R075	●	6	-0.020 -0.038	9	5.5	18	6	76	R 0.75
4PGRM060-090-06-R100	●	6	-0.020 -0.038	9	5.5	18	6	76	R 1.0
4PGRM080-120-08-R050	●	8	-0.025 -0.047	12	7.4	24	8	100	R 0.5
4PGRM080-120-08-R100	●	8	-0.025 -0.047	12	7.4	24	8	100	R 1.0
4PGRM080-120-08-R150	●	8	-0.025 -0.047	12	7.4	24	8	100	R 1.5
4PGRM080-120-08-R200	●	8	-0.025 -0.047	12	7.4	24	8	100	R 2.0
4PGRM100-150-10-R050	●	10	-0.025 -0.047	15	9.2	30	10	100	R 0.5
4PGRM100-150-10-R100	●	10	-0.025 -0.047	15	9.2	30	10	100	R 1.0
4PGRM100-150-10-R150	●	10	-0.025 -0.047	15	9.2	30	10	100	R 1.5
4PGRM100-150-10-R200	●	10	-0.025 -0.047	15	9.2	30	10	100	R 2.0
4PGRM120-180-12-R050	●	12	-0.032 -0.059	18	11	36	12	125	R 0.5
4PGRM120-180-12-R100	●	12	-0.032 -0.059	18	11	36	12	125	R 1.0
4PGRM120-180-12-R150	●	12	-0.032 -0.059	18	11	36	12	125	R 1.5
4PGRM120-180-12-R200	●	12	-0.032 -0.059	18	11	36	12	125	R 2.0
4PGRM160-240-16-R050	●	16	-0.032 -0.059	24	15	48	16	125	R 0.5
4PGRM160-240-16-R150	●	16	-0.032 -0.059	24	15	48	16	125	R 1.5
4PGRM200-300-20-R050	●	20	-0.040 -0.073	30	19	60	20	150	R 0.5
4PGRM200-300-20-R200	●	20	-0.040 -0.073	30	19	60	20	150	R 2.0

No. of Flutes Z=4

- Radius type with 4 flutes. The diameter of the neck portion is thinner than the cutting diameter and it is suitable for deep slotting. Due to the corner R on the cutting edge, it is applicable for finishing of sloped workpiece.

Recommended Cutting Conditions ➡ L39

● : Std. Item

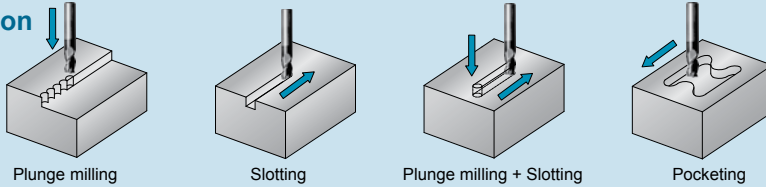


AXEL MILL

Triple functions

Applicable for plunge milling, slotting and finishing with one endmill

Application

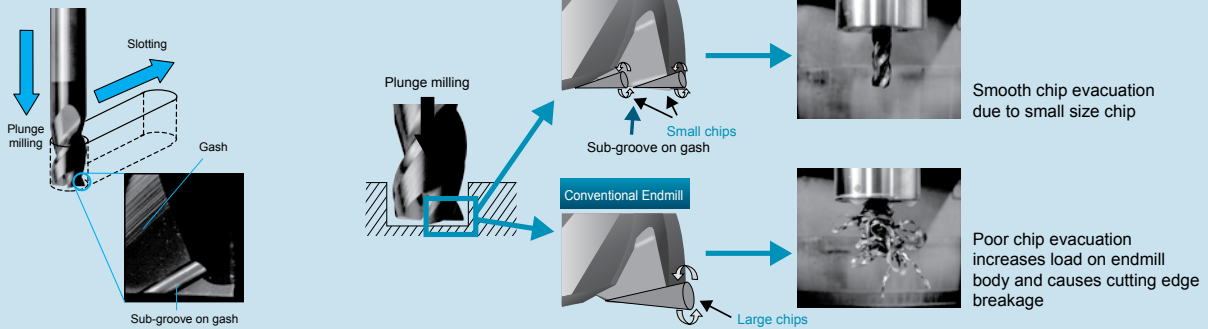


Triple Performances

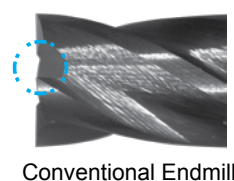
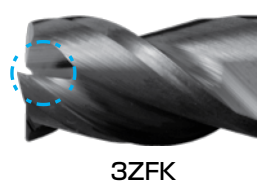
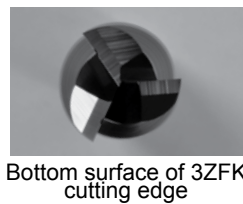
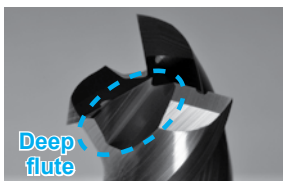
1. High efficiency cutting due to new design

- Smooth chip evacuation because sub-groove on gash breaks chips at plunge milling

Effect of sub-groove on gash



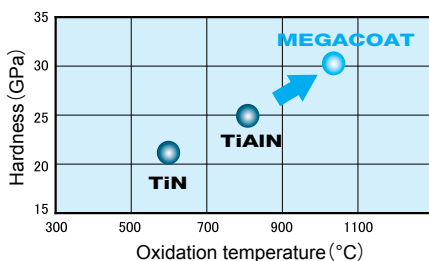
- Prevents chip clogging by deep flute and gash design.



2. Longer tool life by MEGACOAT

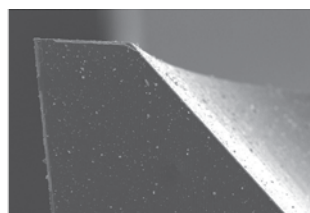
- Excellent wear resistance and heat-resistance

MEGACOAT (New PVD coat)



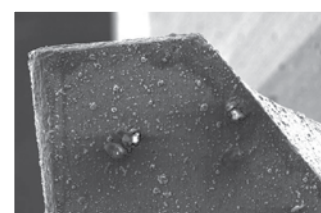
3. Better surface finish by sharp cutting edge quality

- Smooth and sharp to the tip of the cutting edge
- Controls burr formation. Better surface roughness



MEGACOAT

Smooth and sharp to the tip of the cutting edge
Longer tool life improved surface finish



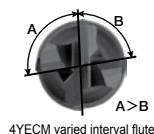
Competitor Coating A

Rough coating surface and round blunt cutting edge

High efficiency chip evacuation, for Steel and Difficult-to-cut materials, Unequally partitioned flute design

No. of Flutes: 4

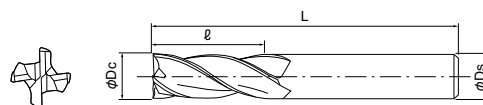
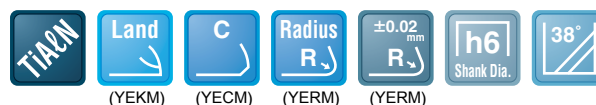
4YEKM, 4YECM, 4YERM



4YEKM varied interval flute

Workpiece Materials

★ 1st choice



4YEKM (With corner land)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	Spec of Corners	No. of Flutes Z
4YEKM040-120-06	●	4	-0.020 -0.038	12	6	55	-	4
4YEKM050-130-06	●	5	-0.020 -0.038	13	6	57	-	4
4YEKM060-130-06	●	6	-0.020 -0.038	13	6	57	-	4
4YEKM080-160-08	●	8	-0.025 -0.047	16	8	63	-	4
4YEKM090-190-10	●	9	-0.025 -0.047	19	10	72	-	4
4YEKM100-220-10	●	10	-0.025 -0.047	22	10	72	-	4
4YEKM120-260-12	●	12	-0.032 -0.059	26	12	83	-	4
4YEKM160-320-16	●	16	-0.032 -0.059	32	16	92	-	4
4YEKM200-380-20	●	20	-0.040 -0.073	38	20	104	-	4
4YEKM250-450-25	●	25	-0.040 -0.073	45	25	121	-	4

4YECM (With corner chamfering)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	Spec of Corners	No. of Flutes Z
4YECM040-120-06-C04	●	4	-0.020 -0.038	12	6	55	C 0.4	4
4YECM050-130-06-C04	●	5	-0.020 -0.038	13	6	57	C 0.4	4
4YECM060-130-06-C04	●	6	-0.020 -0.038	13	6	57	C 0.4	4
4YECM080-160-08-C04	●	8	-0.025 -0.047	16	8	63	C 0.4	4
4YECM090-190-10-C05	●	9	-0.025 -0.047	19	10	72	C 0.5	4
4YECM100-220-10-C05	●	10	-0.025 -0.047	22	10	72	C 0.5	4
4YECM120-260-12-C05	●	12	-0.032 -0.059	26	12	83	C 0.5	4
4YECM160-320-16-C05	●	16	-0.032 -0.059	32	16	92	C 0.5	4
4YECM200-380-20-C05	●	20	-0.040 -0.073	38	20	104	C 0.5	4
4YECM250-450-25-C05	●	25	-0.040 -0.073	45	25	121	C 0.5	4

4YERM (Radius)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	Spec of Corners	No. of Flutes Z
4YERM040-120-06-R020	●	4	-0.020 -0.038	12	6	55	R 0.2	4
4YERM050-130-06-R020	●	5	-0.020 -0.038	13	6	57	R 0.2	4
4YERM060-130-06-R020	●	6	-0.020 -0.038	13	6	57	R 0.2	4
4YERM080-160-08-R020	●	8	-0.025 -0.047	16	8	63	R 0.2	4
4YERM090-190-10-R020	●	9	-0.025 -0.047	19	10	72	R 0.2	4
4YERM100-220-10-R030	●	10	-0.025 -0.047	22	10	72	R 0.3	4
4YERM120-260-12-R030	●	12	-0.032 -0.059	26	12	83	R 0.3	4
4YERM160-320-16-R030	●	16	-0.032 -0.059	32	16	92	R 0.3	4
4YERM200-380-20-R030	●	20	-0.040 -0.073	38	20	104	R 0.3	4
4YERM250-450-25-R030	●	25	-0.040 -0.073	45	25	121	R 0.3	4

- Unequally partitioned flute design prevents vibration and reduces cutting force at slotting. This has led to the high speed and high feed cutting.
- We provide three types of edge shape for different application; Radius, Corner Land and Corner Chamfered type.
- There is Maximum 0.01mm back taper.

Recommended Cutting Conditions ➡ L41

● : Std. Item

High efficiency chip evacuation, for Steel and Difficult-to-cut materials, Unequally partitioned flute design

No. of Flutes: 5

5DEKM, 5DERM



Workpiece Materials ★ 1st choice

P ~30HRC	P 30~40HRC	M Stainless steel	S Titanium Alloys	S Heat-resistant Alloys	K Cast Iron
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APTIN	Land (DEKM)	Radius R (DERM)	± 0.05 mm R (DERM)	h6 Shank Dia.	38°
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5DEKM (With corner land)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L	No. of Flutes Z
5DEKM040-120-06	●	4	-0.020 -0.038	12	6	55	5
5DEKM050-130-06	●	5	-0.020 -0.038	13	6	57	5
5DEKM060-130-06	●	6	-0.020 -0.038	13	6	57	5
5DEKM080-160-08	●	8	-0.025 -0.047	16	8	63	5
5DEKM090-190-10	●	9	-0.025 -0.047	19	10	72	5
5DEKM100-220-10	●	10	-0.025 -0.047	22	10	72	5
5DEKM120-260-12	●	12	-0.032 -0.059	26	12	83	5
5DEKM160-320-16	●	16	-0.032 -0.059	32	16	92	5
5DEKM200-380-20	●	20	-0.040 -0.073	38	20	104	5
5DEKM250-450-25	●	25	-0.040 -0.073	45	25	121	5

5DERM (Radius)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L	Spec of Corners	No. of Flutes Z
5DERM040-120-06-R025	●	4	-0.020 -0.038	12	6	55	R0.25	5
5DERM050-130-06-R025	●	5	-0.020 -0.038	13	6	57	R0.25	5
5DERM060-130-06-R040	●	6	-0.020 -0.038	13	6	57	R0.4	5
5DERM080-160-08-R050	●	8	-0.025 -0.047	16	8	63	R0.5	5
5DERM090-190-10-R050	●	9	-0.025 -0.047	19	10	72	R0.5	5
5DERM100-220-10-R050	●	10	-0.025 -0.047	22	10	72	R0.5	5
5DERM120-260-12-R075	●	12	-0.032 -0.059	26	12	83	R0.75	5
5DERM160-320-16-R075	●	16	-0.032 -0.059	32	16	92	R0.75	5
5DERM200-380-20-R075	●	20	-0.040 -0.073	38	20	104	R0.75	5
5DERM250-450-25-R075	●	25	-0.040 -0.073	45	25	121	R0.75	5

- 5 edge design enables high feed rate cutting. Unequally partitioned flute design prevents vibration. 5DERM is suitable for 0.8Dc slotting.

Recommended Cutting Conditions ➡ L42

Steel and Difficult-to-cut materials, Finishing

No. of Flutes: 4,6

4YFSM, 6YFSM



Workpiece Materials ★ 1st choice

P ~30HRC	P 30~40HRC	M Stainless steel	S Titanium Alloys	S Heat-resistant Alloys	K Cast Iron
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TiAlN	Sharp	h6 Shank Dia.	45°
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4YFSM

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L	No. of Flutes Z
4YFSM040-130-06	●	4	-0.020 -0.038	13	6	50	4
4YFSM050-130-06	●	5	-0.020 -0.038	13	6	50	4

6YFSM

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L	No. of Flutes Z
6YFSM060-130-06	●	6	-0.020 -0.038	13	6	50	6
6YFSM080-190-08	●	8	-0.025 -0.047	19	8	63	6
6YFSM100-220-10	●	10	-0.025 -0.047	22	10	76	6
6YFSM120-260-12	●	12	-0.032 -0.059	26	12	76	6
6YFSM160-320-16	●	16	-0.032 -0.059	32	16	89	6
6YFSM200-380-20	●	20	-0.040 -0.073	38	20	104	6

- Multiple flutes type with excellent chip evacuation. (web thickness ratio: 60%) It has positive type rake angle and suitable for semi-finishing of difficult-to-cut materials such as stainless steel and inconel.

