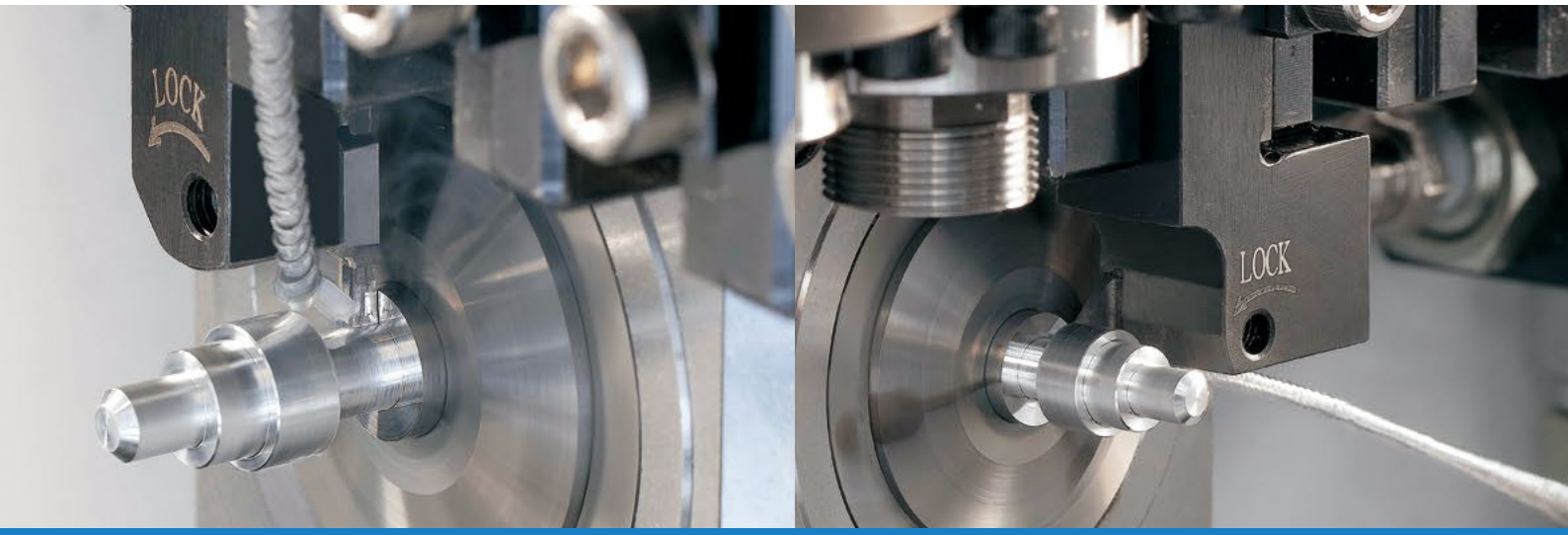
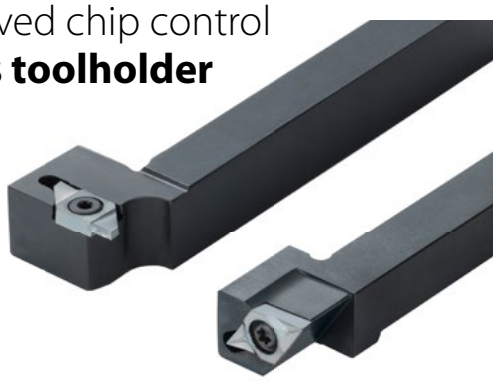
Aluminum alloy machining solutions

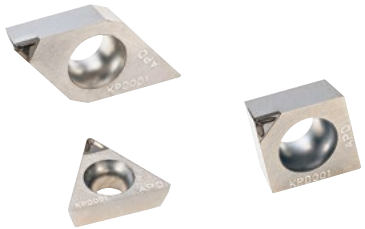


Solutions to improve productivity in aluminum alloy machining

Improved chip control
Y-axis toolholder



Molded PCD
APD chipbreaker



Molded PCD
AGT chipbreaker for KTKF holders

For small parts machining

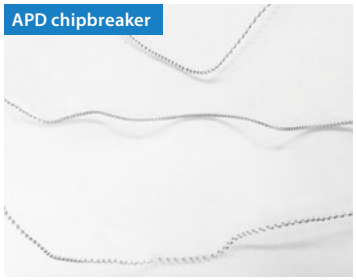
Aluminum alloy machining solutions

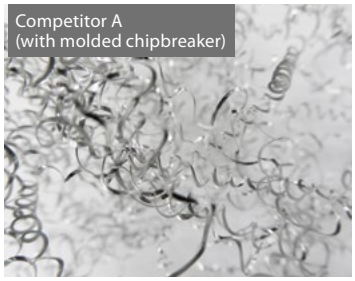
PCD chipbreaker for finishing, multifunctional PCD chipbreaker for grooving and traversing with good chip control, and Y-axis toolholders for excellent aluminum machining results

