For superalloy machining

4JER

High efficiency and stable machining for superalloy such as Inconel®
Long tool life machining with MEGACOAT HARD for excellent heat resistance

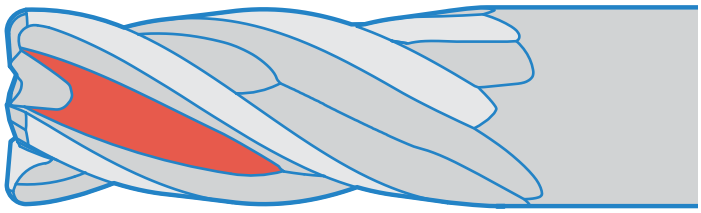
4

MEGACOAT is applied

1 Resistant to breakage

Stable slotting and trochoid machining with chip pocket grooves and large core thickness

Chip pocket for smooth chip evacuation during slotting applications

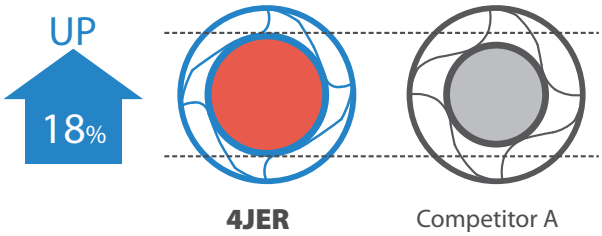


Excellent chip evacuation

2 times

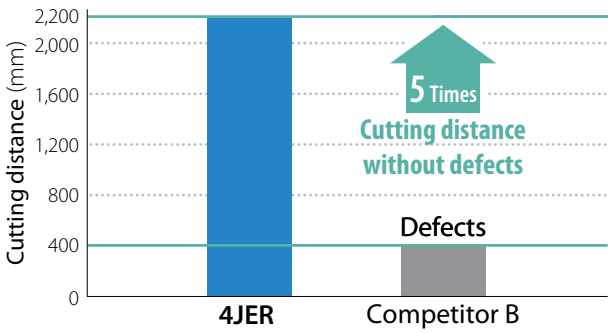
Amount of chip evacuation

Core thickness comparison



Decreases tool deflection and achieves excellent machining precision

Slotting performance comparison (Internal evaluation)



Cutting conditions : n = 1,200 min-1, Vf = 140 mm/min, ap = 4 mm
End mill dia. ø8 mm, slotting, wet
workpiece material : Inconel®718 (Aging treatment, 40HRC)

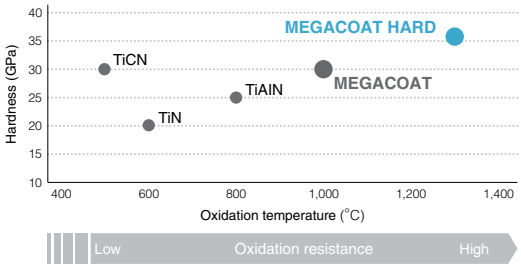
Recommended workpiece materials ★ 1st Choice

★P ~30HRC | P 30~40HRC | M Stainless steel | S Titanium Alloy | ★S Heat-resistant Alloy

2 Achieves long tool life and stable machining

The MEGACOAT HARD coating technology delivers the highest hardness and heat resistance in Kyocera's PVD coating

Properties of coating

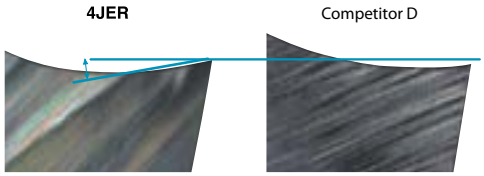


Wear resistance comparison (Cutting distance 975mm)

Cutting conditions : n= 1,200 min^{-1}, Vf = 140 mm/min, ap = 4 mm
End mill dia. ø8 mm, Slotting, Wet
Workpiece material : Inconel®718 (Aging treatment, 40HRC)

3 Decreased burr

High sharpness with a large rake angle

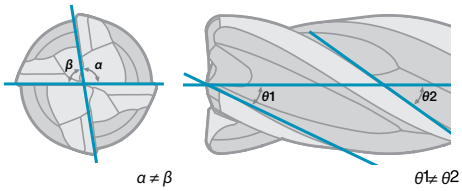


Burring during slotting (Inconel® **718**)

Cutting conditions : n = 1,200 min^{-1}, Vf = 140 mm/min, ap = 4 mm
End mill dia. ø8 mm, Wet

