

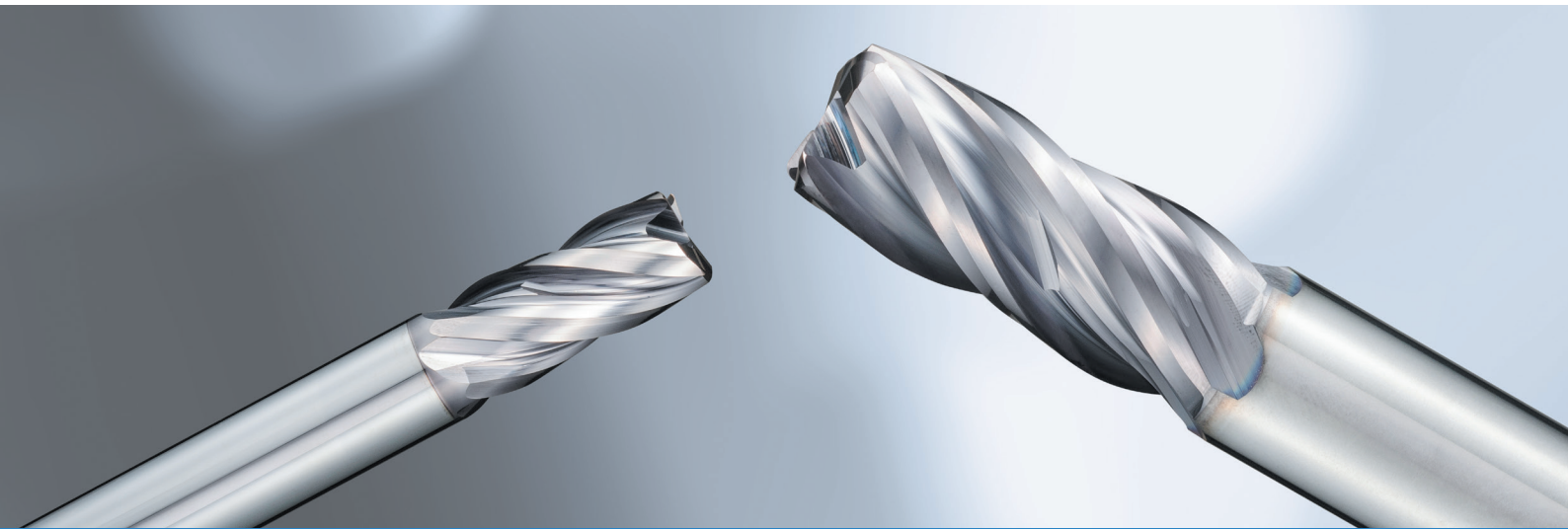
THE NEW VALUE FRONTIER



Solid end mill | **4JER**

For superalloy machining

4JER



High efficiency and stable machining for heat resistant alloys such as Inconel®

Resistant to breakage and capable of stable slotting and trochoidal machining

Long tool life and stable machining with MEGACOAT HARD

Improved chatter resistance with variable helix design



For heat resistant alloy machining

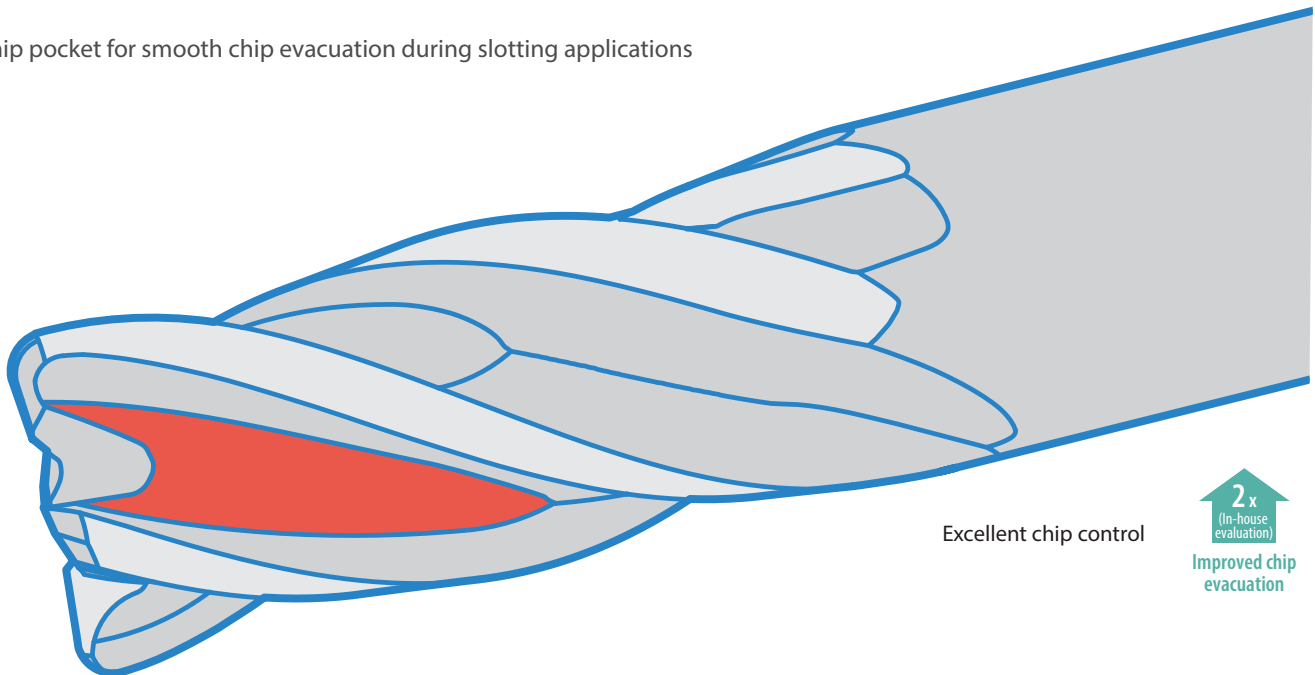
4JER

- High efficiency and stable machining for heat resistant alloys such as Inconel®
- Long tool life machining with MEGACOAT HARD for excellent thermal resistance