Superior chip control improves machining quality and productivity

Molded PCD APD chipbreaker

APD Chipbreaker shows good chip control from small to large D.O.C.





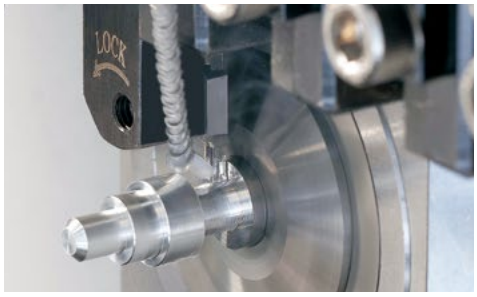
Improved chip control

Beautiful surface finish

High performance across a variety of machining applications

Molded PCD AGT chipbreaker
for KTKF holders

Unique chipbreaker design provides excellent chip control



Improved chip control

Multifunctional PCD chipbreaker for grooving and traversing

New toolholders maintain stable machining

Improved chip control Y-axis toolholder

Excellent chip evacuation with y-axis tuning prevents chip entanglement

Controls chip evacuation

Molded PCD chipbreaker

APD chipbreaker

Superior chip control when machining aluminum

1 Good chip control improves productivity

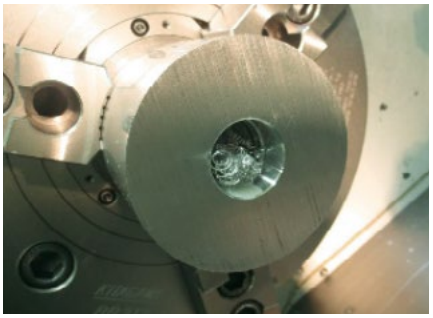
Improved chip control

Beautiful surface finish

Challenges

- ☑ **Chip clogging causes machining downtime**
- ☑ **Reduced part quality with cloudy finish**

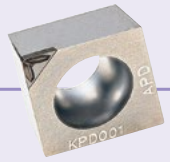
Long chips cause these problems



Chip clogging reduces surface finish quality

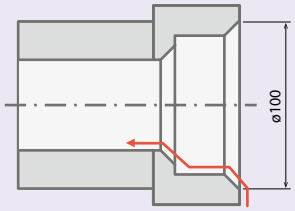
SOLUTION

Newly developed molded chipbreaker design
Improved chip control increases productivity

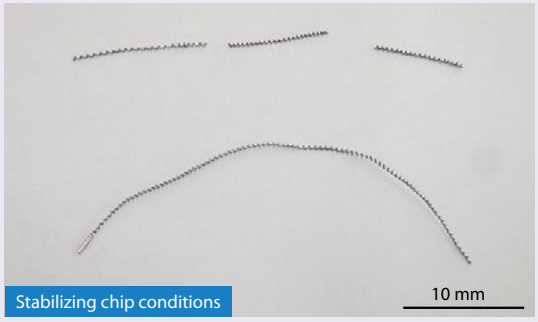


Head ADC12 (Die cast aluminum)

Cutting conditions : n = 2700min^{-1}, Vc = ~ 850 m/min, ap = 0.5 mm,
f = 0.10 mm/rev, CCMT09T304APD KPD001

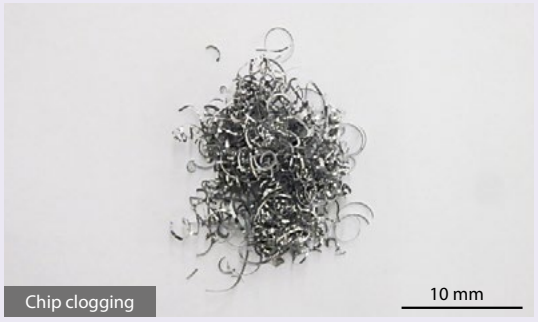


APD chipbreaker



Chips are evacuated smoothly
No chip clogging and long chips

Competitor B (without chipbreaker)



(User evaluation)

2 Newly designed molded chipbreaker controls chips

Chipbreaker features

Dot for large D.O.C.

