

Super Fine Pitch Cutter for Aluminum Machining

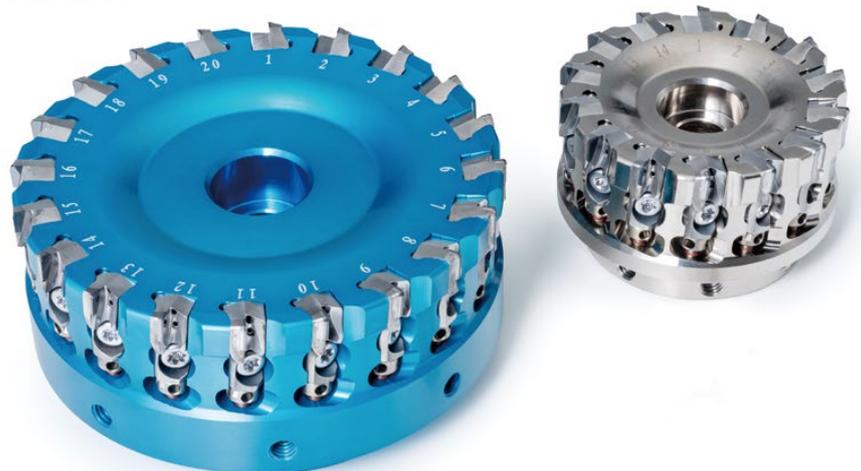
**MD90****NEW****High efficiency and premium quality aluminum machining**