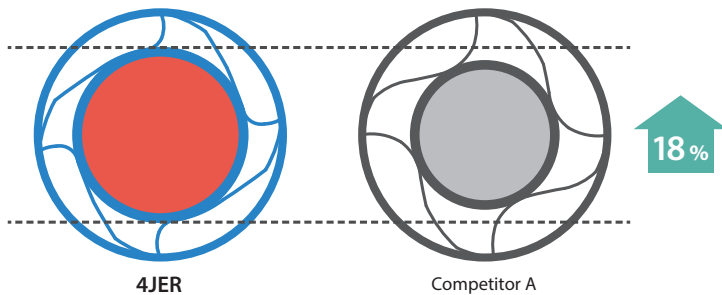
1 Resistant to breakage

Stable slotting and trochoid machining with a chip pocket groove and large core thickness

Chip pocket for smooth chip evacuation during slotting applications

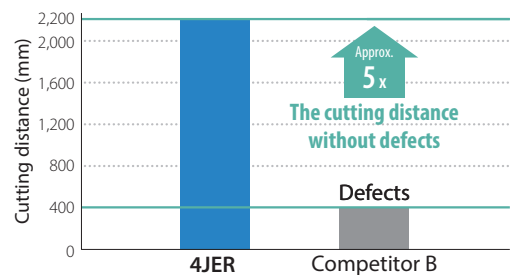


Core thickness comparison



Decreases tool deflection and achieves excellent machining precision

Slotting performance comparison (In-house evaluation)

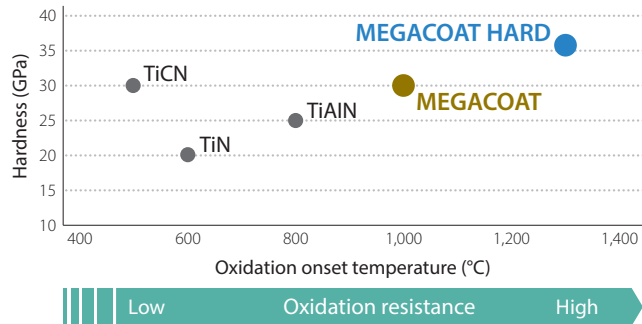


Cutting conditions: $n = 1,200 \text{ min}^{-1}$, $V_f = 140 \text{ mm/min}$, $a_p = 4 \text{ mm}$
Machining diameter $\varnothing 8 \text{ mm}$, slotting, wet
Workpiece: Inconel® 718