Recommended Cutting Conditions ➡ L43

● : Std. Item

L



Solid End Mill



High efficiency chip evacuation, Roughing, Large flat surface

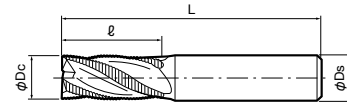
No. of Flutes: 3, 4, 5

3RDS, 4RDS, 5RDS



Workpiece Materials

★ 1st choice



3RDSM, 4RDSM, 5RDSM

(Medium)

Shouldering

Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
3RDSM040-110-06	●	4	-0.030 -0.105	11	6	55	3
3RDSM050-130-06	●	5	-0.030 -0.105	13	6	57	3
3RDSM060-130-06	●	6	-0.030 -0.105	13	6	57	3
3RDSM080-160-08	●	8	-0.040 -0.130	16	8	63	3
4RDSM100-220-10	●	10	-0.040 -0.130	22	10	72	4
4RDSM120-260-12	●	12	-0.050 -0.160	26	12	83	4
4RDSM160-320-16	●	16	-0.050 -0.160	32	16	92	4
4RDSM200-380-20	●	20	-0.065 -0.195	38	20	104	4
5RDSM250-450-25	●	25	-0.065 -0.195	45	25	121	5

3RDSL, 4RDSL, 5RDSL

(Long)

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
3RDSL060-240-06	●	6	-0.030 -0.105	24	6	76	3
3RDSL080-280-08	●	8	-0.040 -0.130	28	8	76	3
4RDSL100-340-10	●	10	-0.040 -0.130	34	10	89	4
4RDSL120-450-12	●	12	-0.050 -0.160	45	12	100	4
4RDSL160-560-16	●	16	-0.050 -0.160	56	16	125	4
4RDSL200-600-20	●	20	-0.065 -0.195	60	20	125	4
5RDSL250-800-25	●	25	-0.065 -0.195	80	25	150	5

- Three, four and five flutes types are available for roughing.
They reduce cutting force due to the edge design with sine-curve pattern.

L



Solid End Mill

Recommended Cutting Conditions ➡ L43-L44

● : Std. Item

High efficiency chip evacuation, Roughing, Notched surface

No. of Flutes: 4, 6

4RFSM, 6RFSM



Workpiece Materials ★ 1st choice

P ~30HRC	P 30~40HRC	H ~55HRC	H ~68HRC	M Stainless steel	S Titanium Alloys	S Heat-resistant Alloys	K Cast Iron
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TIA2N

4RFSM

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
4RFSM060-130-06	●	6	-0.030 -0.105	13	6	57	4
4RFSM080-160-08	●	8	-0.040 -0.130	16	8	63	4
4RFSM100-220-10	●	10	-0.040 -0.130	22	10	72	4
4RFSM120-260-12	●	12	-0.050 -0.160	26	12	83	4
4RFSM160-320-16	●	16	-0.050 -0.160	32	16	92	4
4RFSM200-380-20	●	20	-0.065 -0.195	38	20	104	4

6RFSM

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
6RFSM160-320-16	●	16	-0.050 -0.160	32	16	92	6
6RFSM200-380-20	●	20	-0.065 -0.195	38	20	104	6
6RFSM250-450-25	●	25	-0.065 -0.195	45	25	121	6

Recommended Cutting Conditions ➡ L44

- RFS type is applicable for hardened metals and titanium alloys due to strong cutting edge with notched surface and 45 degrees helix angle.

High efficiency chip evacuation, Roughing, Notched surface, Radius

No. of Flutes: 3, 4

3RFRS, 4RFRS



Workpiece Materials ★ 1st choice

P ~30HRC	P 30~40HRC	H ~55HRC	H ~68HRC	M Stainless steel	S Titanium Alloys	S Heat-resistant Alloys	K Cast Iron
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TIA2N

3RFRS (Radius)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	Spec of Corners r	Under Neck Length l2	No. of Flutes Z
3RFRS040-040-06-R075	●	4	-0.030 -0.105	4	6	75	R 0.75	27.5	3
3RFRS050-050-06-R075	●	5	-0.030 -0.105	5	6	75	R 0.75	17	3

4RFRS (Radius)

Shouldering Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	Spec of Corners r	Under Neck Length l2	No. of Flutes Z
4RFRS060-060-10-R075	●	6	-0.030 -0.105	6	10	100	R 0.75	52.5	4
4RFRS080-080-10-R075	●	8	-0.040 -0.130	8	10	100	R 0.75	31.5	4
4RFRS100-100-12-R075	●	10	-0.040 -0.130	10	12	125	R 0.75	33.5	4
4RFRS120-120-16-R100	●	12	-0.050 -0.160	12	16	125	R 1.0	58.5	4

- Due to the strong cutting edge with large flat surface, it is suitable for hardened metals and titanium alloys. It can provide good surface roughness of 2.5 to 4.9 µmRa.

Recommended Cutting Conditions ➡ L45

● : Std. Item

L



Solid End Mill

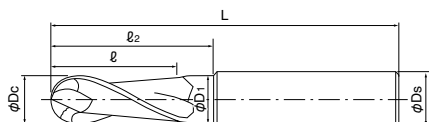
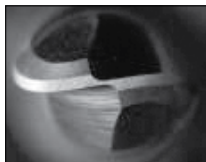
Ball-nose End Mill (Copying)

No. of Flutes: 2, 3

2UEBS (Ball-nose End Mill with 2 Flutes)

Workpiece Materials

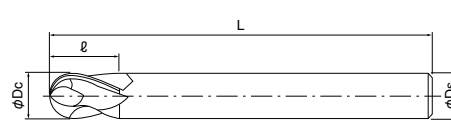
★ 1st choice



3UEBS (Ball-nose End Mill with 3 Flutes)

Workpiece Materials

★ 1st choice



2UEBS (Ball-nose End Mill with 2 Flutes)

Copying

(Unit : mm)

Description	Std.	Radius of Ball Nose R	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. øD1	Under Neck Length ℓ2	Shank diameter øDs	Overall length L
2UEBS010-030-04	●	R0.5	1	-0.014 -0.028	3	-	-	4	50
2UEBS020-030-04	●	R1	2	-0.014 -0.028	3	-	-	4	50
2UEBS030-095-06	●	R1.5	3	-0.014 -0.028	9.5	-	-	6	58
2UEBS040-120-06	●	R2	4	-0.020 -0.038	12	-	-	6	76
2UEBS050-140-06	●	R2.5	5	-0.020 -0.038	14	-	-	6	76
2UEBS060-160-06	●	R3	6	-0.020 -0.038	16	5.5	40	6	100
2UEBS080-200-08	●	R4	8	-0.025 -0.047	20	7.5	40	8	100
2UEBS100-220-10	●	R5	10	-0.025 -0.047	22	9.5	35	10	100
2UEBS120-250-12	●	R6	12	-0.032 -0.059	25	11.5	50	12	125
2UEBS160-320-16	●	R8	16	-0.032 -0.059	32	15.5	60	16	150
2UEBS200-380-20	●	R10	20	-0.040 -0.073	38	19.5	60	20	150

※ Actual ball-nose radius will be half of actual measurement of outer diameter.

3UEBS (Ball-nose End Mill with 3 Flutes)

Copying

(Unit : mm)

Description	Std.	Radius of Ball Nose R	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Shank diameter øDs	Overall length L
3UEBS030-070-06	●	R1.5	3	-0.014 -0.028	7	6	57
3UEBS040-080-06	●	R2	4	-0.020 -0.038	8	6	57
3UEBS050-100-06	●	R2.5	5	-0.020 -0.038	10	6	57
3UEBS060-100-06	●	R3	6	-0.020 -0.038	10	6	57
3UEBS080-160-08	●	R4	8	-0.025 -0.047	16	8	63
3UEBS100-190-10	●	R5	10	-0.025 -0.047	19	10	72
3UEBS120-220-12	●	R6	12	-0.032 -0.059	22	12	83

- Ball-nose end mill with three flutes for cutting of difficult-to-cut materials.

Recommended Cutting Conditions ➡ L45

● : Std. Item

Ball-nose End Mill with 4 Flutes

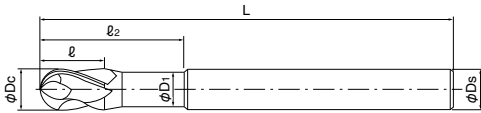
No. of Flutes: 4

4YEBM



Workpiece Materials

★ 1st choice



4YEBM (Ball-nose End Mill with 4 Flutes)

Shouldering

Slotting

(Unit : mm)

Description	Std.	Radius of Ball Nose	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Under Neck Length	Shank diameter	Overall length
		R	øDc		ℓ	øD1	ℓ2	øDs	L
4YEBM050-090-06	●	R2.5	5	-0.020 -0.038	9	4.5	15	6	57
4YEBM060-100-06	●	R3	6	-0.020 -0.038	10	5.5	15	6	57
4YEBM080-120-08	●	R4	8	-0.025 -0.047	12	7.4	20	8	63
4YEBM100-140-10	●	R5	10	-0.025 -0.047	14	9.2	25	10	72
4YEBM120-160-12	●	R6	12	-0.032 -0.059	16	11	30	12	83
4YEBM160-220-16	●	R8	16	-0.032 -0.059	22	15	38	16	92
4YEBM200-260-20	●	R10	20	-0.040 -0.073	26	19	50	20	104

No. of Flutes Z=4

※ Actual ball-nose radius will be half of actual measurement of outer diameter.

● Ball-nose end mill for semi-finishing of difficult-to-cut materials.

L



Solid End Mill

Recommended Cutting Conditions ➡ L46

● : Std. Item

Special corner-R shape, 6 flutes, High feed rate

No. of Flutes: 6

6PDRS



Workpiece Materials

★ 1st choice

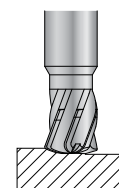


6PDRS

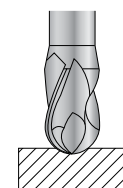
(Unit : mm)

Description	Std.	Outside Dia.	Mill Dia. tolerance	Length of cut	Under Neck Length	Shank diameter	Overall length	No. of Flutes
		øDc		ℓ	ℓ ₂	øDs	L	Z
6PDRS060-045-06	●	6	-0.020 -0.038	4.5	9	6	57	6
6PDRS080-060-08	●	8	-0.025 -0.047	6	12	8	63	6
6PDRS100-075-10	●	10	-0.025 -0.047	7.5	15	10	72	6
6PDRS120-090-12	●	12	-0.032 -0.059	9	18	12	83	6

- Increased rigidity with large core diameter. 6 edge design enables high feed rate cutting. Achieves large cutting allowance and high efficiency cutting with special corner-R shape. Ramping and arc cutting are possible.



PDR



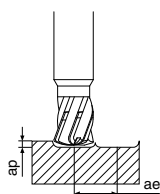
General Purpose
Ball-Nosed End Mill

L



Solid End Mill

Recommended Cutting Conditions



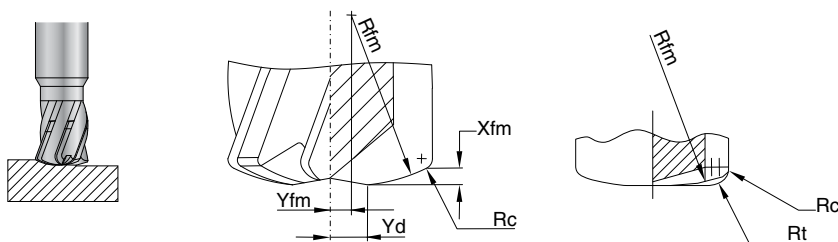
Copying

Workpiece Material		Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12
Pre-hardened steel	52HRC	ø6 : 0.32×3.3mm (0.32×0.55Dc)	Spindle Revolution (min-1)	6,400	4,800	3,800	3,200
		ø8 : 0.42×4.4mm (0.42×0.55Dc)	Feed Rate (mm/min)	7,600	7,200	6,900	7,600
Alloy steel (SCM, SNCM)	45HRC	ø10: 0.53×5.5mm (0.53×0.55Dc)	Spindle Revolution (min-1)	8,500	6,400	5,100	4,200
		ø12: 0.63×6.6mm (0.63×0.55Dc)	Feed Rate (mm/min)	15,300	15,300	15,300	12,700

● : Std. Item

6PDRS Ramping / Arc cutting

Details of 6PDRS cutting edge shape



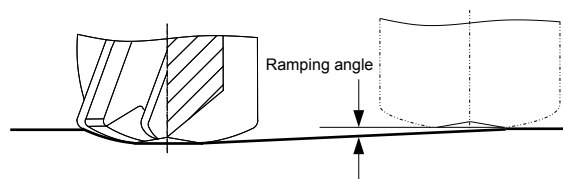
Xfm: Maximum depth of cut
Yfm: Distance between the center line of tool and the center of Rfm
Yd: Distance between the center line of tool and the start position of cutting edge
Rfm: Radius of tool tip
Rc: Corner-R
Rt: Virtual radius in program

Description	Outside Dia.	Depth of Cut	Radius of Tool Tip	Corner-R	Distance between the center line of tool and the center of Rfm	Distance between the center line of tool and the start position of cutting edge	Virtual radius in program
	ϕDc	Xfm	Rfm	Rc	Yfm	Yd	Rt
6PDRS060-045-06	6	0.32	6	0.62	0.75	1.32	0.62
6PDRS080-060-08	8	0.42	8	0.83	1.00	1.76	0.83
6PDRS100-075-10	10	0.53	10	1.04	1.25	2.20	1.04
6PDRS120-090-12	12	0.63	12	1.24	1.50	2.64	1.24

- Cutting with cut amount exceeding the Xfm value is not recommended.