Improved machining efficiency with fine pitch cutter

Excellent machining quality with unique PCD inserts

Lightweight design compatible with BT30

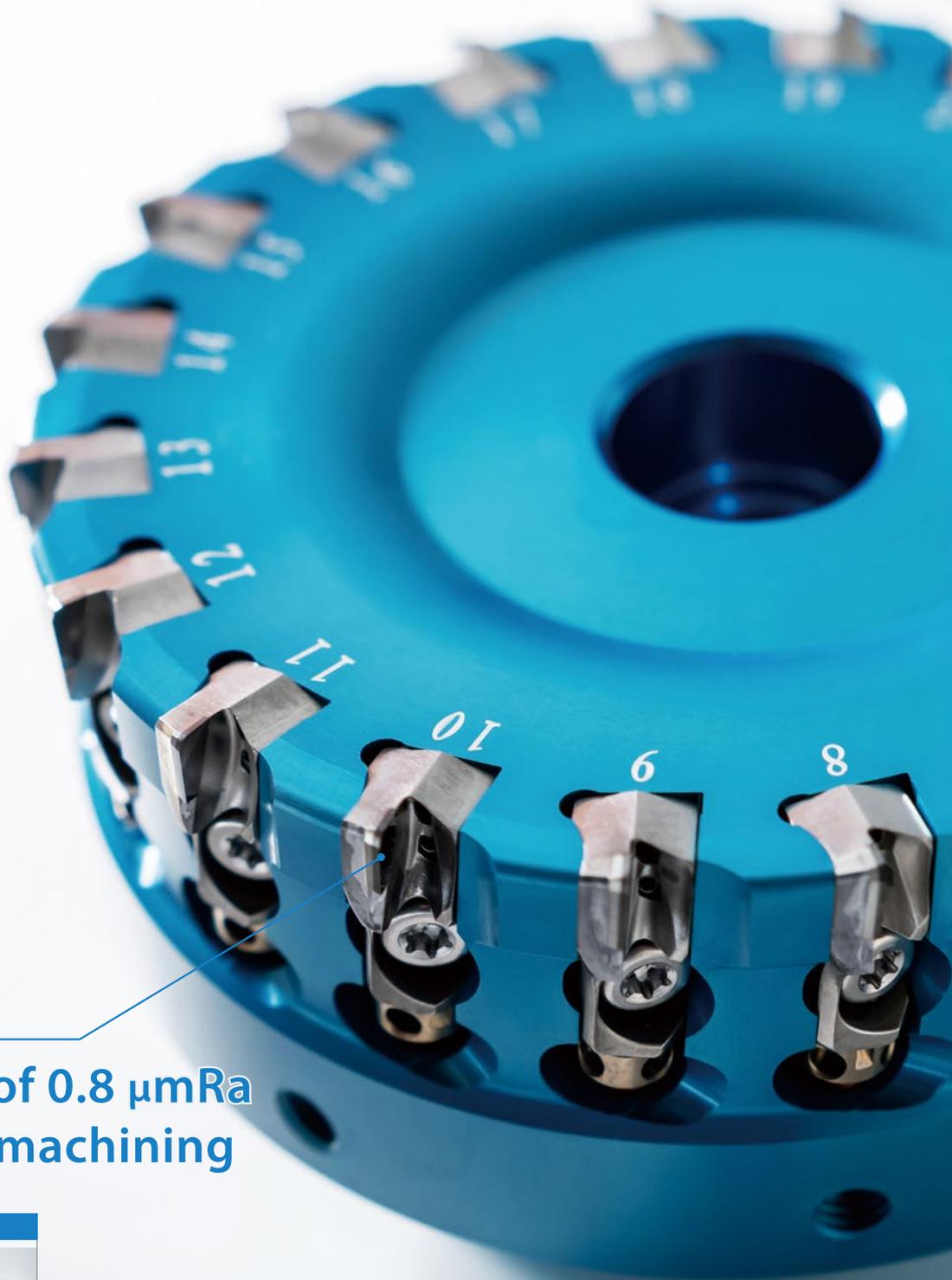
Custom-designed options also available



Super Fine Pitch Cutter for Aluminum Machining

# MD90

Improved machining efficiency of aluminum parts with super fine pitch specifications  
Unique design provides high quality and high precision results with long tool life



**High quality**

**Surface finish of  $0.8 \mu\text{mRa}$  or less. Stable machining**

Minimized burr



No chatter



$V_c = 2,500 \text{ m/min}$  ( $n = 8,000 \text{ min}^{-1}$ ),  $a_p \times a_e = 0.2 \times 75 \text{ mm}$ ,  $f_z = 0.08 \text{ mm/t}$  ( $V_f = 12,800 \text{ mm/min}$ ) Wet ADC12 BT50  $\phi 100$  (20 inserts)  
(Internal evaluation)

# Engineered to perfection

A new generation of super fine pitch cutters combine multiple aspects of Kyocera's leading milling technology

Machine aluminum with higher speeds and higher quality with PCD inserts



## High efficiency

### Capable of $V_f \geq 24,000$ mm/min

High-efficiency machining achieved with an ultra-fine pitch design  
Custom designed options allow for further efficiency improvements

#### Machining efficiency comparison (Internal evaluation)

**MD90**  
18 inserts (Custom Designs)

**$V_f = 26,800$  mm/min**

Efficiency  
↑  
1.2x

Competitor A  
14 inserts

**$V_f = 21,000$  mm/min**

$V_c = 2,500$  m/min ( $n = 10,000$  min<sup>-1</sup>),  $a_p \times a_e = 0.2 \times 53$  mm,  $f_z = 0.15$  mm/t Wet ADC12 BT30  $\varnothing 80$

## Lightweight

### Compatible with BT30

Offering lightweight aluminum body sizes from  $\varnothing 80$  mm  
Largest cutter dia. of  $\varnothing 125$  mm weighs less than 1.5 kg

# 1 Unique design provides high efficiency and high quality machining results

## High efficiency The shape of the cutter maintains super fine pitch specifications



**Curved contact surface**  
 Maximized pitch maintains multiple inserts and rigidity  
 Reduces chattering by dispersing stress

**Chatter resistance comparison**  
 (Internal evaluation)

<b>MD90 (16 inserts)</b>	Competitor A (14 inserts)