Controls chips with step

Dot for medium D.O.C.

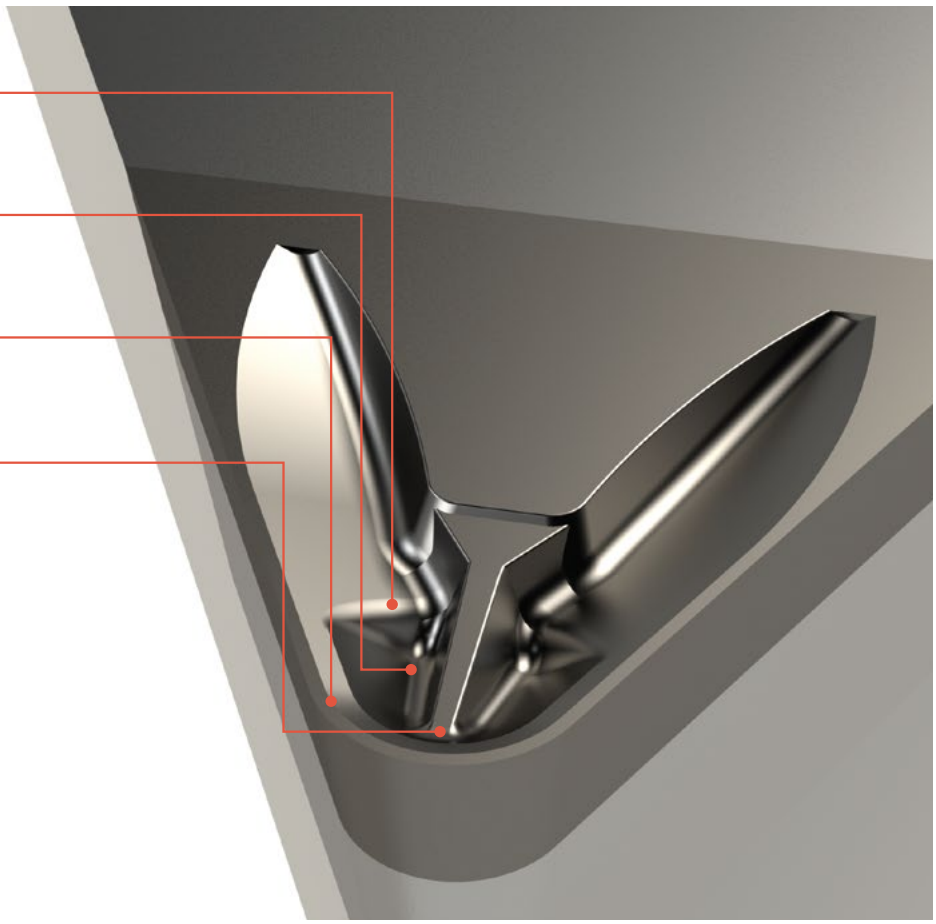
Controls chips with side of dot

Land for small D.O.C.