Ramping

During ramping, lower the feed rate in the ratio in the chart on the right.

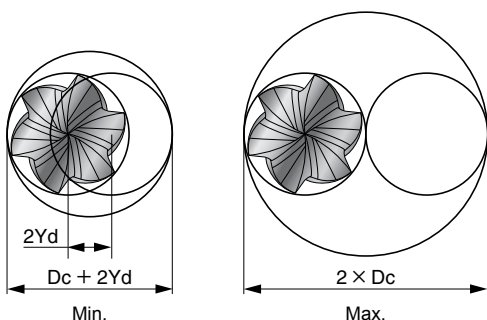


Ramping angle	1°	2°	3°	4°	5°
Ratio of feed rate	100%	70%	50%	30%	10%

- During pocket cutting, set the ramping angle at 0.5°.
- Vertical milling is not recommended.

Arc cutting

In arc cutting, hole diameter of each cutting should be within the range in the chart on the right.



Description	Min.	Max.
6PDRS060-045-06	8.64	12.00
6PDRS080-060-08	11.52	16.00
6PDRS100-075-10	14.40	20.00
6PDRS120-090-12	17.28	24.00

L



Solid End Mill

Hardened Metals, Multi-edge, Negative rake angle, Finishing

No. of Flutes: 4,5,6,7,8

4HFS, 5HFS, 6HFS, 7HFS, 8HFS



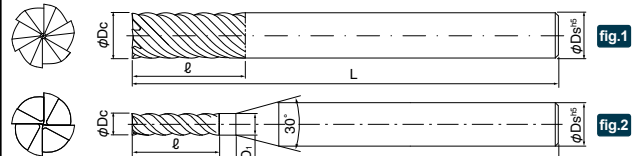
MEGACOAT Hard is applied

Super Micro-grain carbide

High efficiency cutting

Workpiece Materials

★ 1st choice



4HFSS, 5HFSS, 6HFSS, 7HFSS (Short)

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. øD1	Under Neck Length ℓ2	Shank diameter øDs	Overall length L	No. of Flutes Z
4HFSS010-040-06 fig.2	●	1	0 -0.015	4	1.05	4.8	6	60	4
4HFSS020-060-06 fig.2	●	2	0 -0.015	6	2.10	7.2	6	60	4
4HFSS030-080-06 fig.2	●	3	0 -0.015	8	3.15	9.6	6	60	4
4HFSS040-100-06 fig.2	●	4	0 -0.015	10	4.2	12.0	6	60	4
4HFSS050-120-06 fig.2	●	5	0 -0.015	12	5.2	14.4	6	60	4
5HFSS040-100-06 fig.2	●	4	0 -0.015	10	4.2	12.0	6	60	5
6HFSS060-140-06 fig.1	●	6	0 -0.020	14	-	-	6	60	6
6HFSS080-180-08 fig.1	●	8	-0.005 -0.025	18	-	-	8	70	6
6HFSS100-220-10 fig.1	●	10	-0.005 -0.025	22	-	-	10	80	6
6HFSS120-260-12 fig.1	●	12	-0.010 -0.030	26	-	-	12	90	6
7HFSS060-140-06 fig.1	●	6	0 -0.020	14	-	-	6	60	7
7HFSS080-180-08 fig.1	●	8	-0.005 -0.025	18	-	-	8	70	7
7HFSS100-220-10 fig.1	●	10	-0.005 -0.025	22	-	-	10	80	7
7HFSS120-260-12 fig.1	●	12	-0.010 -0.030	26	-	-	12	90	7

4HFSM, 5HFSM, 6HFSM, 7HFSM, 8HFSM (Medium)

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut ℓ	Neck Dia. øD1	Under Neck Length ℓ2	Shank diameter øDs	Overall length L	No. of Flutes Z
4HFSM010-050-06 fig.2	●	1	0 -0.015	5	1.05	6	6	60	4
4HFSM020-090-06 fig.2	●	2	0 -0.015	9	2.10	10.8	6	60	4
4HFSM030-120-06 fig.2	●	3	0 -0.015	12	3.15	14.4	6	60	4
4HFSM040-140-06 fig.2	●	4	0 -0.015	14	4.2	16.8	6	60	4
4HFSM050-170-06 fig.2	●	5	0 -0.015	17	5.2	20.4	6	60	4
5HFSM040-140-06 fig.2	●	4	0 -0.015	14	4.2	16.8	6	60	5
6HFSM060-170-06 fig.1	●	6	0 -0.020	17	-	-	6	60	6
6HFSM080-230-08 fig.1	●	8	-0.005 -0.025	23	-	-	8	70	6
6HFSM100-280-10 fig.1	●	10	-0.005 -0.025	28	-	-	10	80	6
6HFSM120-330-12 fig.1	●	12	-0.010 -0.030	33	-	-	12	90	6
6HFSM140-370-16 fig.2	●	14	-0.010 -0.030	37	14.2	44.4	16	105	6
6HFSM150-420-16 fig.2	●	15	-0.010 -0.030	42	15.2	50.4	16	105	6
6HFSM160-420-16 fig.1	●	16	-0.010 -0.030	42	-	-	16	105	6
6HFSM200-480-20 fig.1	●	20	-0.010 -0.030	48	-	-	20	110	6
7HFSM060-170-06 fig.1	●	6	0 -0.020	17	-	-	6	60	7
7HFSM080-230-08 fig.1	●	8	-0.005 -0.025	23	-	-	8	70	7
7HFSM100-280-10 fig.1	●	10	-0.005 -0.025	28	-	-	10	80	7
7HFSM120-330-12 fig.1	●	12	-0.010 -0.030	33	-	-	12	90	7
7HFSM160-420-16 fig.1	●	16	-0.010 -0.030	42	-	-	16	105	7
8HFSM250-530-25 fig.1	●	25	-0.010 -0.030	53	-	-	25	125	8



Bottom surface of 6HSS cutting edge

- New PVD coating “MEGACOAT Hard” for hardened metals.
Achieves high rigidity by ensuring a large core diameter, longer tool life and stable cutting.
Also increases cutting edge strength and chip evacuation with a negative rake angle.

Recommended Cutting Conditions [L46](#)

● : Std. Item

Hardened Metals, Multi-edge, Negative rake angle, Finishing

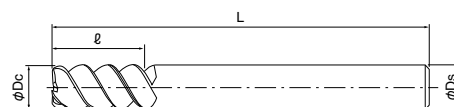
No. of Flutes: 4,6

4UGSM, 6UGSM



Workpiece Materials

★ 1st choice



4UGSM

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
4UGSM030-080-06	●	3	-0.014 -0.028	8	6	50	4
4UGSM040-120-06	●	4	-0.020 -0.038	12	6	57	4
4UGSM050-130-06	●	5	-0.020 -0.038	13	6	57	4

6UGSM

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
6UGSM060-150-06	●	6	-0.020 -0.038	15	6	60	6
6UGSM080-200-08	●	8	-0.025 -0.047	20	8	75	6
6UGSM100-250-10	●	10	-0.025 -0.047	25	10	80	6
6UGSM120-300-12	●	12	-0.032 -0.059	30	12	100	6
6UGSM160-400-16	●	16	-0.032 -0.059	40	16	110	6

- In order to achieve stable cutting of hardened metals, negative type rake angle is adopted.
Also, for attaining high efficiency, we provide six flutes type for over dia. 6mm.

L



Solid End Mill

Recommended Cutting Conditions ➡ L47

● : Std. Item

Aluminum & Non-ferrous Metals, Unequally partitioned flute design, With wiper edge

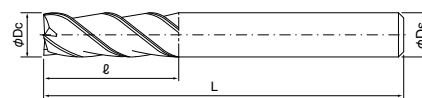
No. of Flutes: 3

3NESM



Workpiece Materials

☐ 1st choice



Shouldering

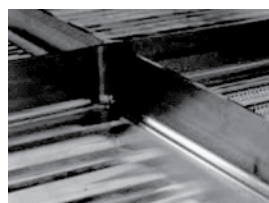
Slotting

(Unit : mm)

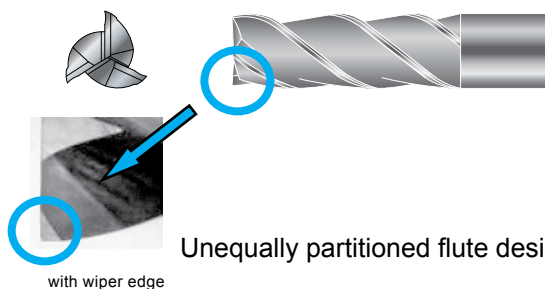
Description	Std.	Outside Dia.	Mill Dia. tolerance	Length of cut	Shank diameter	Overall length	No. of Flutes
		øDc		ℓ	øDs	L	Z
3NESM030-120-06	●	3	-0.014 -0.028	12	6	50	3
3NESM040-120-06	●	4	-0.020 -0.038	12	6	50	3
3NESM050-140-06	●	5	-0.020 -0.038	14	6	50	3
3NESM060-160-06	●	6	0 -0.008	16	6	50	3
3NESM080-200-08	●	8	0 -0.009	20	8	63	3
3NESM100-220-10	●	10	0 -0.009	22	10	76	3
3NESM120-250-12	●	12	0 -0.011	25	12	76	3
3NESM160-320-16	●	16	0 -0.011	32	16	89	3
3NESM200-380-20	●	20	0 -0.013	38	20	104	3

* Cutting edge of over 6mm øDc has margin.

- A wiper is attached at the lower edge for improving the bottom surface finish.
Chattering is controlled with cutting edge slots at varied intervals, and finishing of lateral surfaces is improved.



Finished surface of aluminum alloy at high speed cutting.
Reached 0.25μmRa
(Bottom face /side face/corner)



with wiper edge

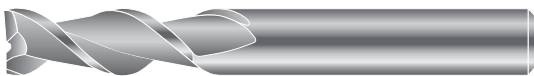
Recommended Cutting Conditions L47

● : Std. Item

Aluminum & Non-ferrous Metals, Finishing, Sharpness oriented, Smooth chip evacuation

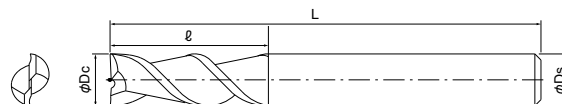
No. of Flutes: 2,3

2NFSM, 3NFSM, 3NFSL



Workpiece Materials

1st choice



2NFSM (Medium)

Shouldering

Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
2NFSM010-040-04	●	1	-0.014 -0.028	4	4	38	2
2NFSM015-060-04	●	1.5	-0.014 -0.028	6	4	38	2
2NFSM020-080-04	●	2	-0.014 -0.028	8	4	38	2
2NFSM025-080-04	●	2.5	-0.014 -0.028	8	4	38	2
2NFSM030-080-06	●	3	-0.014 -0.028	8	6	50	2
2NFSM040-080-06	●	4	-0.020 -0.038	8	6	50	2
2NFSM050-140-06	●	5	-0.020 -0.038	14	6	50	2
2NFSM060-160-06	●	6	0 -0.008	16	6	50	2
2NFSM080-200-08	●	8	0 -0.009	20	8	63	2
2NFSM100-220-10	●	10	0 -0.009	22	10	76	2
2NFSM120-250-12	●	12	0 -0.011	25	12	76	2
2NFSM160-320-16	●	16	0 -0.011	32	16	89	2
2NFSM200-380-20	●	20	0 -0.013	38	20	104	2

* Cutting edge of over 6mm øDc has margin.

3NFSL (Long)

Shouldering

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
3NFSL030-190-06	●	3	-0.014 -0.028	19	6	63	3
3NFSL040-190-06	●	4	-0.020 -0.038	19	6	63	3
3NFSL050-200-06	●	5	-0.020 -0.038	20	6	63	3
3NFSL060-280-06	●	6	0 -0.008	28	6	76	3
3NFSL080-300-08	●	8	0 -0.009	30	8	76	3
3NFSL100-340-10	●	10	0 -0.009	34	10	89	3
3NFSL120-450-12	●	12	0 -0.011	45	12	100	3
3NFSL160-560-16	●	16	0 -0.011	56	16	125	3
3NFSL200-600-20	●	20	0 -0.013	60	20	125	3

* Cutting edge of over 6mm øDc has margin.

3NFSM (Medium)

Shouldering

Slotting

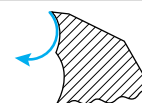
(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	No. of Flutes Z
3NFSM030-120-06	●	3	-0.014 -0.028	12	6	50	3
3NFSM040-120-06	●	4	-0.020 -0.038	12	6	50	3
3NFSM050-140-06	●	5	-0.020 -0.038	14	6	50	3
3NFSM060-160-06	●	6	0 -0.008	16	6	50	3
3NFSM080-200-08	●	8	0 -0.009	20	8	63	3
3NFSM100-220-10	●	10	0 -0.009	22	10	76	3
3NFSM120-250-12	●	12	0 -0.011	25	12	76	3
3NFSM160-320-16	●	16	0 -0.011	32	16	89	3
3NFSM200-380-20	●	20	0 -0.013	38	20	104	3

* Cutting edge of over 6mm øDc has margin.

NFSM type
NFSL type
rake angle

A convex shape in the slot
improves chip evacuation.



- Sharpness oriented for aluminum cutting. Good chip evacuation from the 45 degree helix angle.