$V_c = 3,000 \text{ m/min}$ ,  $a_p \times a_e = 0.2 \times 70 \text{ mm}$   
 $f_z = 0.07 \text{ mm/t}$  Wet ADC12  $\phi 80$  (Prototype)

**Scatter prevention**  
 Firm insert hold

### Ultra fine pitch with lightweight design

Largest cutter dia. of  $\phi 125 \text{ mm}$  weighs less than 1.5kg. Compatible with BT30

Cutting Dia.	No. of Inserts	Weight (kg)	Body
$\phi 40$	6	0.26	Steel
$\phi 50$	10	0.37	
$\phi 63$	14	0.62	
$\phi 80$	16	0.6	Aluminum
$\phi 100$	20	0.96	
<b><math>\phi 125</math></b>	<b>24</b>	<b>1.48</b>	

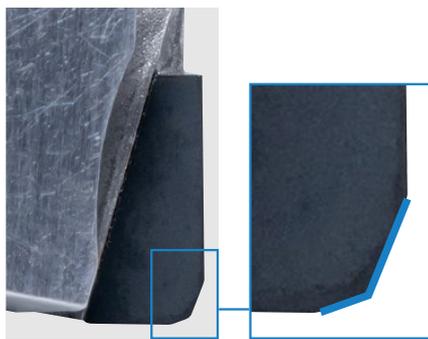
Metric Bore Dia.

## High quality High machined surface quality, high precision and long tool life

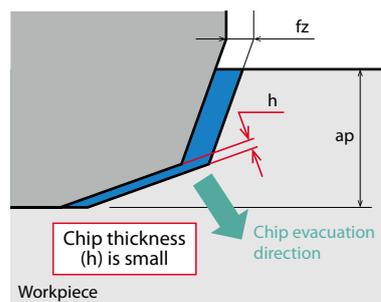
### Suppresses burr formation

#### Double-edge (Standard type)

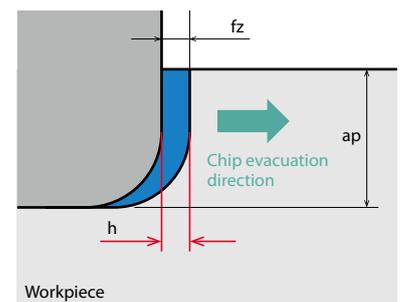
Controls the chip evacuation direction and suppresses distortion caused by chip separation



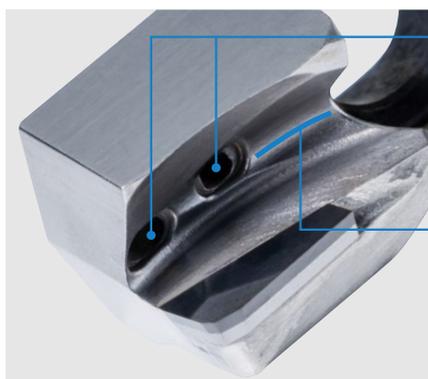
#### Double-edge



#### Corner R



### Achieves stable machining



#### Double coolant holes

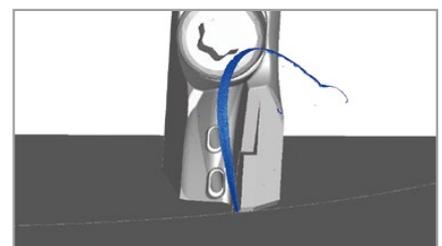
Effective cooling of cutting edge and workpiece to achieve superior surface finishes  
 Suppresses chip biting and insert defects

#### Streamlined chip pocket

Good chip control protects cutter body  
 Stable cutter balance delivers high-precision machining and longer tool life