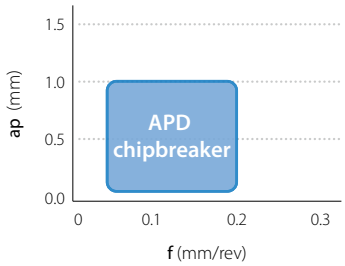
Good control of thin chips

Front edge dots

Stable chip control with a dot that protrudes to the corner



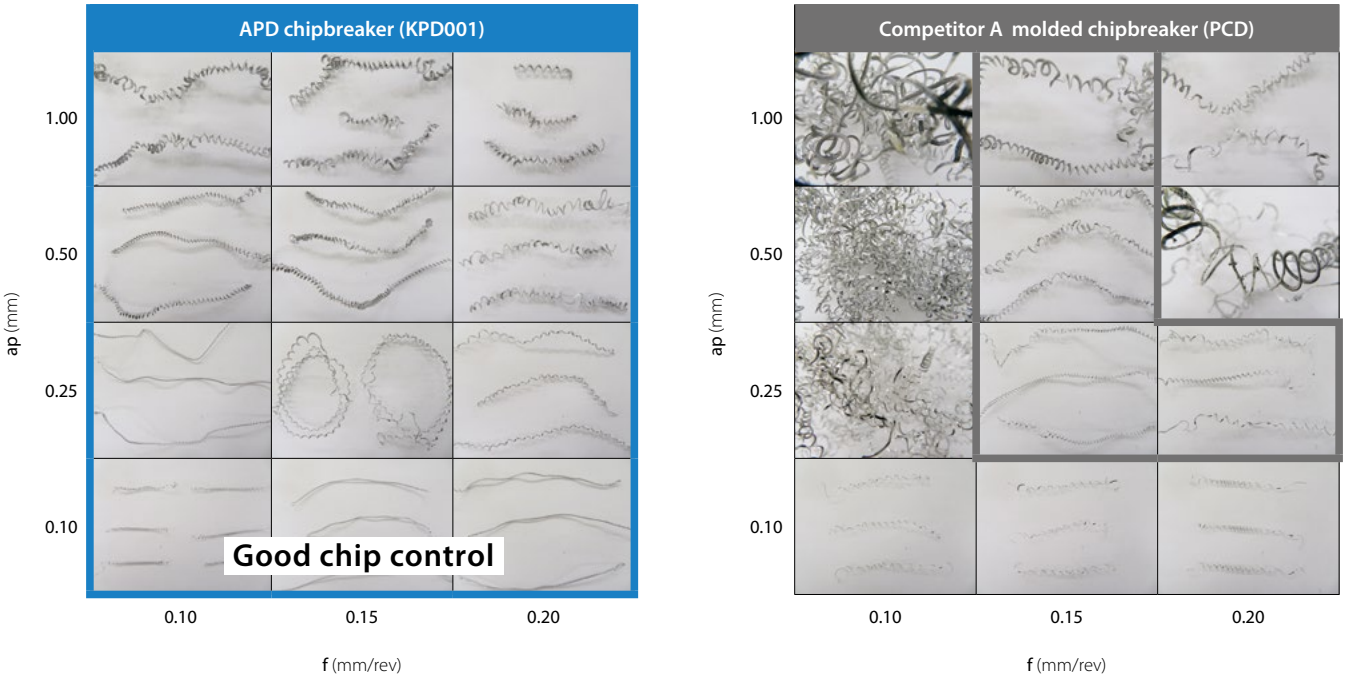
Chipbreaker map



Chip control comparison (internal evaluation)

APD chipbreaker showed stable machining of less than 1 mm D.O.C. under various cutting conditions.

Excellent chip control from small D.O.C. to large D.O.C.

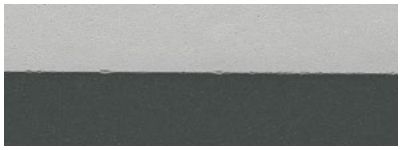


Cutting conditions : Vc = 500 m/min, ap = 0.1 - 1.0 mm, f = 0.10 - 0.20 mm/rev, continuous external turning , wet, Workpiece: Al-Mg2.5

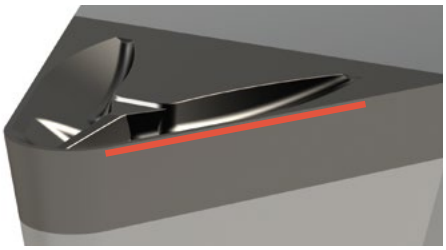
3 Excellent surface finish

APD chipbreaker with sharp edge showed better surface finish compared to competitor

APD chipbreaker (Indicated by red line on the right pic)

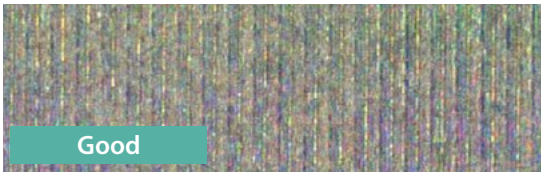


Competitor C

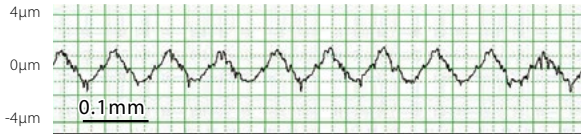


Surface finish comparison (internal evaluation)

APD chipbreaker (KPD001)