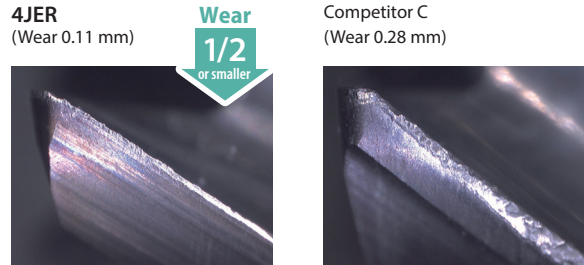
2 Achieves long tool life and stable machining

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

Coating film property



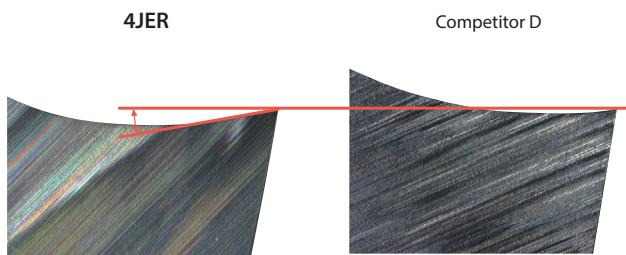
Wear resistance evaluation (Cutting distance 975 mm)



Cutting conditions: $n = 1,200 \text{ min}^{-1}$, $V_f = 140 \text{ mm/min}$, $a_p = 4 \text{ mm}$
Machining diameter $\phi 8 \text{ mm}$, slotting, wet
Workpiece: Inconel® 718

3 Decreased burr

High sharpness with a large rake angle



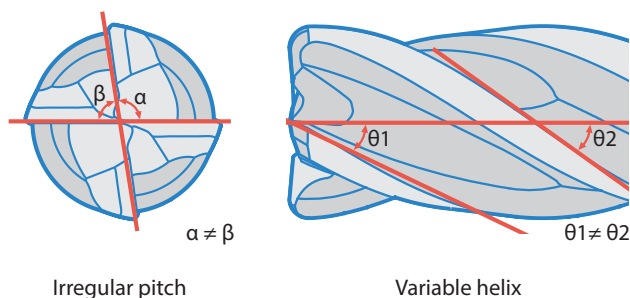
Burring during slotting (Inconel® 718)



Cutting conditions: $n = 1,200 \text{ min}^{-1}$, $V_f = 140 \text{ mm/min}$, $a_p = 4 \text{ mm}$
Machining diameter $\phi 8 \text{ mm}$, wet

4 Chattering resistance

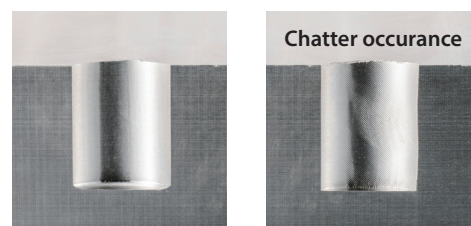
Improved chatter resistance with irregular pitch and variable helix design



Reduces chatter in the cut

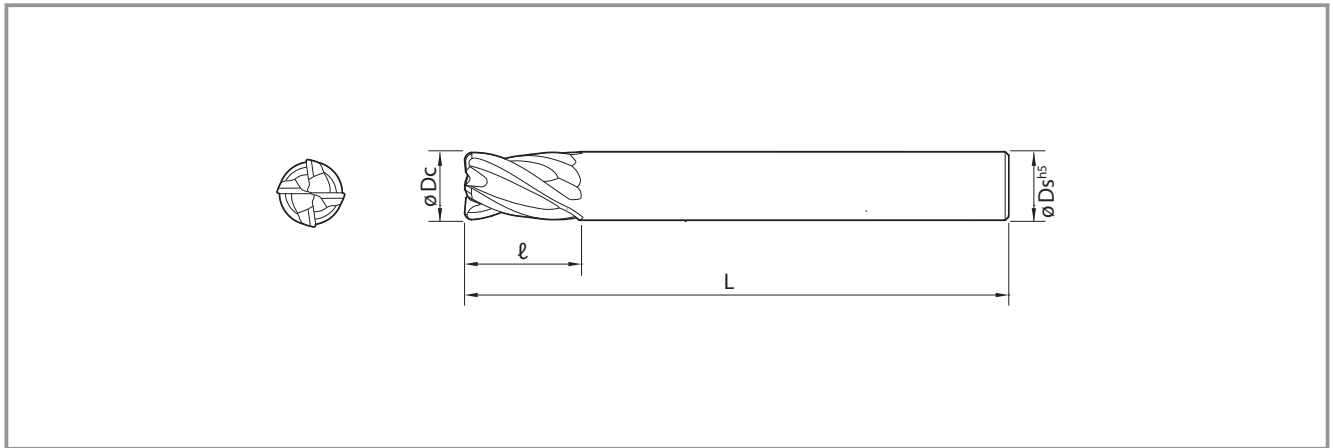
- Dampening effect
- Decreased chattering with high quality surface finish