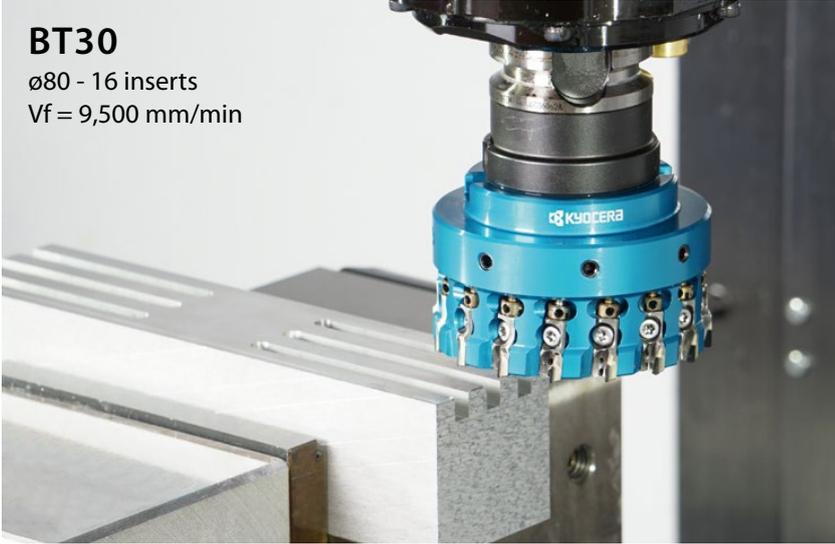
#### Chip evacuation simulation

Evacuate chips along the pocket



Image

**Performance** Achieve high-efficiency and high-quality machining with ultra-fine pitch specifications



**BT30**  
 ø80 - 16 inserts  
 Vf = 9,500 mm/min

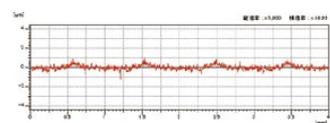
n = 9,900 min<sup>-1</sup> (Vc = 2,500 m/min)  
 Vf = 9,500 mm/min (fz = 0.06 mm/t)  
 ap x ae = 0.3 x 50 mm  
 ADC12 Wet ø80  
 MD90-080RA-T16CSF  
 LNGX1807PDFR-G (KPD01A)  
 (Internal evaluation)

**Surface finish evaluation**

Suppresses burr formation and edge chipping



Excellent surface finish

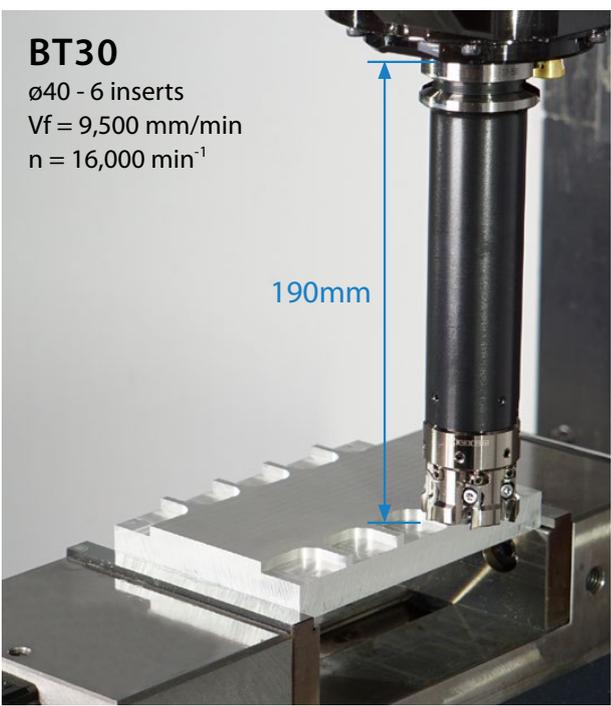


**Machining efficiency comparison** (Internal evaluation)

**MD90** (16 inserts) **Vf = 9,500mm/min** ↑ Efficiency  
**Competitor A** (14 inserts) **Vf = 8,300mm/min**

Since the MD90 has a high number of cutting edges, table feed (Vf) can be improved. Efficiency can be improved while maintaining the same machining quality as competitor.