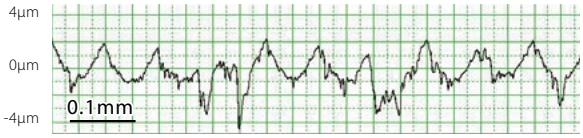


0.64μmRa



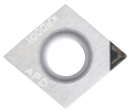
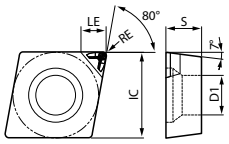
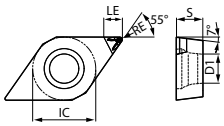
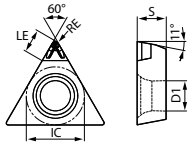
Competitor D Molded chipbreaker (PCD)

0.84μmRa



Cutting conditions : Vc = 450 m/min, ap = 0.25 mm, f = 0.10 mm/rev, continuous external turning , wet, workpiece : ADC12 (Die cast aluminum)

Inserts

Shape		Description		Dimensions (mm)					No. of cutting edge	KPD001
				IC	S	D	RE	LE		
		CCMT	09T302APD	9.525	3.97	4.4	0.2	2.7	1	●
			09T304APD				0.4	2.7		●
			09T308APD				0.8	2.7		●
		DCMT	11T302APD	9.525	3.97	4.4	0.2	2.7	1	●
			11T304APD				0.4	2.7		●
			11T308APD				0.8	2.7		●
		TPMT	110302APD	6.35	3.18	3.3	0.2	2.6	1	●
			110304APD				0.4	2.5		●
			110308APD				0.8	2.5		●

● : Available

Recommended cutting conditions

Workpiece		PCD KPD001	Notes
Aluminum Alloy	Vc: m/min	300 ~ 1,500	Wet
	ap(mm)	~ 1.0	
	fz(mm/t)	0.05 ~ 0.20	
Brass	Vc: m/min	300 ~ 1,500	
	ap(mm)	~ 1.0	
	fz(mm/t)	0.05 ~ 0.20	

Molded PCD Chipbreaker for KTKF holders

AGT chipbreaker

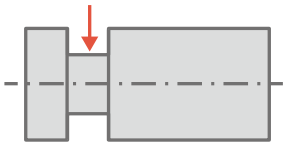
Improved chip control for various aluminum alloy machining applications

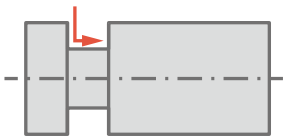
Improved chip control

Multifunctional PCD chipbreaker for grooving and traversing

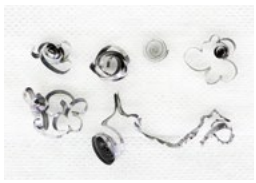
1 Stable machining for a wide range of applications

Chip control and surface finish comparison with grooving and traversing



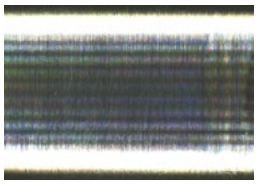
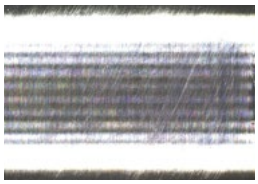


Chip control comparison (grooving)

TKF-AGT	Competitor E
	

Cutting conditions: Vc = 250 m/min, ap = 2.0 mm, wet, workpiece : Al-Mg1SiCu

Surface finish comparison (traversing)

TKF-AGT	Competitor E
	

Cutting conditions: Vc = 250 m/min, ap = 0.5 mm, wet, workpiece: Al-Mg1SiCu

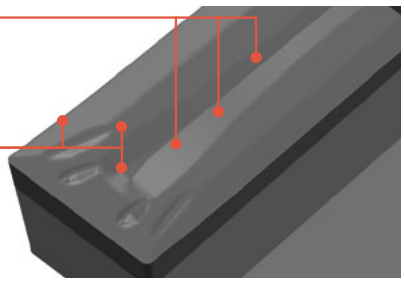
AGT Chipbreaker showed better chip control when grooving compared to competitor.
It also showed superior surface finish with less scratching when traversing.

2 Unique chipbreaker provides excellent chip control

Dots

Traversing
Reduces chip clogging by adjusting the width of the chipbreaker to the D.O.C.
Dots around cutting edge for small D.O.C.