4 Resistance to chattering

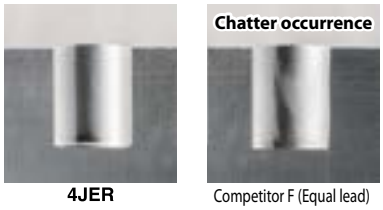
Improved chatter resistance with varied interval flute and variable lead



Varied interval flute design
Prevents periodical vibration during machining

Variable Lead
Anti vibration effect
Prevents chattering, and superior surface finish

Slotting Surface in Trochoidal Machining (Inconel® **718**)



Cutting Conditions : n =1,200min-1, Vf = 300 mm/min, ap = 20 mm
End Mill Dia. ø16 mm, Width 20mm, Wet

4JER

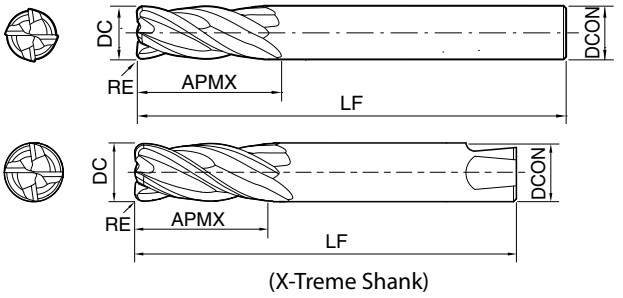
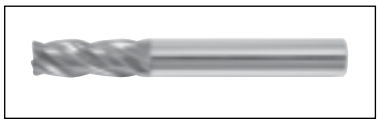


Fig.1

Fig.2

(X-Treme Shank)



MEGACOAT HARD | Radius R | h5 Shank Dia. | 32° 35°

4JER (Short)

Shouldering Slotting

(Unit : mm)

Description	Availability	DC	Mill Dia. tolerance	RE	APMX	DCON	LF	ZEFP	Shape
4JER060-090-R03	●	6.0	0 -0.020	0.3	9	6	60	4	Fig.1
4JER060-090-R05	●			0.5					
4JER060-090-R10	●			1.0					
4JER080-120-R03	●	8.0	-0.005 -0.025	0.3	12	8	70	4	
4JER080-120-R05	●			0.5					
4JER080-120-R10	●			1.0					
4JER080-120-R15	●			1.5					
4JER100-150-R03	●	10.0	-0.005 -0.025	0.3	15	10	80	4	
4JER100-150-R05	●			0.5					
4JER100-150-R10	●			1.0					
4JER100-150-R15	●			1.5					
4JER100-150-R20	●			2.0					
4JER100-150-R30	●			3.0					
4JER120-180-R05	●	12.0	-0.010 -0.030	0.5	18	12	100	4	
4JER120-180-R10	●			1.0					
4JER120-180-R15	●			1.5					
4JER120-180-R20	●			2.0					
4JER120-180-R30	●			3.0					
4JER160-240-R10	●	16.0	-0.010 -0.030	1.0	24	16	110	4	
4JER160-240-R20	●			2.0					
4JER160-240-R30	●			3.0					
4JER200-300-R10	●	20.0	-0.010 -0.030	1.0	30	20	125	4	
4JER200-300-R20	●			2.0					
4JER200-300-R30	●			3.0					

*4JER...XT Shank (X-Treme Shank) is for NIKKEN X-Treme chuck

4JER (Medium)

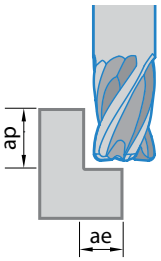
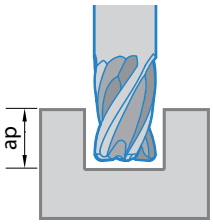
Shouldering Slotting

(Unit : mm)