Recommended Cutting Conditions ➡ L47-L48

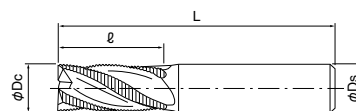
● : Std. Item

3AESM, 3AESL



Workpiece Materials

★ 1st choice



3AESM (Medium)

Shouldering

Slotting

(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	Spec of Corners C	No. of Flutes Z
3AESM060-130-06	●	6	-0.030 -0.105	13	6	57	0.6	3
3AESM080-160-08	●	8	-0.040 -0.130	16	8	63	0.6	3
3AESM100-220-10	●	10	-0.040 -0.130	22	10	72	0.6	3
3AESM120-260-12	●	12	-0.050 -0.160	26	12	83	1	3
3AESM160-320-16	●	16	-0.050 -0.160	32	16	92	1	3
3AESM200-380-20	●	20	-0.065 -0.195	38	20	104	1	3
3AESM250-450-25	●	25	-0.065 -0.195	45	25	121	1	3

3AESL (Long)

Shouldering

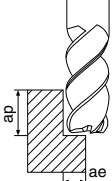
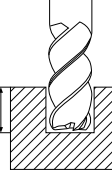
(Unit : mm)

Description	Std.	Outside Dia. øDc	Mill Dia. tolerance	Length of cut l	Shank diameter øDs	Overall length L	Spec of Corners C	No. of Flutes Z
3AESL060-240-06	●	6	-0.030 -0.105	24	6	76	0.6	3
3AESL080-280-08	●	8	-0.040 -0.130	28	8	76	0.6	3
3AESL100-340-10	●	10	-0.040 -0.130	34	10	89	0.6	3
3AESL120-450-12	●	12	-0.050 -0.160	45	12	100	1	3
3AESL160-560-16	●	16	-0.050 -0.160	56	16	125	1	3
3AESL200-600-20	●	20	-0.065 -0.195	60	20	125	1	3
3AESL250-800-25	●	25	-0.065 -0.195	80	25	150	1	3

- Three flutes type for roughing of aluminum. With corner chamfering.

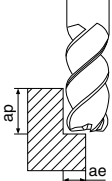

Recommended Cutting Conditions

2FESS

Application	Workpiece Material	Application	Outside Dia.Dc (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
 <p>Shouldering</p> <p>Depth of Cut (ap×ae) (mm)</p> <p>1.2Dc×0.05Dc (Dc<ø3) 1.2Dc×0.1Dc (Dc≥ø3)</p>  <p>Slotting</p> <p>Depth of Cut (ap) (mm)</p> <p>0.1Dc (Dc<ø1) 0.3Dc (ø1≤Dc<ø3) 0.5Dc (Dc≥ø3)</p>	Carbon Steel SxxC	Shouldering	Spindle Revolution (min ⁻¹)	25,500	13,200	6,600	4,500	3,300	2,200	1,700
			Feed Rate (mm/min)	225	230	375	415	420	410	410
		Slotting	Spindle Revolution (min ⁻¹)	15,300	8,000	4,000	2,700	2,000	1,300	1,000
			Feed Rate (mm/min)	135	140	225	250	250	245	245
	Alloy Steel SCM, SNCM	Shouldering	Spindle Revolution (min ⁻¹)	22,000	11,000	5,600	3,700	2,800	1,900	1,400
			Feed Rate (mm/min)	195	220	285	315	310	310	310
		Slotting	Spindle Revolution (min ⁻¹)	13,000	6,600	3,400	2,200	1,700	1,200	900
			Feed Rate (mm/min)	115	130	170	190	185	185	185
	Pre-hardened steel NAK, 30~45HRC	Shouldering	Spindle Revolution (min ⁻¹)	12,700	7,200	4,200	3,000	2,200	1,500	1,100
			Feed Rate (mm/min)	55	80	100	105	105	110	110
		Slotting	Spindle Revolution (min ⁻¹)	7,600	4,300	2,500	1,800	1,300	900	700
			Feed Rate (mm/min)	35	50	60	63	63	65	65
	Stainless steel SUS	Shouldering	Spindle Revolution (min ⁻¹)	22,000	11,000	5,600	3,700	2,800	1,900	1,400
			Feed Rate (mm/min)	95	95	110	115	115	115	115
		Slotting	Spindle Revolution (min ⁻¹)	13,000	6,600	3,400	2,200	1,700	1,200	900
			Feed Rate (mm/min)	60	60	65	70	70	70	70

* Cutting with coolant is recommended for stainless steel.

2FESM

Application	Workpiece Material	Application	Outside Dia.Dc (mm)	ø0.5	ø1	ø2	ø4	ø6	ø8	ø12	ø16
 <p>Shouldering</p> <p>Depth of Cut (ap×ae) (mm)</p> <p>1.5Dc×0.05Dc (Dc<ø3) 1.5Dc×0.1Dc (Dc≥ø3)</p>  <p>Slotting</p> <p>Depth of Cut (ap) (mm)</p> <p>0.1Dc (Dc<ø1) 0.3Dc (ø1≤Dc<ø3) 0.5Dc (Dc≥ø3)</p>	Carbon Steel SxxC	Shouldering	Spindle Revolution (min ⁻¹)	32,000	25,500	13,200	6,600	4,500	3,300	2,200	1,700
			Feed Rate (mm/min)	210	225	230	375	415	420	410	410
		Slotting	Spindle Revolution (min ⁻¹)	19,000	15,300	8,000	4,000	2,700	2,000	1,300	1,000
			Feed Rate (mm/min)	130	135	140	225	250	250	245	245
	Alloy Steel SCM, SNCM	Shouldering	Spindle Revolution (min ⁻¹)	27,000	22,000	11,000	5,600	3,700	2,800	1,900	1,400
			Feed Rate (mm/min)	180	195	220	285	315	310	310	310
		Slotting	Spindle Revolution (min ⁻¹)	16,000	13,000	6,600	3,400	2,200	1,700	1,200	900
			Feed Rate (mm/min)	105	115	130	170	190	185	185	185
	Pre-hardened steel NAK, 30~45HRC	Shouldering	Spindle Revolution (min ⁻¹)	22,500	12,700	7,200	4,200	3,000	2,200	1,500	1,100
			Feed Rate (mm/min)	50	55	80	100	105	105	110	110
		Slotting	Spindle Revolution (min ⁻¹)	13,500	7,600	4,300	2,500	1,800	1,300	900	700
			Feed Rate (mm/min)	30	35	50	60	63	63	65	65
	Stainless steel SUS	Shouldering	Spindle Revolution (min ⁻¹)	27,000	22,000	11,000	5,600	3,700	2,800	1,900	1,400
			Feed Rate (mm/min)	60	95	95	110	115	115	115	115
		Slotting	Spindle Revolution (min ⁻¹)	16,000	13,000	6,600	3,400	2,200	1,700	1,200	900
			Feed Rate (mm/min)	35	60	60	65	70	70	70	70

* Cutting with coolant is recommended for stainless steel.

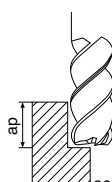
L



Solid End Mill

Recommended Cutting Conditions

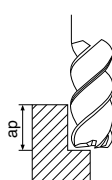
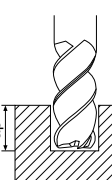
2FESL (Shouldering)

Application	Workpiece Material	Outside Dia. Dc (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
 <p>Shouldering</p> <p>Depth of Cut ($ap \times ae$) (mm)</p> <p>$2.5Dc \times 0.05Dc$ ($Dc < \phi 3$)</p> <p>$2.5Dc \times 0.1Dc$ ($Dc \geq \phi 3$)</p>	Carbon Steel SxxC	Spindle Revolution (min^{-1})	19,000	9,500	4,800	3,200	2,400	1,600	1,200
		Feed Rate (mm/min)	210	210	210	210	210	210	210
	Alloy Steel SCM, SNCM	Spindle Revolution (min^{-1})	14,300	7,200	3,600	2,400	2,000	1,300	1,000
		Feed Rate (mm/min)	155	160	160	160	170	170	150
	Pre-hardened steel NAK, 30~45HRC	Spindle Revolution (min^{-1})	11,200	5,600	2,800	1,900	1,600	1,000	800
		Feed Rate (mm/min)	85	85	90	90	100	95	80
	Stainless steel SUS	Spindle Revolution (min^{-1})	14,300	7,200	3,600	2,400	2,000	1,300	1,000
		Feed Rate (mm/min)	95	95	95	95	105	105	80

* Cutting with coolant is recommended for stainless steel.

Slotting is not recommended.

2FEKS, 2FEKM

Application	Workpiece Material	Application	Outside Dia. Dc (mm)	ø3	ø4	ø6	ø8	ø10	ø12	ø16
 <p>Shouldering</p> <p>Depth of Cut ($ap \times ae$) (mm)</p> <p>$1.2Dc \times 0.1Dc$</p>  <p>Slotting</p> <p>Depth of Cut (ap) (mm)</p> <p>$0.5Dc$</p>	Carbon Steel SxxC	Shouldering	Spindle Revolution (min^{-1})	9,300	7,000	4,600	3,500	3,000	2,700	2,200
			Feed Rate (mm/min)	450	450	470	470	470	470	440
		Slotting	Spindle Revolution (min^{-1})	7,500	6,000	4,400	3,300	2,700	2,300	1,900
			Feed Rate (mm/min)	240	260	340	340	340	340	320
	Alloy Steel SCM, SNCM	Shouldering	Spindle Revolution (min^{-1})	8,800	6,600	4,400	3,300	2,600	2,200	1,800
			Feed Rate (mm/min)	370	370	380	380	380	380	360
		Slotting	Spindle Revolution (min^{-1})	7,200	5,400	3,600	2,700	2,200	1,800	1,500
			Feed Rate (mm/min)	270	270	270	270	270	270	270
	Pre-hardened steel NAK, 30~45HRC	Shouldering	Spindle Revolution (min^{-1})	6,400	4,800	3,200	2,400	1,900	1,600	1,200
			Feed Rate (mm/min)	130	130	130	140	140	140	140
		Slotting	Spindle Revolution (min^{-1})	5,300	4,000	2,600	2,000	1,600	1,300	1,000
			Feed Rate (mm/min)	120	120	120	120	120	120	120
	Stainless steel SUS	Shouldering	Spindle Revolution (min^{-1})	8,000	6,000	4,000	3,000	2,400	2,000	1,500
			Feed Rate (mm/min)	140	140	140	140	140	140	140
		Slotting	Spindle Revolution (min^{-1})	5,300	4,000	2,600	2,000	1,600	1,300	1,000
			Feed Rate (mm/min)	80	90	100	100	100	90	90

* Cutting with coolant is recommended for stainless steel.

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Solid End Mill

Recommended Cutting Conditions

4FESM (Shouldering)

Application	Workpiece Material	Outside Dia. Dc (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
<p>Shouldering</p> <p>Depth of Cut (ap×ae) (mm)</p> <p>1.5Dc×0.05Dc (Dc < ø3) 1.5Dc×0.1Dc (Dc ≥ ø3)</p>	Carbon Steel SxxC	Spindle Revolution (min ⁻¹)	25,500	13,000	6,600	4,400	3,300	2,200	1,700
		Feed Rate (mm/min)	335	345	580	620	625	630	600
	Alloy Steel SCM, SNCM	Spindle Revolution (min ⁻¹)	22,000	11,000	5,600	3,700	2,800	1,900	1,400
		Feed Rate (mm/min)	290	290	395	455	455	470	460
	Pre-hardened steel NAK, 30~45HRC	Spindle Revolution (min ⁻¹)	12,000	7,200	4,200	3,000	2,200	1,500	1,100
		Feed Rate (mm/min)	105	125	150	160	160	165	140
	Stainless steel SUS	Spindle Revolution (min ⁻¹)	22,000	11,000	5,600	3,700	2,800	1,900	1,400
		Feed Rate (mm/min)	130	145	165	165	170	175	155

* Cutting with coolant is recommended for stainless steel.

Slotting is not recommended.

4FEKM (Tough corner edge) (Shouldering)

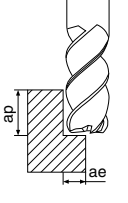
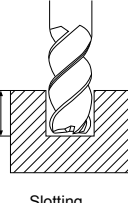
Application	Workpiece Material	Outside Dia. Dc (mm)	ø3	ø4	ø6	ø8	ø10	ø12	ø16
<p>Shouldering</p> <p>Depth of Cut (ap×ae) (mm)</p> <p>1.5Dc×0.1Dc</p>	Carbon Steel SxxC	Spindle Revolution (min ⁻¹)	10,600	8,000	5,300	4,000	3,200	2,700	2,100
		Feed Rate (mm/min)	680	690	770	770	770	770	770
	Alloy Steel SCM, SNCM	Spindle Revolution (min ⁻¹)	8,800	6,600	4,400	3,300	2,600	2,200	2,000
		Feed Rate (mm/min)	500	550	620	630	630	630	610
	Pre-hardened steel NAK, 30~45HRC	Spindle Revolution (min ⁻¹)	6,400	4,800	3,200	2,400	1,900	1,600	1,200
		Feed Rate (mm/min)	180	180	180	190	190	190	190
	Stainless steel SUS	Spindle Revolution (min ⁻¹)	8,000	6,000	4,000	3,000	2,300	2,000	1,500
		Feed Rate (mm/min)	190	200	200	200	210	210	210

* Cutting with coolant is recommended for stainless steel.

Slotting is not recommended.