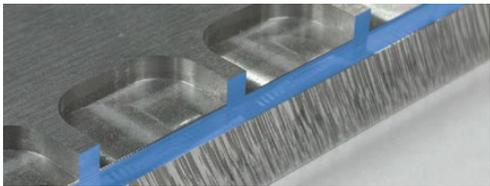
**Performance** Achieves stable machining even with a long overhang



**BT30**  
 ø40 - 6 inserts  
 Vf = 9,500 mm/min  
 n = 16,000 min<sup>-1</sup>

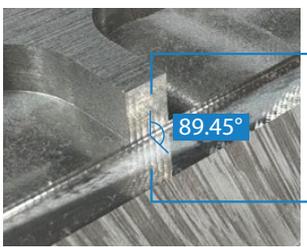
190mm

n = 16,000 min<sup>-1</sup> (Vc = 2,000 m/min)  
 Vf = 9,500 mm/min (fz = 0.1 mm/t)  
 ap x ae = 5 x 5 mm ADC12 Wet ø40 (6 inserts)  
 MD90-040RS-T6CMSF  
 LNGX180704PDFR-RR (KPD01A)  
 (Internal evaluation)

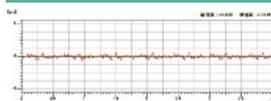
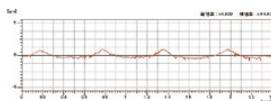


**Surface finish evaluation**

Wall surface : 0.32µmRa



Bottom : 0.18µmRa



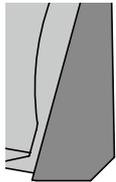
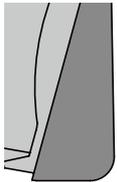
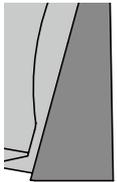
## Custom Designs

### For various machining applications

We can make your custom design needs a reality across a variety of applications.

Please contact our sales representatives for details.

#### Examples

Cutting Dia.	ø20 ~ ø350		
No. of Inserts	Depends on cutting diameter		
Cutting edge shape	Corner chamfer	Corner R	Sharp corner
			



## Regrinding

### Standard amount of regrinding

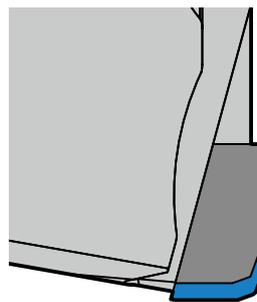
Front face only : 0.1 mm (up to 5 times)

Entire circumference : 0.1 mm (up to 3 times)

The above is for reference only.

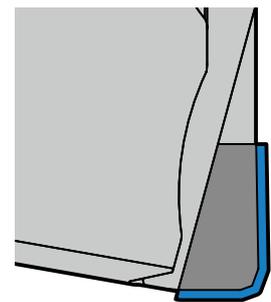
Please contact our sales representatives for details.

Front face only



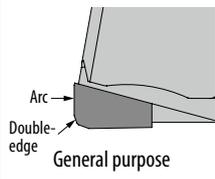
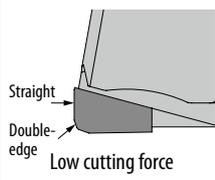
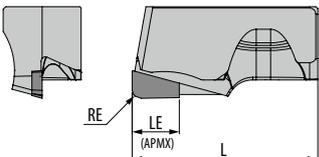
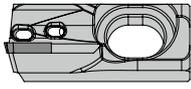
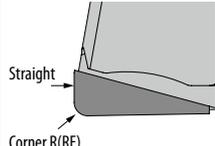
Regrinding part

Entire circumference



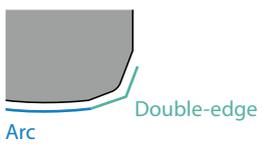
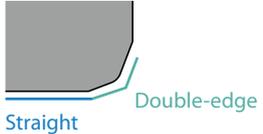
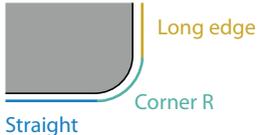
Regrinding part

# Insert

Shape		Description	Dimension (mm)			PCD	
			L	RE	LE (APMX)	KPD01A	
Standard	 <p>Arc Double-edge General purpose</p>	 <p>Straight Double-edge Low cutting force</p>		18.1	-	4	●
							0.4
Long edge	 <p>Straight Corner R(RE)</p>				0.8	●	
						●	

The dimension indicated for LE (APMX) is brand new. Please note that it may change after regrinding.