Description	Availability	DC	Mill Dia. tolerance	RE	APMX	DCON	LF	ZEFP	Shape
4JER060-150-R03	●	6.0	0 -0.020	0.3	15	6	60	4	Fig.1
4JER060-150-R05	●			0.5					
4JER060-150-R10	●			1.0					
4JER080-200-R03	●	8.0	-0.005 -0.025	0.3	20	8	70	4	
4JER080-200-R05	●			0.5					
4JER080-200-R10	●			1.0					
4JER080-200-R15	●			1.5					
4JER100-250-R03	●	10.0	-0.005 -0.025	0.3	25	10	80	4	
4JER100-250-R05	●			0.5					
4JER100-250-R10	●			1.0					
4JER100-250-R15	●			1.5					
4JER100-250-R20	●			2.0					
4JER100-250-R30	●			3.0					
4JER120-260-R05	●	12.0	-0.010 -0.030	0.5	26	12	100	4	
4JER120-260-R10	●			1.0					
4JER120-260-R15	●			1.5					
4JER120-260-R20	●			2.0					
4JER120-260-R30	●			3.0					
4JER160-350-R10	●	16.0	-0.010 -0.030	1.0	35	16	110	4	
4JER160-350-R20	●			2.0					
4JER160-350-R30	●			3.0					
4JER200-450-R10	●	20.0	-0.010 -0.030	1.0	45	20	125	4	
4JER200-450-R20	●			2.0					
4JER200-450-R30	●			3.0					
4JER120-260-R10-XT	●	12.0	-0.010 -0.030	1.0	26	12	94	4	Fig.2
4JER120-260-R20-XT	●			2.0					
4JER120-260-R30-XT	●			3.0					
4JER160-350-R10-XT	●	16.0	-0.010 -0.030	1.0	35	16	116	4	
4JER160-350-R20-XT	●			2.0					
4JER160-350-R30-XT	●			3.0					
4JER200-450-R10-XT	●	20.0	-0.010 -0.030	1.0	45	20	130	4	
4JER200-450-R20-XT	●			2.0					
4JER200-450-R30-XT	●			3.0					

● : Available

4JER Cutting conditions

Machining Application	Workpiece Material	Application	Depth of Cut ap × ae (mm)	Outer Diameter Dc (mm)	ø 6	ø 8	ø 10	ø 12	ø 16	ø 20
 Shouldering	Carbon Steel / Cast Iron S45C-FC	Shouldering	1.5Dc × 0.1Dc	Number of Revolutions (min^{-1})	6,900	5,200	4,100	3,400	2,600	2,100
				Feed Rate (mm/min)	1,500	1,500	1,400	1,400	1,300	1,100
		Slotting	Dc ≦ ø12 : ap ≦ 1.0Dc Dc > ø12 : ap ≦ 12	Number of Revolutions (min^{-1})	5,600	4,200	3,300	2,800	2,100	1,700
				Feed Rate (mm/min)	720	670	620	540	480	360
	Alloy Steel SCM, SNCM	Shouldering	1.5Dc × 0.1Dc	Number of Revolutions (min^{-1})	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	1,020	920	870	800	720	640
		Slotting	Dc ≦ ø12 : ap ≦ 1.0Dc Dc > ø12 : ap ≦ 12	Number of Revolutions (min^{-1})	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	530	510	470	450	400	360
	Pre-hardened Steel (30~45HRC)	Shouldering	1.5Dc × 0.05Dc	Number of Revolutions (min^{-1})	4,600	3,500	2,800	2,300	1,700	1,300
				Feed Rate (mm/min)	850	830	800	770	640	590
		Slotting	ap ≦ 0.5Dc	Number of Revolutions (min^{-1})	3,700	2,800	2,200	1,900	1,400	1,100
				Feed Rate (mm/min)	480	450	440	410	340	300
 Slotting	Stainless Steel SUS304	Shouldering	1.5Dc × 0.05Dc	Number of Revolutions (min^{-1})	4,800	3,600	2,900	2,400	1,800	1,400
				Feed Rate (mm/min)	850	830	800	770	640	590
		Slotting	ap ≦ 0.5Dc	Number of Revolutions (min^{-1})	3,500	2,800	2,200	1,900	1,400	1,100
				Feed Rate (mm/min)	300	280	250	230	190	170
	Titanium Alloy	Shouldering	1.5Dc × 0.1Dc	Number of Revolutions (min^{-1})	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	580	630	660	600	500	400
		Slotting	Dc ≦ ø12 : ap ≦ 1.0Dc Dc > ø12 : ap ≦ 12	Number of Revolutions (min^{-1})	3,700	2,800	2,200	1,900	1,400	1,100
				Feed Rate (mm/min)	320	340	370	340	260	210
	Heat Resistant Alloy (Inconel® 718, etc.)	Shouldering	1.5Dc × 0.05Dc	Number of Revolutions (min^{-1})	2,400	1,800	1,400	1,200	900	720
				Feed Rate (mm/min)	330	320	320	320	320	290
		Slotting	ap ≦ 0.5Dc	Number of Revolutions (min^{-1})	1,600	1,200	950	800	600	480
				Feed Rate (mm/min)	180	140	110	100	80	60

Coolant is recommended for stainless steel, titanium alloy, and superalloy.