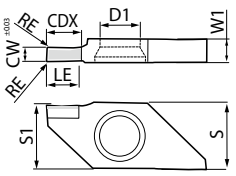
Grooving
Stable machining with three chipbreaker dots



Sloped cutting edge

Reduces chattering with low cutting force design
Good surface finish with excellent chip evacuation

Inserts

Shape		Description		Dimensions (mm)								Angle	No. of cutting edge	KPD001
				CW	CDX	RE	W1	S	S1	D1	LE	PSIRR		
		TKF12R	200-AGT	2.0	4.8	+0 −0.05 0.1	3.0	8.7	8.3	5.0	4.2	0°	1	●
			250-AGT	2.5	4.8	+0 −0.05 0.1	3.0	8.7	8.3	5.0	4.2	0°	1	●

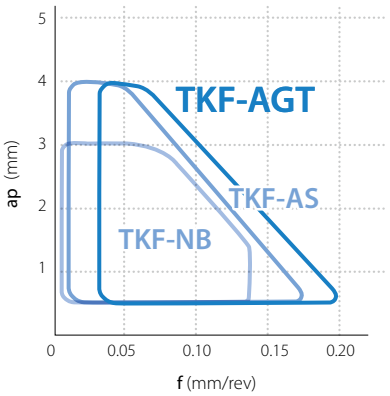
● : Available

Recommended cutting conditions

Workpiece		PCD	
		KPD001	
		Grooving	Traversing
Aluminum alloy	Vc: m/min	200 ~ 500	
	fz (mm/t)	0.03 ~ 0.15	0.03 ~ 0.20
Brass	Vc: m/min	100 ~ 350	
	fz (mm/t)	0.03 ~ 0.15	0.03 ~ 0.20

PCD inserts are for traversing and grooving applications.
When using in cut-off machining, maximum cut-off diameter is ø8. Set the feed rate less than 0.08mm/rev.
Cutting with coolant is recommended.

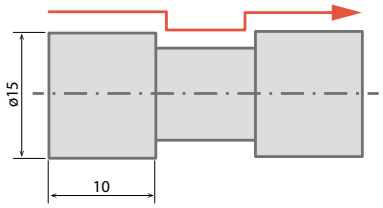
Chipbreaker map



Case studies

Spool valve Al-Mg1SiCu

n = 6,500 min^{-1}
ap = 2.0 mm (Grooving), 0.15 mm / 2.0 mm (Traversing)
f = 0.1 mm / rev, Wet



Chip control improved

TKF-AGT

Traversing (ap=0.15mm) | Traversing (ap=2.0mm) | Grooving

Good chip control without chip clogging

Conventional A

Traversing (ap=0.15mm) | Traversing (ap=2.0mm) | Grooving

Chip clogging occurred

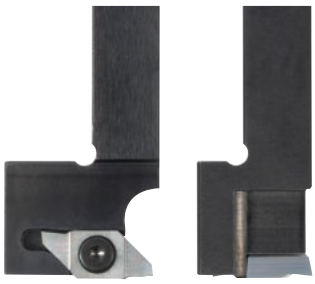
(User evaluation)

Improved chip control

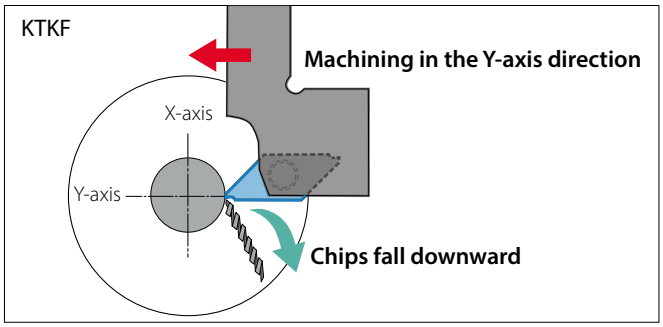
Y-axis toolholder

New special shape toolholder for small parts machining

Controls chip evacuation



1 Controlled chip evacuation for stable machining



The Y-axis machining direction allows the chips to fall down and away from the workpiece, improving chip evacuation.

2 KTKF grooving and cut-off system and external turning holders

KTKF

Back turning, threading and cut-off

KTKFR1216JX-12-Y : Shank 1216 type
KTKFR1616JX-12-Y : Shank 1616 type
Applicable inserts: TKF12R…

For more details, see Kyocera Y-axis Toolholder catalog.

External turning

Front turning

SDJCR1212JX-11FF-Y: Shank 1212 type
SDJCR1616JX-11FF-Y: Shank 1616 type
Applicable inserts : DC□□11T3…

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