Recommended Cutting Conditions

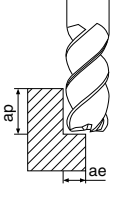
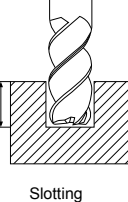
2FESW

Application	Workpiece Material	Application	Outside Dia. Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø13
 <p>Shouldering</p> <p>Depth of Cut (ap×ae) (mm)</p> <p>1Dc×0.2Dc</p>  <p>Slotting</p> <p>Depth of Cut (ap) (mm)</p> <p>0.2Dc</p>	Carbon Steel SxxC	Shouldering	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	660	640	640	640	520	450	410	350
		Slotting	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	660	640	640	640	520	450	410	350
	Alloy Steel SCM, SNCM	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	420	430	430	430	350	300	270	230
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	420	430	430	430	350	300	270	230
	Pre-hardened steel NAK, 30~45HRC	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	420	430	430	430	350	300	270	230
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	420	430	430	430	350	300	270	230
	Stainless steel SUS	Shouldering	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,500
			Feed Rate (mm/min)	320	320	320	320	260	230	210	180
		Slotting	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,500
			Feed Rate (mm/min)	320	320	320	320	260	230	210	180

* Cutting with coolant is recommended for stainless steel.

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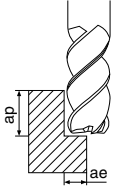
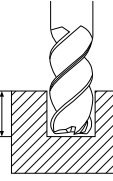
3FESW

Application	Workpiece Material	Application	Outside Dia. Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø13
 <p>Shouldering</p> <p>Depth of Cut (ap×ae) (mm)</p> <p>1Dc×0.2Dc</p>  <p>Slotting</p> <p>Depth of Cut (ap) (mm)</p> <p>0.2Dc</p>	Carbon Steel SxxC	Shouldering	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	810	800	800	800	650	560	510	450
		Slotting	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	810	800	800	800	650	560	510	450
	Alloy Steel SCM, SNCM	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	530	530	530	530	430	370	340	300
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	530	530	530	530	430	370	340	300
	Pre-hardened steel NAK, 30~45HRC	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	530	530	530	530	430	370	340	300
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	530	530	530	530	430	370	340	300
	Stainless steel SUS	Shouldering	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,500
			Feed Rate (mm/min)	400	400	400	400	320	280	260	230
		Slotting	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,500
			Feed Rate (mm/min)	400	400	400	400	320	280	260	230

* Cutting with coolant is recommended for stainless steel.

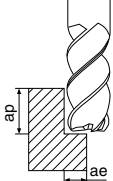
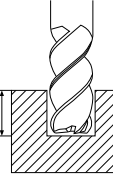
Recommended Cutting Conditions

4FESW

Application	Workpiece Material	Application	Outside Dia. Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø13
 <p>Shouldering</p> <p>Depth of Cut (ap×ae) (mm)</p> <p>1Dc×0.2Dc</p>  <p>Slotting</p> <p>Depth of Cut (ap) (mm)</p> <p>0.2Dc</p>	Carbon Steel SxxC	Shouldering	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	960	960	960	960	780	680	620	570
		Slotting	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	960	960	960	960	780	680	620	570
	Alloy Steel SCM, SNCM	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	640	640	640	640	520	450	410	370
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	640	640	640	640	520	450	410	370
	Pre-hardened steel NAK, 30~45HRC	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	640	640	640	640	520	450	410	370
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,700
			Feed Rate (mm/min)	640	640	640	640	520	450	410	370
	Stainless steel SUS	Shouldering	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,500
			Feed Rate (mm/min)	480	480	480	480	390	340	310	290
		Slotting	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,500
			Feed Rate (mm/min)	480	480	480	480	390	340	310	290

* Cutting with coolant is recommended for stainless steel.

3UF5M

Application	Workpiece Material	Application	Outside Dia. Dc (mm)	ø2	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
 <p>Shouldering</p> <p>Depth of Cut (ap×ae) (mm)</p> <p>1.5Dc×0.1Dc</p>  <p>Slotting</p> <p>Depth of Cut (ap) (mm)</p> <p>0.25Dc (Carbon steel/Cast iron) 0.5Dc</p>	Carbon Steel Cast Iron	Shouldering	Spindle Revolution (min ⁻¹)	18,000	12,000	9,200	7,300	6,100	4,600	3,700	3,100	2,300	1,800
			Feed Rate (mm/min)	380	430	440	500	510	500	560	560	590	590
		Slotting	Spindle Revolution (min ⁻¹)	16,000	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,000	1,600
			Feed Rate (mm/min)	190	230	240	290	300	290	280	290	310	350
	Alloy Steel SCM, SNCM	Shouldering	Spindle Revolution (min ⁻¹)	14,000	9,000	6,800	5,400	4,500	3,400	2,700	2,300	1,700	1,400
			Feed Rate (mm/min)	250	270	270	320	350	340	360	350	390	420
		Slotting	Spindle Revolution (min ⁻¹)	11,000	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,400	1,100
			Feed Rate (mm/min)	130	130	150	180	190	180	170	180	190	210
	Stainless steel SUS	Shouldering	Spindle Revolution (min ⁻¹)	10,000	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,200	1,000
			Feed Rate (mm/min)	180	170	170	210	230	220	230	220	220	230
		Slotting	Spindle Revolution (min ⁻¹)	10,000	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,200	1,000
			Feed Rate (mm/min)	120	120	120	140	150	140	140	140	150	180
	Titanium Alloys Heat-resistant Alloys (40~50HRC)	Shouldering	Spindle Revolution (min ⁻¹)	6,000	4,200	3,200	2,500	2,100	1,600	1,300	1,100	800	600
			Feed Rate (mm/min)	60	90	100	120	110	110	120	110	120	130
		Slotting	Spindle Revolution (min ⁻¹)	6,000	4,200	3,200	2,500	2,100	1,600	1,300	1,100	800	600
			Feed Rate (mm/min)	50	60	70	80	90	90	90	80	90	100
	Aluminum Alloys	Shouldering	Spindle Revolution (min ⁻¹)	32,000	21,000	16,000	13,000	11,000	8,000	6,400	5,300	4,000	3,200
			Feed Rate (mm/min)	670	760	770	900	920	860	1,000	1,100	1,100	1,200
		Slotting	Spindle Revolution (min ⁻¹)	32,000	21,000	16,000	13,000	11,000	8,000	6,400	5,300	4,000	3,200
			Feed Rate (mm/min)	480	440	480	590	630	580	670	730	860	960

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

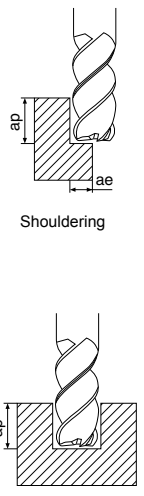
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Solid End Mill

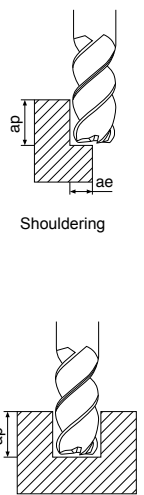
Recommended Cutting Conditions

4PGSS, 5PGSS

Application	Workpiece Material	Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 <p>Shouldering</p> <p>Slotting</p>	Carbon Steel SxxC	Shouldering	1D×0.3D	Spindle Revolution (min ⁻¹)	13,300	10,000	8,000	6,600	5,000	4,000	3,300	2,500	2,000	1,600
				Feed Rate (mm/min)	1,860	1,600	1,440	1,320	1,200	1,360	1,320	1,200	1,200	1,360
		Slotting	1D	Spindle Revolution (min ⁻¹)	/	/	/	6,600	5,000	4,000	3,300	2,500	2,000	1,600
				Feed Rate (mm/min)	/	/	/	660	600	680	660	600	600	680
	Alloy Steel SCM, SNCM	Shouldering	1D×0.3D	Spindle Revolution (min ⁻¹)	10,600	8,000	6,400	5,300	4,000	3,200	2,700	2,000	1,600	1,300
				Feed Rate (mm/min)	1,180	1,020	920	840	880	890	860	880	830	1,040
		Slotting	0.75D	Spindle Revolution (min ⁻¹)	/	/	/	5,300	4,000	3,200	2,700	2,000	1,600	1,300
				Feed Rate (mm/min)	/	/	/	420	440	440	430	440	410	520
	Pre-hardened steel NAK, 30~45HRC	Shouldering	1D×0.25D	Spindle Revolution (min ⁻¹)	8,500	6,400	5,100	4,200	3,200	2,500	2,100	1,600	1,300	1,000
				Feed Rate (mm/min)	710	610	550	500	570	550	580	570	570	700
		Slotting	0.5D	Spindle Revolution (min ⁻¹)	/	/	/	4,200	3,200	2,500	2,100	1,600	1,300	1,000
				Feed Rate (mm/min)	/	/	/	250	290	280	290	280	280	350
	Stainless steel SUS	Shouldering	1D×0.25D	Spindle Revolution (min ⁻¹)	5,300	4,000	3,200	2,700	2,000	1,600	1,300	1,000	800	600
				Feed Rate (mm/min)	290	250	230	210	240	250	230	240	240	270
		Slotting	0.4D	Spindle Revolution (min ⁻¹)	/	/	/	2,700	2,000	1,600	1,300	1,000	800	600
				Feed Rate (mm/min)	/	/	/	100	120	120	120	120	120	130
	Titanium Alloys Heat-resistant Alloys (40~50HRC)	Shouldering	1D×0.2D	Spindle Revolution (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100	900	700	550	450
				Feed Rate (mm/min)	160	130	110	110	110	130	120	140	130	150
		Slotting	0.3D	Spindle Revolution (min ⁻¹)	/	/	/	1,900	1,400	1,100	900	700	550	450
				Feed Rate (mm/min)	/	/	/	60	60	60	60	70	70	80

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

4PGSM, 5PGSM, 6PGSM

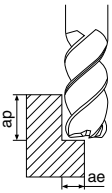

Application	Workpiece Material	Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 <p>Shouldering</p> <p>Slotting</p>	Carbon Steel SxxC	Shouldering	1.5D×0.3D	Spindle Revolution (min ⁻¹)	6,600	5,000	4,000	3,300	2,500	2,000	1,600
				Feed Rate (mm/min)	1,030	980	1,260	1,520	1,570	1,510	1,340
		Slotting	0.5D	Spindle Revolution (min ⁻¹)	6,600	5,000	4,000	3,300	2,500	2,000	1,600
				Feed Rate (mm/min)	520	500	640	770	790	750	670
	Alloy Steel SCM, SNCM	Shouldering	1.5D×0.3D	Spindle Revolution (min ⁻¹)	5,300	4,000	3,200	2,700	2,000	1,600	1,300
				Feed Rate (mm/min)	740	670	940	1,130	1,170	1,140	1,030
		Slotting	0.5D	Spindle Revolution (min ⁻¹)	5,300	4,000	3,200	2,700	2,000	1,600	1,300
				Feed Rate (mm/min)	380	330	480	560	580	570	520
	Pre-hardened steel NAK, 30~45HRC	Shouldering	1.5D×0.2D	Spindle Revolution (min ⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300	1,000
				Feed Rate (mm/min)	470	490	610	700	730	710	710
		Slotting	0.4D	Spindle Revolution (min ⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300	1,000
				Feed Rate (mm/min)	230	250	310	350	370	350	360
	Stainless steel SUS	Shouldering	1.5D×0.2D	Spindle Revolution (min ⁻¹)	2,700	2,000	1,600	1,300	1,000	800	600
				Feed Rate (mm/min)	170	190	250	280	280	280	250
		Slotting	0.4D	Spindle Revolution (min ⁻¹)	2,700	2,000	1,600	1,300	1,000	800	600
				Feed Rate (mm/min)	80	90	120	140	140	140	130
	Titanium Alloys Heat-resistant Alloys (40~50HRC)	Shouldering	1.5D×0.2D	Spindle Revolution (min ⁻¹)	1,900	1,400	1,100	900	700	550	450
				Feed Rate (mm/min)	90	90	130	150	160	150	150
		Slotting	0.3D	Spindle Revolution (min ⁻¹)	1,900	1,400	1,100	900	700	550	450
				Feed Rate (mm/min)	40	40	60	70	80	70	70

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

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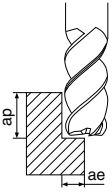
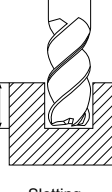
Solid End Mill

4PGSL, 5PGSL, 6PGSL

Application	Workpiece Material	Application	Depth of Cut ($a_p \times a_e$) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 Shouldering  Slotting	Carbon Steel SxxC	Shouldering	1.5D×0.3D	Spindle Revolution (min^{-1})	6,600	5,000	4,000	3,300	2,500	2,000	1,600
				Feed Rate (mm/min)	1,030	980	1,260	1,520	1,570	1,510	1,340
		Slotting	0.5D	Spindle Revolution (min^{-1})	6,600	5,000	4,000	3,300	2,500	2,000	1,600
				Feed Rate (mm/min)	520	500	640	770	790	750	670
	Alloy Steel SCM, SNCM	Shouldering	1.5D×0.3D	Spindle Revolution (min^{-1})	5,300	4,000	3,200	2,700	2,000	1,600	1,300
				Feed Rate (mm/min)	740	670	940	1,130	1,170	1,140	1,030
		Slotting	0.5D	Spindle Revolution (min^{-1})	5,300	4,000	3,200	2,700	2,000	1,600	1,300
				Feed Rate (mm/min)	380	330	480	560	580	570	520
	Pre-hardened steel NAK, 30~45HRC	Shouldering	1.5D×0.2D	Spindle Revolution (min^{-1})	4,200	3,200	2,500	2,100	1,600	1,300	1,000
				Feed Rate (mm/min)	470	490	610	700	730	710	710
		Slotting	0.4D	Spindle Revolution (min^{-1})	4,200	3,200	2,500	2,100	1,600	1,300	1,000
				Feed Rate (mm/min)	230	250	310	350	370	350	360
	Stainless Steel SUS	Shouldering	1.5D×0.2D	Spindle Revolution (min^{-1})	2,700	2,000	1,600	1,300	1,000	800	600
				Feed Rate (mm/min)	170	190	250	280	280	280	250
		Slotting	0.4D	Spindle Revolution (min^{-1})	2,700	2,000	1,600	1,300	1,000	800	600
				Feed Rate (mm/min)	80	90	120	140	140	140	130
	Titanium Alloys Heat-resistant Alloys (40~50HRC)	Shouldering	1.5D×0.2D	Spindle Revolution (min^{-1})	1,900	1,400	1,100	900	700	550	450
				Feed Rate (mm/min)	90	90	130	150	160	150	150
		Slotting	0.3D	Spindle Revolution (min^{-1})	1,900	1,400	1,100	900	700	550	450
				Feed Rate (mm/min)	40	40	60	70	80	70	70