● : Available

Type	Shape	Features and applications
G	 <p>Arc Double-edge</p>	<p>1st recommendation</p> <p>Suppresses burrs and ensures high-quality surface finish</p> <p>Achieves longer tool life and stable machining</p>
L	 <p>Straight Double-edge</p>	<p>Low cutting force with straight wiper edge</p> <p>Provides suitable results even with lower rigidity workpieces or clamping power</p>
RR	 <p>Long edge Corner R</p>	<p>Corner Radius (R)</p> <p>Suitable for machining with larger D.O.C and heavy loads</p>

Polycrystalline Diamond Average particle size : 1 μm

**KPD01A** Achieves both wear resistance and chipping resistance required for machining with ultra-fine pitch tools  
Stable, high-efficiency machining is possible

## MD90 (Steel body)

\*Please refer to page 6 about APMX.

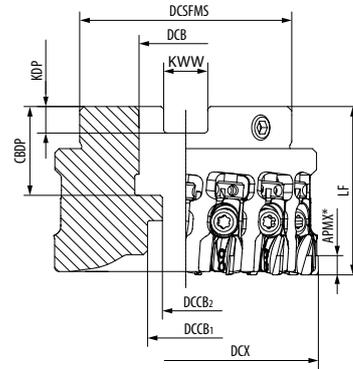


Fig.1

### Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)										Rake angle	Coolant hole	Shape	Weight (kg)	Max. Revolution (min <sup>-1</sup> )	Arbor bolt (Attachment)
			DCX	DCSFMS	DCB	DCCB <sub>1</sub>	DCCB <sub>2</sub>	LF	CBDP	KDP	KWW	A.R.						
Metric Bore Dia. MD90- 040RS-T6CMSF	●	6	40	38.5	16	13.5	9		19	5.6	8.4	+5°	Yes	Fig.1	0.26	25,000	HH8X25H	
	●	10	50	48.5	22	18	11	40	21	6.3	10.4				0.37		HH10X30H	
	●	14	63	50											0.62			

#### Maximum number of revolutions

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece.