Slotting surface in trochoidal machining (Inconel® 718)



Cutting conditions: $n = 1,200 \text{ min}^{-1}$, $V_f = 300 \text{ mm/min}$, $a_p = 20 \text{ mm}$
Machining diameter $\phi 16 \text{ mm}$, Slot width 20 mm, wet

End mills (Short depth of cut)

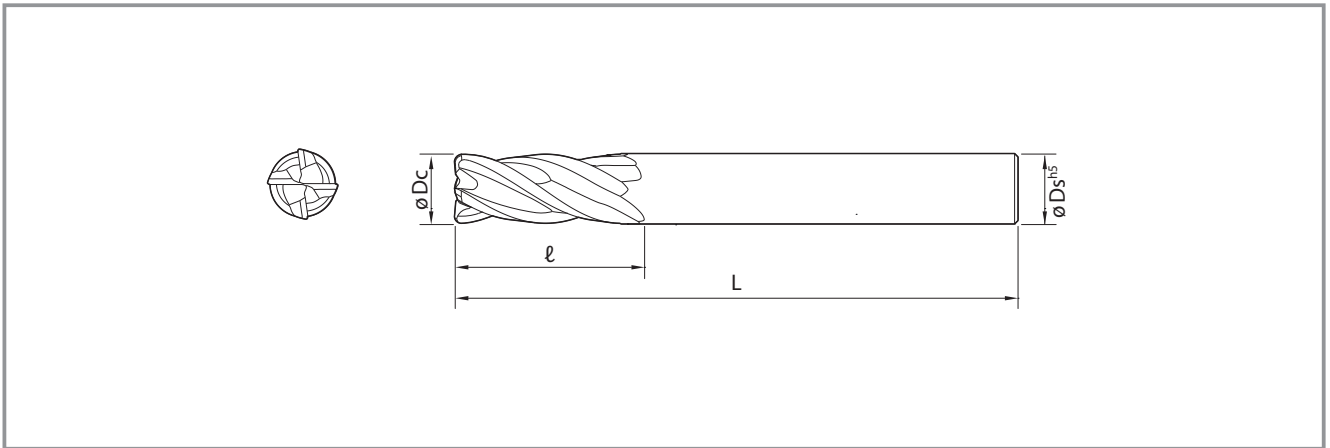


(Unit: mm)

Description	Availability	Outer diameter	Outer diameter tolerance	Corner R	Flute length	Shank diameter	Overall length	Number of flutes
		$\varnothing D_c$		r	ℓ	$\varnothing D_s$	L	Z
4JER060-090-R03	●	6.0	0 -0.020	0.3	9	6	60	4
4JER060-090-R05	●			0.5	9	6	60	4
4JER060-090-R10	●			1.0	9	6	60	4
4JER080-120-R03	●	8.0	-0.005 -0.025	0.3	12	8	70	4
4JER080-120-R05	●			0.5	12	8	70	4
4JER080-120-R10	●			1.0	12	8	70	4
4JER080-120-R15	●			1.5	12	8	70	4
4JER100-150-R03	●	10.0	-0.005 -0.025	0.3	15	10	80	4
4JER100-150-R05	●			0.5	15	10	80	4
4JER100-150-R10	●			1.0	15	10	80	4
4JER100-150-R15	●			1.5	15	10	80	4
4JER100-150-R20	●			2.0	15	10	80	4
4JER100-150-R30	●			3.0	15	10	80	4
4JER120-180-R05	●	12.0	-0.010 -0.030	0.5	18	12	100	4
4JER120-180-R10	●			1.0	18	12	100	4
4JER120-180-R15	●			1.5	18	12	100	4
4JER120-180-R20	●			2.0	18	12	100	4
4JER120-180-R30	●			3.0	18	12	100	4
4JER160-240-R10	●	16.0	-0.010 -0.030	1.0	24	16	110	4
4JER160-240-R20	●			2.0	24	16	110	4
4JER160-240-R30	●			3.0	24	16	110	4
4JER200-300-R10	●	20.0	-0.010 -0.030	1.0	30	20	125	4
4JER200-300-R20	●			2.0	30	20	125	4
4JER200-300-R30	●			3.0	30	20	125	4