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

4PGRM

Application	Workpiece Material	Application	Depth of Cut ($a_p \times a_e$) (mm)	Outside Dia. Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
 Shouldering  Slotting	Carbon Steel SxxC	Shouldering	1D×0.3D	Spindle Revolution (min^{-1})	13,300	10,000	8,000	6,600	5,000	4,000	3,300	2,500	2,000
				Feed Rate (mm/min)	1,860	1,600	1,440	1,320	1,200	1,360	1,320	1,200	1,200
		Slotting	1D	Spindle Revolution (min^{-1})	/	/	/	6,600	5,000	4,000	3,300	2,500	2,000
				Feed Rate (mm/min)	/	/	/	660	600	680	660	600	600
	Alloy Steel SCM, SNCM	Shouldering	1D×0.3D	Spindle Revolution (min^{-1})	10,600	8,000	6,400	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	1,180	1,020	920	840	880	890	860	880	830
		Slotting	0.75D	Spindle Revolution (min^{-1})	/	/	/	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	/	/	/	420	440	440	430	440	410
	Pre-hardened steel NAK, 30~45HRC	Shouldering	1D×0.25D	Spindle Revolution (min^{-1})	8,500	6,400	5,100	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	710	610	550	500	570	550	580	570	570
		Slotting	0.5D	Spindle Revolution (min^{-1})	/	/	/	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	/	/	/	250	290	280	290	280	280
	Stainless Steel SUS	Shouldering	1D×0.25D	Spindle Revolution (min^{-1})	5,300	4,000	3,200	2,700	2,000	1,600	1,300	1,000	800
				Feed Rate (mm/min)	290	250	230	210	240	250	230	240	240
		Slotting	0.4D	Spindle Revolution (min^{-1})	/	/	/	2,700	2,000	1,600	1,300	1,000	800
				Feed Rate (mm/min)	/	/	/	100	120	120	120	120	120
	Titanium Alloys Heat-resistant Alloys (40~50HRC)	Shouldering	1D×0.2D	Spindle Revolution (min^{-1})	3,700	2,800	2,200	1,900	1,400	1,100	900	700	550
				Feed Rate (mm/min)	160	130	110	110	110	130	120	140	130
		Slotting	0.3D	Spindle Revolution (min^{-1})	/	/	/	1,900	1,400	1,100	900	700	550
				Feed Rate (mm/min)	/	/	/	60	60	60	60	70	70

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

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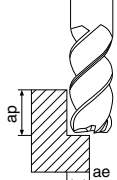
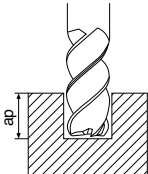


Solid End Mill



Recommended Cutting Conditions

3ZFKS (Short), 3ZFKM (Medium)

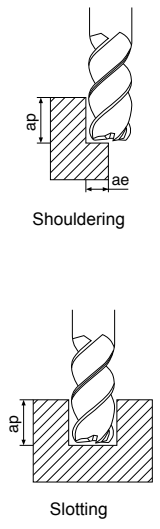
Application	Workpiece Material	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø10	ø12	
<div><p>Shouldering</p></div> <div><p>Plunge milling Slotting</p></div>	Carbon Steel SxxC	<div>Shouldering</div> <div>Short 1.2Dc×0.3Dc Medium 1.5Dc×0.3Dc</div> <div><div>Plunge milling</div><div>Slotting</div></div> <div>1Dc</div>	Spindle Revolution (min ⁻¹)	13,800	10,700	8,800	7,500	6,600	6,000	4,800	4,000	
			Feed Rate (mm/min)	Shouldering	850	950	1,100	1,200	1,100	1,000	910	850
				Plunge milling	180	170	170	170	160	150	120	100
				Slotting	570	650	700	730	750	780	800	750
	Alloy Steel SCM, SNCM	<div>Shouldering</div> <div>Short 1.2Dc×0.3Dc Medium 1.5Dc×0.3Dc</div> <div><div>Plunge milling</div><div>Slotting</div></div> <div>0.5Dc</div>	Spindle Revolution (min ⁻¹)	10,600	9,300	8,300	7,400	6,500	6,000	4,700	3,500	
			Feed Rate (mm/min)	Shouldering	700	780	900	980	900	850	750	700
				Plunge milling	120	120	130	140	130	130	120	100
				Slotting	500	540	570	590	610	600	580	500
	Pre-hardened steel NAK, 30~45HRC	<div>Shouldering</div> <div>Short 1.2Dc×0.3Dc Medium 1.5Dc×0.3Dc</div> <div><div>Plunge milling</div><div>Slotting</div></div> <div>0.5Dc</div>	Spindle Revolution (min ⁻¹)	5,200	4,000	3,200	2,600	2,300	2,000	1,600	1,400	
			Feed Rate (mm/min)	Shouldering	440	440	490	490	490	440	400	370
				Plunge milling	90	110	110	130	110	100	80	70
				Slotting	220	270	270	320	330	330	230	200
	Stainless Steel SUS	<div>Shouldering</div> <div>Short 1.2Dc×0.2Dc Medium 1.5Dc×0.2Dc</div> <div><div>Plunge milling</div><div>Slotting</div></div> <div>0.5Dc</div>	Spindle Revolution (min ⁻¹)	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900	
			Feed Rate (mm/min)	Shouldering	280	270	330	340	330	330	350	320
				Plunge milling	20	30	40	40	40	30	20	20
				Slotting	110	110	130	140	130	130	120	120
	Titanium Alloys	<div>Shouldering</div> <div>Short 1.2Dc×0.2Dc Medium 1.5Dc×0.2Dc</div> <div><div>Plunge milling</div><div>Slotting</div></div> <div>0.5Dc</div>	Spindle Revolution (min ⁻¹)	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900	
			Feed Rate (mm/min)	Shouldering	280	270	330	340	330	330	350	320
				Plunge milling	20	30	40	40	40	30	20	20
				Slotting	110	110	130	140	130	130	120	120

- Compressed air is recommended for cutting steel.
- Water soluble coolant is recommended for machining stainless steel and titanium alloys.
- Adjust depth of cut (ap) to suit machine rigidity

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Solid End Mill

4YEKM, 4YECM, 4YERM

Application	Workpiece Material	Application	Depth of Cut ($a_p \times a_e$) (mm)	Outside Dia. Dc (mm)	$\phi 4$	$\phi 5$	$\phi 6$	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 16$	$\phi 20$	$\phi 25$
 <p>Shouldering</p> <p>Slotting</p>	Carbon steel Alloy steel ~HRC30	Shouldering	$1D \times 0.5D$	Spindle Revolution (min^{-1})	8,400	6,700	5,600	4,200	3,300	2,800	2,100	1,700	1,300
				Feed Rate (mm/min)	840	800	890	840	790	720	580	510	390
		Slotting	1D	Spindle Revolution (min^{-1})	8,400	6,700	5,600	4,200	3,300	2,800	2,100	1,700	1,300
				Feed Rate (mm/min)	840	800	890	840	790	720	580	510	390
	Carbon steel Alloy steel 30~40HRC	Shouldering	$1D \times 0.3D$	Spindle Revolution (min^{-1})	6,800	5,400	4,500	3,400	2,700	2,300	1,700	1,400	1,100
				Feed Rate (mm/min)	540	540	630	610	540	500	400	360	300
		Slotting	1D	Spindle Revolution (min^{-1})	6,800	5,400	4,500	3,400	2,700	2,300	1,700	1,400	1,100
				Feed Rate (mm/min)	540	540	630	610	540	500	400	360	300
	Stainless steel SUS	Shouldering	$1D \times 0.25D$	Spindle Revolution (min^{-1})	6,400	5,100	4,200	3,200	2,600	2,100	1,600	1,300	1,000
				Feed Rate (mm/min)	510	510	580	570	520	460	380	330	280
		Slotting	0.5D	Spindle Revolution (min^{-1})	6,400	5,100	4,200	3,200	2,600	2,100	1,600	1,300	1,000
				Feed Rate (mm/min)	510	510	580	570	520	460	380	330	280
	Titanium Alloys	Shouldering	$1D \times 0.25D$	Spindle Revolution (min^{-1})	4,000	3,200	2,700	2,000	1,600	1,300	1,000	800	600
				Feed Rate (mm/min)	190	190	210	240	190	200	180	190	160
		Slotting	0.5D	Spindle Revolution (min^{-1})	4,000	3,200	2,700	2,000	1,600	1,300	1,000	800	600
				Feed Rate (mm/min)	190	190	210	240	190	200	180	190	160
	Heat-resistant Alloys	Shouldering	$1D \times 0.25D$	Spindle Revolution (min^{-1})	2,400	1,900	1,600	1,200	1,000	800	600	500	400
				Feed Rate (mm/min)	100	80	100	130	100	120	110	110	80
		Slotting	0.3D	Spindle Revolution (min^{-1})	2,400	1,900	1,600	1,200	1,000	800	600	500	400
				Feed Rate (mm/min)	100	80	100	130	100	120	110	110	80

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

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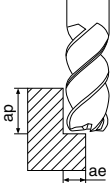


Solid End Mill



Recommended Cutting Conditions

5DEKM, 5DERM

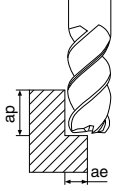
Application	Workpiece Material	Application	Outside Dia. Dc (mm)	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 <p>Shouldering</p> <p>Depth of Cut (ap×ae)(mm)</p> <p>5DEKM: 1.5Dc×0.25Dc 5DERM: 1.5Dc×0.5Dc</p>	Medium and high carbon steel > 0.3%C	Shouldering	Spindle Revolution (min ⁻¹)	16,000	12,700	10,600	8,000	6,400	5,300	4,000	3,200	2,500
			Feed Rate (mm/min)	2,400	2,500	2,700	2,400	2,200	1,900	1,600	1,600	1,400
		Slotting	Spindle Revolution (min ⁻¹)	16,000	12,700	10,600	8,000	6,400	5,300	4,000	3,200	2,500
			Feed Rate (mm/min)	2,400	2,500	2,700	2,400	2,200	1,900	1,600	1,600	1,400
	Alloy steel and alloy tool steel < 330HB < 35HRC	Shouldering	Spindle Revolution (min ⁻¹)	14,300	11,500	9,600	7,200	5,700	4,800	3,600	2,900	2,300
			Feed Rate (mm/min)	2,100	1,700	1,900	1,800	1,700	1,400	1,300	1,100	
		Slotting	Spindle Revolution (min ⁻¹)	14,300	11,500	9,600	7,200	5,700	4,800	3,600	2,900	2,300
			Feed Rate (mm/min)	2,100	1,700	1,900	1,800	1,700	1,400	1,300	1,100	
	Alloy steel and alloy tool steel 340~450HB 36~48HRC	Shouldering	Spindle Revolution (min ⁻¹)	13,000	10,000	8,500	6,400	5,100	4,200	3,200	2,500	2,000
			Feed Rate (mm/min)	1,300	1,500	1,700	1,300	1,300	1,300	1,100	1,000	1,000
		Slotting	Spindle Revolution (min ⁻¹)	13,000	10,000	8,500	6,400	5,100	4,200	3,200	2,500	2,000
			Feed Rate (mm/min)	1,300	1,500	1,700	1,300	1,300	1,300	1,100	1,000	1,000
	Austenitic Stainless Steel (X5CrNi1810) (SUS302, 303, 304)	Shouldering	Spindle Revolution (min ⁻¹)	9,200	7,300	6,100	4,600	3,700	3,100	2,300	1,800	1,500
			Feed Rate (mm/min)	1,400	1,100	1,200	1,100	1,100	1,100	920	820	730
		Slotting	Spindle Revolution (min ⁻¹)	9,200	7,300	6,100	4,600	3,700	3,100	2,300	1,800	1,500
			Feed Rate (mm/min)	1,400	1,100	1,200	1,100	1,100	1,100	920	820	730
	Austenitic Stainless Steel (X5CrNiMo17122) (SUS316, 316L)	Shouldering	Spindle Revolution (min ⁻¹)	6,400	5,100	4,200	3,200	2,500	2,100	1,600	1,300	1,000
			Feed Rate (mm/min)	640	760	640	640	640	640	560	510	410
		Slotting	Spindle Revolution (min ⁻¹)	6,400	5,100	4,200	3,200	2,500	2,100	1,600	1,300	1,000
			Feed Rate (mm/min)	640	760	640	640	640	640	560	510	410
	Titanium Alloys	Shouldering	Spindle Revolution (min ⁻¹)	4,800	3,800	3,200	2,400	1,900	1,600	1,200	960	760
			Feed Rate (mm/min)	480	380	480	480	380	400	360	380	340
		Slotting	Spindle Revolution (min ⁻¹)	4,800	3,800	3,200	2,400	1,900	1,600	1,200	960	760
			Feed Rate (mm/min)	480	380	480	480	380	400	360	380	340
	Heat-resistant Alloys	Shouldering	Spindle Revolution (min ⁻¹)	3,200	2,500	2,100	1,600	1,300	1,100	800	640	510
			Feed Rate (mm/min)	160	130	210	240	190	210	200	190	180
		Slotting	Spindle Revolution (min ⁻¹)	3,200	2,500	2,100	1,600	1,300	1,100	800	640	510
			Feed Rate (mm/min)	160	130	210	240	190	210	200	190	180
	Gray Cast Iron	Shouldering	Spindle Revolution (min ⁻¹)	14,000	11,000	9,000	6,800	5,400	4,500	3,400	2,700	2,200
			Feed Rate (mm/min)	2,000	2,200	2,300	2,000	2,200	1,800	1,700	1,600	1,400
		Slotting	Spindle Revolution (min ⁻¹)	14,000	11,000	9,000	6,800	5,400	4,500	3,400	2,700	2,200
			Feed Rate (mm/min)	2,000	2,200	2,300	2,000	2,200	1,800	1,700	1,600	1,400
	Nodular Cast Iron CGI Malleable Cast Iron	Shouldering	Spindle Revolution (min ⁻¹)	10,000	8,300	6,900	5,200	4,100	3,500	2,600	2,100	1,700
			Feed Rate (mm/min)	1,000	1,200	1,000	1,300	1,000	1,000	910	830	830
		Slotting	Spindle Revolution (min ⁻¹)	10,000	8,300	6,900	5,200	4,100	3,500	2,600	2,100	1,700
			Feed Rate (mm/min)	1,000	1,200	1,000	1,300	1,000	1,000	910	830	830