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

● : Available

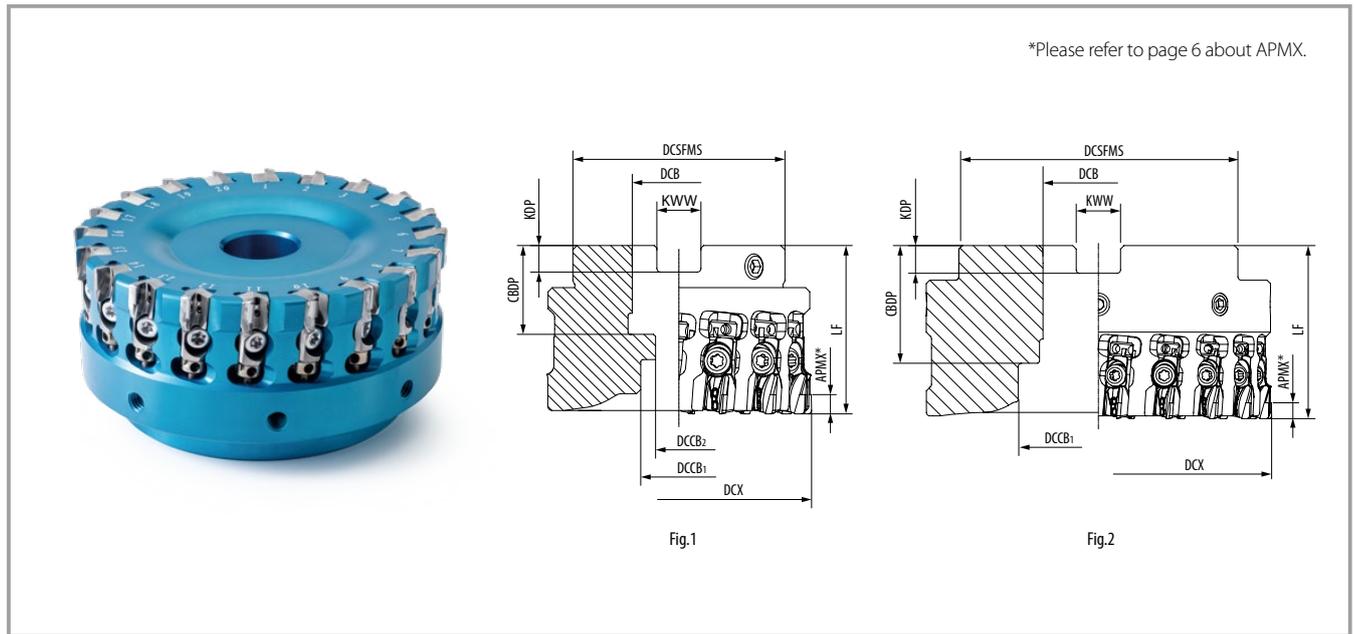
### Recommended cutting conditions

Workpiece	Property	Cutting speed Vc (m/min)	Feed fz (mm/t)	Recommended grade
Aluminum alloy	Si ratio 12.5% or below	1,000 - <b>2,000</b> - 3,000	0.05 - <b>0.10</b> - 0.20	KPD01A
	Si ratio 12.5% or above	400 - <b>600</b> - 800	0.05 - <b>0.10</b> - 0.20	

Please adjust cutting speed and feed rate according to actual machining conditions taking into account machine and workpiece rigidity

Do not use the cutter at speeds exceeding the maximum cutting speed limit

# MD90 (Aluminum body)



## Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)									Rake angle A.R.	Coolant hole	Shape	Weight (kg)	Max. Revolution (min <sup>-1</sup> )	Arbor bolt (Attachment)	
			DCX	DCSFMS	DCB	DCCB <sub>1</sub>	DCCB <sub>2</sub>	LF	CBDP	KDP	KWW							
Metric Bore Dia.	MD90-080RA-T16CMSF	●	16	80	60	27	20	13	50	24	7	12.4	+5°	Yes	Fig.1	0.6	20,000	HH12X35H
	100RA-T20C27MSF	●	20	100	80											30		
	100RA-T20CMSF	●	24	125		32	45	-	55	24	7	12.4			Fig.2		0.88	16,000
	125RA-T24C27MSF	●				27	20	13							33	9	16.4	
	125RA-T24CMSF	●	40	55	-	38	10	15.9	Fig.2	1.31	16,000	HF20X53HA						
Inch Bore Dia.	MD90-080RA-T16CSF	●	16	80	60								25.4	20	13	50	27	6
	100RA-T20C254SF	●	20	100	80	34	8	12.7	0.97	18,000	HF16X40HA							
	100RA-T20CSF	●	24	125								31.75	45	-	55	27	6	9.5
	125RA-T24C254SF	●				25.4	20	13	38	10	15.9	Fig.1	1.49	HF20X53HA				
	125RA-T24CSF	●	38.1	55	-	38	10	15.9							Fig.2	1.34	16,000	HF20X53HA

Custom sizes of ø125 and above are also available (~ø350).

● : Available

### Maximum number of revolutions

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece.