● Available

End mills (Medium length of cut)

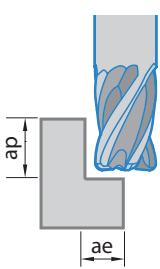
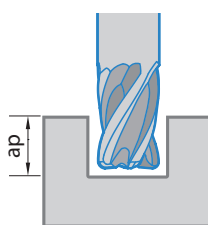


(Unit: mm)

Description	Availability	Outer diameter	Outer diameter tolerance	Corner R	Flute length	Shank diameter	Overall length	Number of flutes
		ø Dc		r	ℓ	ø Ds	L	Z
4JER060-150-R03	●	6.0	0 -0.020	0.3	15	6	60	4
4JER060-150-R05	●			0.5	15	6	60	4
4JER060-150-R10	●			1.0	15	6	60	4
4JER080-200-R03	●	8.0	-0.005 -0.025	0.3	20	8	70	4
4JER080-200-R05	●			0.5	20	8	70	4
4JER080-200-R10	●			1.0	20	8	70	4
4JER080-200-R15	●			1.5	20	8	70	4
4JER100-250-R03	●	10.0	-0.005 -0.025	0.3	25	10	80	4
4JER100-250-R05	●			0.5	25	10	80	4
4JER100-250-R10	●			1.0	25	10	80	4
4JER100-250-R15	●			1.5	25	10	80	4
4JER100-250-R20	●			2.0	25	10	80	4
4JER100-250-R30	●			3.0	25	10	80	4
4JER120-260-R05	●	12.0	-0.010 -0.030	0.5	26	12	100	4
4JER120-260-R10	●			1.0	26	12	100	4
4JER120-260-R15	●			1.5	26	12	100	4
4JER120-260-R20	●			2.0	26	12	100	4
4JER120-260-R30	●			3.0	26	12	100	4
4JER160-350-R10	●	16.0	-0.010 -0.030	1.0	35	16	110	4
4JER160-350-R20	●			2.0	35	16	110	4
4JER160-350-R30	●			3.0	35	16	110	4
4JER200-450-R10	●	20.0	-0.010 -0.030	1.0	45	20	125	4
4JER200-450-R20	●			2.0	45	20	125	4
4JER200-450-R30	●			3.0	45	20	125	4

● Available

Cutting conditions

Machining application	Workpiece material	Application	Depth of cut $ap \times ae$ (mm)	Outer diameter D_c (mm)	$\phi 6$	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 16$	$\phi 20$
 <p>Shouldering</p>  <p>Slotting</p>	Carbon steel / Cast iron	Shouldering	$1.5D_c \times 0.1D_c$	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	$D_c \leq \phi 12 : ap \leq 1.0D_c$ $D_c > \phi 12 : ap \leq 12$	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	Shouldering	$1.5D_c \times 0.1D_c$	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	$D_c \leq \phi 12 : ap \leq 1.0D_c$ $D_c > \phi 12 : ap \leq 12$	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	$1.5D_c \times 0.05D_c$	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	$ap \leq 0.5D_c$	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
Stainless steel	Shouldering	$1.5D_c \times 0.05D_c$	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	$ap \leq 0.5D_c$	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	$1.5D_c \times 0.1D_c$	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	$D_c \leq \phi 12 : ap \leq 1.0D_c$ $D_c > \phi 12 : ap \leq 12$	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	$1.5D_c \times 0.05D_c$	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	$ap \leq 0.5D_c$	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.