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

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Solid End Mill

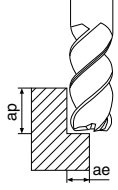
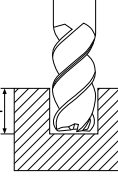
4YFSM, 6YFSM (Shouldering)

Application	Workpiece Material	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
 <p>Shouldering</p>	Carbon Steel < 20HRC	1.5Dc×0.1Dc	Spindle Revolution (min ⁻¹)	10,000	8,000	6,600	5,000	4,000	3,300	2,500	2,000
			Feed Rate (mm/min)	800	800	1,340	1,340	1,340	1,350	1,490	1,610
	Alloy Steel < 30HRC		Spindle Revolution (min ⁻¹)	8,000	6,400	5,300	4,000	3,200	2,700	2,000	1,600
			Feed Rate (mm/min)	570	570	960	960	960	960	1,080	1,150
	Pre-hardened steel 30~45HRC		Spindle Revolution (min ⁻¹)	6,000	4,800	4,000	3,000	2,400	2,000	1,500	1,200
			Feed Rate (mm/min)	360	360	620	660	660	660	740	790
	Stainless steel SUS		Spindle Revolution (min ⁻¹)	5,200	4,100	3,500	2,600	2,100	1,700	1,300	1,000
			Feed Rate (mm/min)	270	280	520	540	550	550	620	650
	Titanium Alloys	1Dc×0.05Dc	Spindle Revolution (min ⁻¹)	3,600	2,900	2,400	1,800	1,400	1,200	900	700
			Feed Rate (mm/min)	160	170	340	360	360	360	410	410
	Heat-resistant Alloys		Spindle Revolution (min ⁻¹)	3,600	2,900	2,400	1,800	1,400	1,200	900	700
			Feed Rate (mm/min)	160	170	340	360	360	360	410	410

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

Slotting is not recommended.

3RDSM, 4RDSM, 5RDSM

Application	Workpiece Material		Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
<div><p>Shouldering</p><p>Slotting</p></div>	Steel	< 22HRC	Shouldering	1.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	11,100	8,400	6,700	5,600	4,200	3,300	2,700
					Feed Rate (mm/min)	1,000	1,000	1,320	1,340	1,340	1,340	1,380
			Slotting	1Dc	Spindle Revolution (min ⁻¹)	9,300	6,900	5,600	4,600	3,500	2,800	2,200
					Feed Rate (mm/min)	800	800	1,000	1,030	1,040	1,050	1,110
		22~32HRC	Shouldering	1.5Dc×0.4Dc	Spindle Revolution (min ⁻¹)	9,600	7,200	5,700	4,800	3,600	2,900	2,300
					Feed Rate (mm/min)	720	720	860	860	860	920	1,030
			Slotting	0.75Dc	Spindle Revolution (min ⁻¹)	7,900	5,900	4,800	4,000	3,000	2,400	1,900
					Feed Rate (mm/min)	550	550	740	740	740	760	860
		32~40HRC	Shouldering	1.5Dc×0.4Dc	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,500
					Feed Rate (mm/min)	320	320	410	410	400	400	400
			Slotting	0.6Dc	Spindle Revolution (min ⁻¹)	5,300	4,000	3,200	2,600	2,000	1,600	1,300
					Feed Rate (mm/min)	260	260	340	340	330	330	330
		40~45HRC	Shouldering	1Dc×0.4Dc	Spindle Revolution (min ⁻¹)	4,800	3,600	2,900	2,400	1,800	1,400	1,100
					Feed Rate (mm/min)	220	220	260	260	250	250	250
			Slotting	0.5Dc	Spindle Revolution (min ⁻¹)	4,300	3,200	2,600	2,200	1,600	1,300	1,000
					Feed Rate (mm/min)	180	180	240	230	230	220	220
		45~50HRC	Shouldering	1Dc×0.3Dc	Spindle Revolution (min ⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300	1,000
					Feed Rate (mm/min)	150	150	180	180	170	170	170
			Slotting	0.4Dc	Spindle Revolution (min ⁻¹)	3,800	2,900	2,300	1,900	1,400	1,100	900
					Feed Rate (mm/min)	140	140	170	160	160	150	150
	Stainless steel SUS	Shouldering	1.5Dc×0.4Dc	Spindle Revolution (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100	900	
				Feed Rate (mm/min)	190	230	310	300	340	310	360	
		Slotting	0.5Dc	Spindle Revolution (min ⁻¹)	2,700	2,000	1,600	1,300	1,000	800	600	
				Feed Rate (mm/min)	110	130	180	170	190	180	190	
	Cast Iron	Shouldering	1.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	9,600	7,200	5,700	4,800	3,600	2,900	2,300	
				Feed Rate (mm/min)	850	850	1,030	1,030	1,030	1,100	1,380	
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	7,900	5,900	4,800	4,000	3,000	2,400	1,900	
				Feed Rate (mm/min)	700	700	900	900	900	910	1,140	

* Cutting with coolant is recommended for stainless steel.

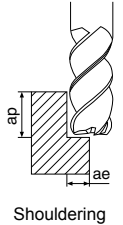
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Solid End Mill

Recommended Cutting Conditions

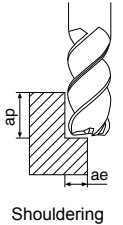
3RDSL, 4RDSL, 5RDSL (Shouldering)

Application	Workpiece Material		Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 Shouldering	Steel	< 22HRC	2.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	7,800	5,900	4,700	3,900	2,900	2,300	1,900
				Feed Rate (mm/min)	700	700	770	780	840	840	940
		22~32HRC		Spindle Revolution (min ⁻¹)	6,700	5,000	4,000	3,400	2,500	2,000	1,600
				Feed Rate (mm/min)	500	500	600	600	600	640	720
		32~40HRC	2.5Dc×0.4Dc	Spindle Revolution (min ⁻¹)	4,500	3,400	2,700	2,200	1,700	1,300	1,100
				Feed Rate (mm/min)	220	220	290	290	280	280	280
		40~45HRC		Spindle Revolution (min ⁻¹)	3,400	2,500	2,000	1,700	1,300	1,000	800
				Feed Rate (mm/min)	150	150	180	180	180	180	180
		45~50HRC	2.5Dc×0.3Dc	Spindle Revolution (min ⁻¹)	2,900	2,200	1,800	1,500	1,100	900	700
				Feed Rate (mm/min)	110	110	130	130	120	120	120
		Stainless steel SUS	1.5Dc×0.1Dc	Spindle Revolution (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100	900
				Feed Rate (mm/min)	120	150	200	200	220	200	230
		Cast Iron	2.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	6,700	5,000	4,000	3,400	2,500	2,000	1,600
				Feed Rate (mm/min)	600	600	720	720	720	770	970

* Cutting with coolant is recommended for stainless steel.

Slotting is not recommended.

4RFSM, 6RFSM

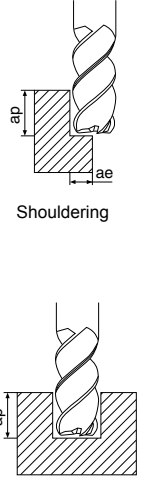
Application	Workpiece Material	Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12	ø16		ø20		ø25
									4 Flute	6 Flute	4 Flute	6 Flute	
	Steel	35~45HRC	Shouldering 1.5Dc×0.4Dc	Spindle Revolution (min ⁻¹)	8,000	6,000	4,800	4,000	3,000	3,000	2,400	2,400	1,900
				Feed Rate (mm/min)	630	630	630	640	640	900	640	930	800
			Slotting 0.5Dc	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	2,400	1,900	1,900	1,500
				Feed Rate (mm/min)	480	480	490	500	500	720	500	750	640
		45~55HRC	Shouldering 1.5Dc×0.33Dc	Spindle Revolution (min ⁻¹)	5,800	4,400	3,500	2,900	2,200	2,200	1,800	1,800	1,400
				Feed Rate (mm/min)	350	350	350	350	350	530	350	530	460
			Slotting 0.5Dc	Spindle Revolution (min ⁻¹)	4,700	3,500	2,800	2,300	1,800	1,800	1,400	1,400	1,100
				Feed Rate (mm/min)	280	280	280	280	280	420	280	420	370
		55~60HRC	Shouldering 1.5Dc×0.25Dc	Spindle Revolution (min ⁻¹)	4,800	3,600	2,900	2,400	1,800	1,800	1,400	1,400	1,100
				Feed Rate (mm/min)	190	220	230	240	220	320	230	340	310
			Slotting 0.3Dc	Spindle Revolution (min ⁻¹)	3,800	2,900	2,300	1,900	1,400	1,400	1,100	1,100	900
				Feed Rate (mm/min)	150	170	180	180	180	260	180	280	250
		Stainless Steel SUS	Shouldering 1.5Dc×0.4Dc	Spindle Revolution (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,400	1,100	1,100	900
				Feed Rate (mm/min)	300	280	260	300	280	420	290	430	380
			Slotting 0.5Dc	Spindle Revolution (min ⁻¹)	3,200	2,400	1,900	1,600	1,200	1,200	1,000	1,000	800
				Feed Rate (mm/min)	200	190	180	200	190	290	210	310	270
	Titanium Alloys	< 40HRC	Shouldering 2Dc×0.4Dc	Spindle Revolution (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,400	1,100	1,100	900
				Feed Rate (mm/min)	390	390	390	390	390	590	390	540	450
			Slotting 0.5Dc	Spindle Revolution (min ⁻¹)	3,000	2,200	1,800	1,500	1,100	1,100	900	900	700
				Feed Rate (mm/min)	310	310	310	310	310	470	310	430	360
		> 40HRC	Shouldering 1.5Dc×0.25Dc	Spindle Revolution (min ⁻¹)	3,200	2,400	1,900	1,600	1,200	1,200	1,000	1,000	800
				Feed Rate (mm/min)	300	300	300	300	300	430	300	430	370
			Slotting 0.3Dc	Spindle Revolution (min ⁻¹)	2,500	1,900	1,500	1,300	1,000	1,000	800	800	600
				Feed Rate (mm/min)	230	230	230	230	230	340	230	340	290
		Inconel	Shouldering 1Dc×0.2Dc	Spindle Revolution (min ⁻¹)	1,600	1,200	1,000	800	600	600	500	500	400
				Feed Rate (mm/min)	100	100	100	100	100	140	100	140	130
			Slotting 0.25Dc	Spindle Revolution (min ⁻¹)	1,300	1,000	800	600	500	500	400	400	300
				Feed Rate (mm/min)	80	80	80	80	80	120	80	120	100

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

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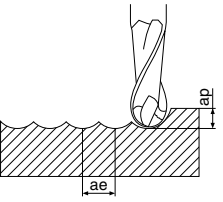
Solid End Mill

3RFRS, 4RFRS

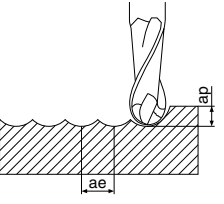
Application	Workpiece Material		Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø4	ø5	ø6	ø8	ø10	ø12
 <p>Shouldering</p> <p>Slotting</p>	Steel	< 30HRC	Shouldering	0.8Dc×0.5Dc	Spindle Revolution (min ⁻¹)	14,300	11,500	9,600	7,200	5,700	4,800
					Feed Rate (mm/min)	860	860	1,150	1,150	1,150	1,150
			Slotting	0.8Dc	Spindle Revolution (min ⁻¹)	11,500	9,200	7,600	5,700	4,600	3,800
					Feed Rate (mm/min)	690	690	920	920	920	920
		30~40HRC	Shouldering	0.8Dc×0.4Dc	Spindle Revolution (min ⁻¹)	9,600	7,600	6,400	4,800	3,800	3,200
					Feed Rate (mm/min)	430	460	640	610	610	570
			Slotting	0.8Dc	Spindle Revolution (min ⁻¹)	7,600	6,100	5,100	3,800	3,100	2,500
					Feed Rate (mm/min)	340	370	490	490	490	460
		40~50HRC	Shouldering	0.8Dc×0.4Dc	Spindle Revolution (min ⁻¹)	6,400	5,100	4,200	3,200	2,500	2,100
					Feed Rate (mm/min)	190	230	320	320	320	340
			Slotting	0.5Dc	Spindle Revolution (min ⁻¹)	5,100	4,100	3,400	2,500	2,000	1,700
					Feed Rate (mm/min)	150	180	260	260	260	270
		50~60HRC	Shouldering	0.8Dc×0.25Dc	Spindle Revolution (min ⁻¹)	4,800	3,800	3,200	2,400	1,900	1,600
					Feed Rate (mm/min)	100	100	130	140	150	160
			Slotting	0.3Dc	Spindle Revolution (min ⁻¹)	3,800	3,100	2,500	1,900	1,500	1,300
					Feed Rate (mm/min)	80	80	100	120	120	130
		60~70HRC	Shouldering	0.8Dc×0.2Dc	Spindle Revolution (min ⁻¹)	3,200	2,500	2,100	1,600	1,300	1,100
					Feed Rate (mm/min)	60	60	70	70	80	90
			Slotting	0.25Dc	Spindle Revolution (min ⁻¹)	2,500	2,000	1,700	1,300	1,000	800
					Feed Rate (mm/min)	50	50	60	60	60	70
	Titanium Alloys	Shouldering	0.8Dc×0.4Dc		Spindle Revolution (min ⁻¹)	6,400	5,100	4,200	3,200	2,500	2,100
					Feed Rate (mm/min)	190	230	340	320	350	380
		Slotting	0.5Dc		Spindle Revolution (min ⁻¹)	4,000	3,200	2,700	2,000	1,600	1,300
					Feed Rate (mm/min)	80	100	150	140	160	170

* Cutting with coolant is recommended for titanium alloys.