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

### Spare parts

Clamp screw	Wrench	Adjust screw	Adjust wrench
BH4X8TR	TTW-15	AJ-3110	LW-2
Torque for insert clamp 3.5 N·m		-	-

## How to install inserts

**1** Mount an Insert



**2** Partially tighten



Torque : 1.0 N·m

**3** Adjust insert runout



Insert runout 5 µm or less

**4** Fully tighten



Torque : 3.5 N·m

**1** Mount inserts into all pockets

**2** Partially tighten the clamp screw (Recommended torque 1.0 N·m)

**3** Turn the screw with the wrench to adjust and make sure that all screw heights are within 5 µm of each other (Recommended)

**4** Fully tighten the clamp screw with tightening torque 3.5 N·m

## Precautions

### While in use



#### Caution

Please use within recommended cutting conditions

Do not run the cutter at revolutions exceeding the printed maximum revolution limit of the cutter body

Inserts or parts may scatter due to the centrifugal force and cutting load

Confirm the total weight of the cutter and the arbor is within the machine's acceptable range

Please do not use under the following conditions:

- When cutter is not fully loaded with inserts
- If the body and/or clamp is damaged
- If a clamp or clamp screw is removed
- If inserts that have different regrind amounts are mounted

Please wear protective equipment such as protective glove when changing inserts or adjusting edge fluctuation

Injury can occur when touching the cutting edge

### Dynamic balance

Balance adjustment on the cutter is completed before shipping

Balance adjustment has been made with special high precision inserts to be ISO balance grade (ISO1940/1) G2.5

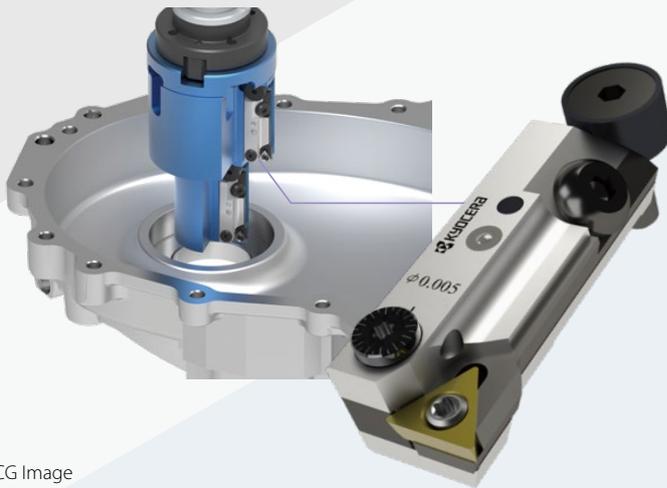
Recommended cutting conditions at Max. revolution

Do not operate the balance adjustment screw at the outer periphery of cutter

This could lead to improper dynamic balance



## Kyocera's solutions for EV parts machining

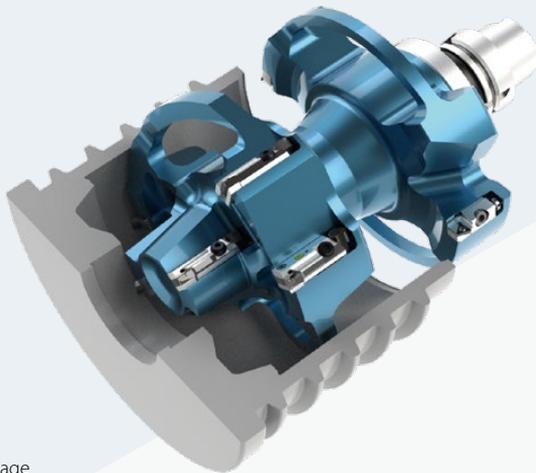


CG Image

### High-rigidity fine-tuning unit K-Bore

New adjustable cartridge design

- Simple, high-precision, fine-tuning system
- Smooth operation
- Rectangular cartridge for higher rigidity



CG Image

### High efficiency finishing bore cutter

Machining motor cases and motor housings with high precision and efficiency

- Multi-flute, high-efficiency design
- Weight reduction through body design optimization
- Flutes are optimized for chip flow

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