2UEBS

Application	Workpiece Material		Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø4	ø6	ø8	ø10	ø12	ø16	ø20
 <p>Copying</p>	Steel	< 42HRC	0.3Dc×0.7Dc	Spindle Revolution (min ⁻¹)	9,600	6,400	4,800	3,800	3,200	2,400	1,900
				Feed Rate (mm/min)	380	420	380	380	340	300	310
		42~48HRC		Spindle Revolution (min ⁻¹)	8,000	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	300	330	300	290	270	240	240
		48~52HRC		Spindle Revolution (min ⁻¹)	6,400	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	190	210	190	190	170	150	150
	Cast Iron	< 180HB		Spindle Revolution (min ⁻¹)	12,700	8,500	6,400	5,100	4,200	3,200	2,500
				Feed Rate (mm/min)	760	850	760	750	690	610	610
		> 180HB		Spindle Revolution (min ⁻¹)	11,100	7,400	5,600	4,500	3,700	2,800	2,200
				Feed Rate (mm/min)	540	590	540	530	480	420	430

3UEBS

Application	Workpiece Material		Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12
 <p>Copying</p>	Carbon Steel < 20HRC	0.2Dc×0.3Dc		Spindle Revolution (min ⁻¹)	13,300	10,000	8,000	6,600	5,000	4,000	3,300
				Feed Rate (mm/min)	600	870	840	850	1,400	1,200	990
	Alloy Steel < 35HRC	0.2Dc×0.3Dc		Spindle Revolution (min ⁻¹)	10,600	8,000	6,400	5,300	4,000	3,200	2,700
				Feed Rate (mm/min)	410	500	610	640	940	830	730
	Pre-hardened steel 30~45HRC	0.1Dc×0.2Dc		Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900
				Feed Rate (mm/min)	220	250	257	280	250	240	230
	Stainless steel SUS	0.05Dc×0.1Dc		Spindle Revolution (min ⁻¹)	5,800	4,400	3,500	2,900	2,200	1,800	1,500
				Feed Rate (mm/min)	160	180	190	180	190	190	170

* Cutting with coolant is recommended for stainless steel.

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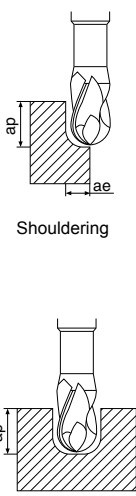


Solid End Mill



Recommended Cutting Conditions

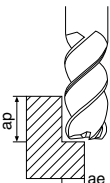
4YEBM

Application	Workpiece Material	Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø5	ø6	ø8	ø10	ø12	ø16	ø20
 <p>Shouldering</p> <p>Slotting</p>	Soft Steel	Shouldering	1Dc×0.5Dc	Spindle Revolution (min ⁻¹)	9,400	7,900	5,900	4,700	3,900	2,900	2,400
				Feed Rate (mm/min)	1,020	1,130	1,270	1,020	990	800	760
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	8,600	7,200	5,400	4,300	3,600	2,700	2,200
				Feed Rate (mm/min)	930	1,030	1,160	930	900	730	700
	Stainless steel SUS	Shouldering	1Dc×0.5Dc	Spindle Revolution (min ⁻¹)	5,700	4,800	3,600	2,900	2,400	1,800	1,400
				Feed Rate (mm/min)	620	630	630	640	560	450	390
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	5,100	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	550	610	570	550	500	400	350
	Titanium Alloys	Shouldering	1Dc×0.3Dc	Spindle Revolution (min ⁻¹)	3,200	2,700	2,000	1,600	1,300	1,000	800
				Feed Rate (mm/min)	180	190	220	170	170	160	160
		Slotting	0.5Dc	Spindle Revolution (min ⁻¹)	2,900	2,400	1,800	1,400	1,200	900	700
				Feed Rate (mm/min)	160	170	190	170	170	160	160
	Heat-resistant Alloys	Shouldering	1Dc×0.2Dc	Spindle Revolution (min ⁻¹)	1,700	1,400	1,000	800	700	500	400
				Feed Rate (mm/min)	70	80	100	80	90	90	80
		Slotting	0.5Dc	Spindle Revolution (min ⁻¹)	1,400	1,200	900	700	600	400	400
				Feed Rate (mm/min)	60	70	80	80	80	80	70
	Gray Cast Iron	Shouldering	1Dc×0.4Dc	Spindle Revolution (min ⁻¹)	7,800	6,500	4,900	3,900	3,200	2,400	1,900
				Feed Rate (mm/min)	840	930	1,050	840	820	660	630
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	7,000	5,800	4,400	3,500	2,900	2,200	1,800
				Feed Rate (mm/min)	760	840	950	760	740	600	570

* Cutting with coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

4HFSS, 5HFSS, 6HFSS, 7HFSS (Shouldering)

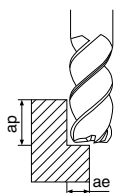
4HFSSM, 5HFSSM, 6HFSSM, 7HFSSM, 8HFSSM (Shouldering)

Application	Workpiece Material	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø1	ø2	ø4	ø6	ø8	ø12
<div></div> <div>Shouldering</div>	Tool Steel (< 40HRC) Pre-hardened steel	1.5Dc×0.05Dc (Dc < ø3) 1.5Dc×0.1Dc (ø3 ≤ Dc)	Spindle Revolution (min ⁻¹)	20,700	20,000	11,100	7,400	5,600	3,700
	Feed Rate (mm/min)		910	1,750	2,000	2,900	2,930	2,930	
	Spindle Revolution (min ⁻¹)		20,700	20,000	9,900	6,600	5,000	3,300	
	Feed Rate (mm/min)		910	1,750	1,800	2,630	2,650	2,650	
	Hardened Steel 45~55HRC	1.5Dc×0.05Dc	Spindle Revolution (min ⁻¹)	20,700	16,000	8,000	5,300	4,000	2,700
	Feed Rate (mm/min)		910	1,400	1,400	2,100	2,100	2,100	
	Hardened Steel 55~60HRC	1.5Dc×0.02Dc	Spindle Revolution (min ⁻¹)	20,700	12,000	6,000	4,000	3,000	2,000
	Feed Rate (mm/min)		640	730	740	1,100	1,100	1,100	
	Hardened Steel 60~65HRC		Spindle Revolution (min ⁻¹)	20,700	11,100	5,600	3,700	2,800	1,900
			Feed Rate (mm/min)	550	600	600	880	880	880
	Hardened Steel 65~70HRC		Spindle Revolution (min ⁻¹)	15,900	8,000	4,000	2,700	2,000	1,330
			Feed Rate (mm/min)	370	370	370	560	560	550

* Above is even number flute condition. In case of Odd number flute, please take standard with increasing feed rate 15-20% condition.

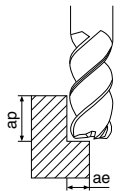
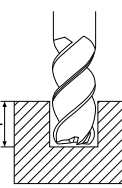
Slotting is not recommended.

4UGSM, 6UGSM (Shouldering)

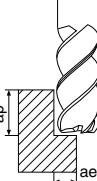
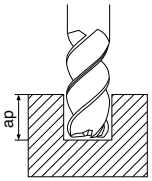
Application	Workpiece Material		Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø4	ø6	ø8	ø10	ø12	ø16
 Shouldering	Steel	45~55HRC	1Dc×0.05Dc	Spindle Revolution (min ⁻¹)	11,900	8,000	6,000	4,800	4,000	3,000
				Feed Rate (mm/min)	810	1,200	1,200	1,000	980	900
		55~60HRC		Spindle Revolution (min ⁻¹)	8,000	5,300	4,000	3,200	2,700	2,000
				Feed Rate (mm/min)	510	760	740	610	610	540
		60~65HRC	1Dc×0.2mm	Spindle Revolution (min ⁻¹)	5,200	3,500	2,600	2,100	1,700	1,300
				Feed Rate (mm/min)	290	480	450	390	370	330
		65~70HRC		Spindle Revolution (min ⁻¹)	2,800	1,900	1,400	1,100	900	700
				Feed Rate (mm/min)	150	250	230	200	200	170

Slotting is not recommended.

3NESM

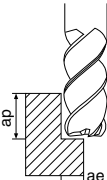
Application	Workpiece Material	Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø3	ø6	ø8	ø10	ø12	ø16	ø20
 Shouldering	Aluminum Alloys	Shouldering	1.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	34,000	17,000	13,000	10,200	8,500	6,400	5,100
				Feed Rate (mm/min)	2,750	2,750	2,750	2,750	2,750	2,750	2,750
 Slotting		Slotting	1Dc	Spindle Revolution (min ⁻¹)	26,500	13,000	9,800	8,000	6,600	5,000	4,000
				Feed Rate (mm/min)	1,100	1,100	1,100	1,100	1,100	1,100	1,100

2NFSM

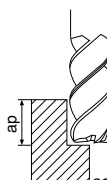
Application	Workpiece Material	Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø3	ø6	ø8	ø10	ø12	ø16	ø20
 Shouldering	Aluminum Alloys	Shouldering	1Dc×0.5Dc	Spindle Revolution (min ⁻¹)	26,500	13,300	10,000	8,000	6,600	5,000	4,000
				Feed Rate (mm/min)	690	950	950	1,130	1,260	1,000	880
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	21,200	10,600	8,000	6,400	5,300	4,000	3,200
				Feed Rate (mm/min)	550	750	750	900	1,010	800	700
 Slotting	High-silicon Aluminum Alloys	Shouldering	1Dc×0.5Dc	Spindle Revolution (min ⁻¹)	19,100	9,600	7,200	5,700	4,800	3,600	2,900
				Feed Rate (mm/min)	420	500	500	600	670	770	570
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	15,900	7,900	5,900	4,800	4,000	3,000	2,400
				Feed Rate (mm/min)	350	420	420	500	560	640	480

Recommended Cutting Conditions

3NFSM

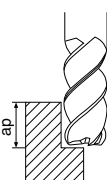
Application	Workpiece Material	Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø3	ø6	ø8	ø10	ø12	ø16	ø20
 Shouldering	Aluminum Alloys	Shouldering	1Dc×0.5Dc	Spindle Revolution (min ⁻¹)	26,500	13,300	10,000	8,000	6,600	5,000	4,000
				Feed Rate (mm/min)	1,040	1,400	1,400	1,700	1,890	1,490	1,310
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	21,200	10,600	8,000	6,400	5,300	4,000	3,200
				Feed Rate (mm/min)	830	1,100	1,100	1,360	1,510	1,290	1,050
	High-silicon Aluminum Alloys	Shouldering	1Dc×0.5Dc	Spindle Revolution (min ⁻¹)	19,100	9,600	7,200	5,700	4,800	3,600	2,900
				Feed Rate (mm/min)	630	750	750	890	1,000	1,160	860
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	15,900	7,900	5,900	4,800	4,000	3,000	2,400
				Feed Rate (mm/min)	520	630	630	740	830	960	710

3NFSL (Shouldering)

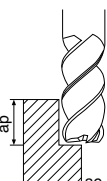
Application	Workpiece Material	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 Shouldering	Aluminum Alloys	2.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	18,500	9,300	7,000	5,600	4,600	3,500	2,800
			Feed Rate (mm/min)	730	980	980	1,200	1,320	1,040	920
	High-silicon Aluminum Alloys	1.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	13,400	6,700	5,000	4,000	3,400	2,500	2,000
			Feed Rate (mm/min)	440	530	530	620	700	810	600

Slotting is not recommended.

3AESM

Application	Workpiece Material	Application	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 Shouldering	Aluminum Alloys	Shouldering	1.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	33,200	24,900	19,900	16,600	12,400	10,000	8,000
				Feed Rate (mm/min)	5,370	5,150	5,080	4,980	4,890	4,840	4,780
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	19,900	14,900	11,900	10,000	7,500	6,000	4,800
				Feed Rate (mm/min)	3,230	3,090	3,050	2,990	2,930	2,900	2,870
	High-silicon Aluminum Alloys	Shouldering	1.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	10,600	8,000	6,400	5,300	4,000	3,200	2,500
				Feed Rate (mm/min)	1,430	1,390	1,360	1,320	1,300	1,290	1,280
		Slotting	1Dc	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,500
				Feed Rate (mm/min)	860	830	810	790	780	770	770

3AESL (Shouldering)

Application	Workpiece Material	Depth of Cut (ap×ae) (mm)	Outside Dia. Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 Shouldering	Aluminum Alloys	2.5Dc×0.5Dc	Spindle Revolution (min ⁻¹)	23,000	17,500	14,000	11,600	8,700	7,000	5,600
			Feed Rate (mm/min)	3,760	3,600	3,560	3,490	3,420	3,390	3,350
	High-silicon Aluminum Alloys		Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,800
			Feed Rate (mm/min)	1,000	970	950	920	910	900	900

Slotting is not recommended.

L

Solid End Mill