

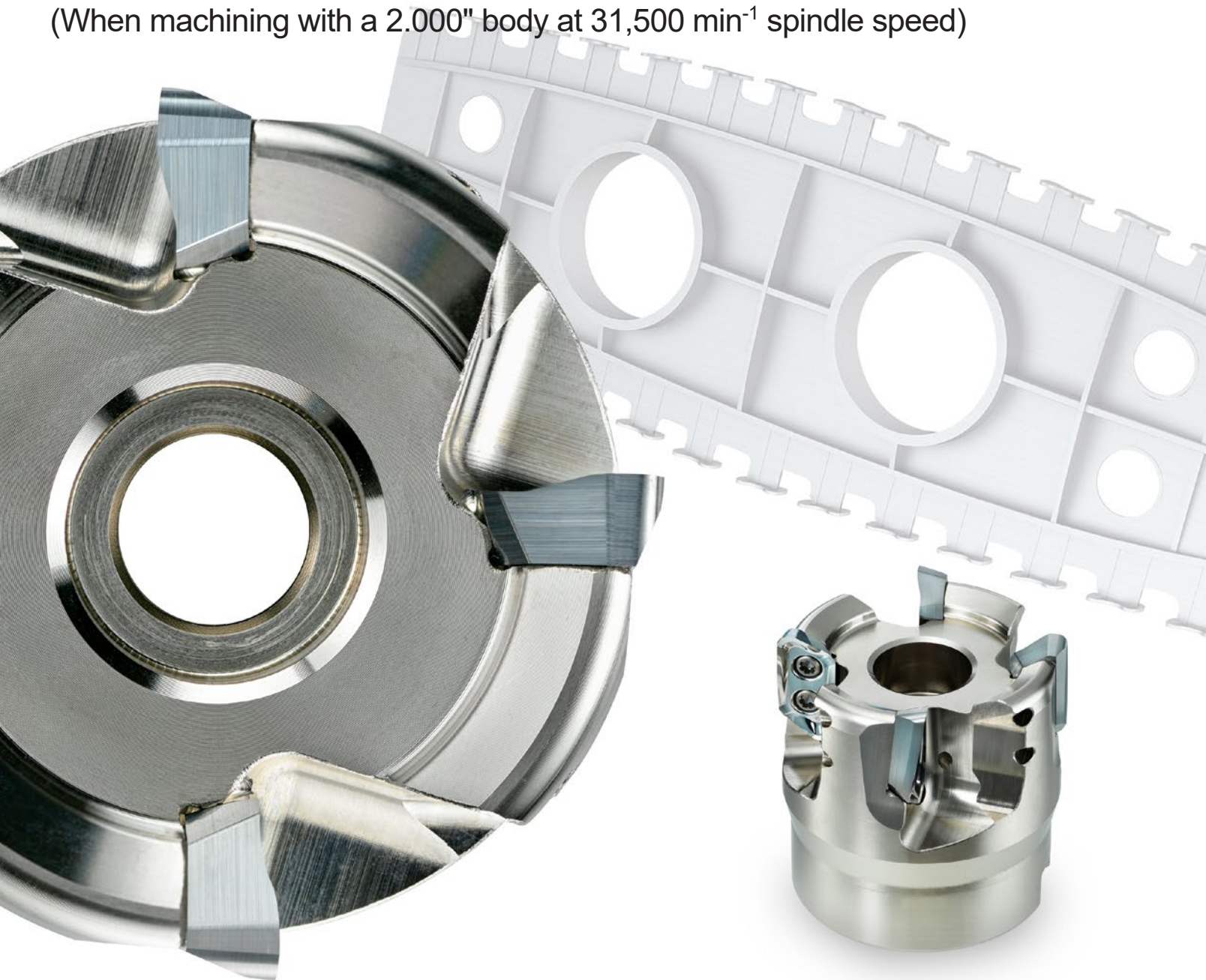
For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

AXD4000A

New
Products

16,500 SFM Cutting Speed Capability
M.R.R (Metal Removal Rate) up to 600in³/min

(When machining with a 2.000" body at 31,500 min⁻¹ spindle speed)



For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

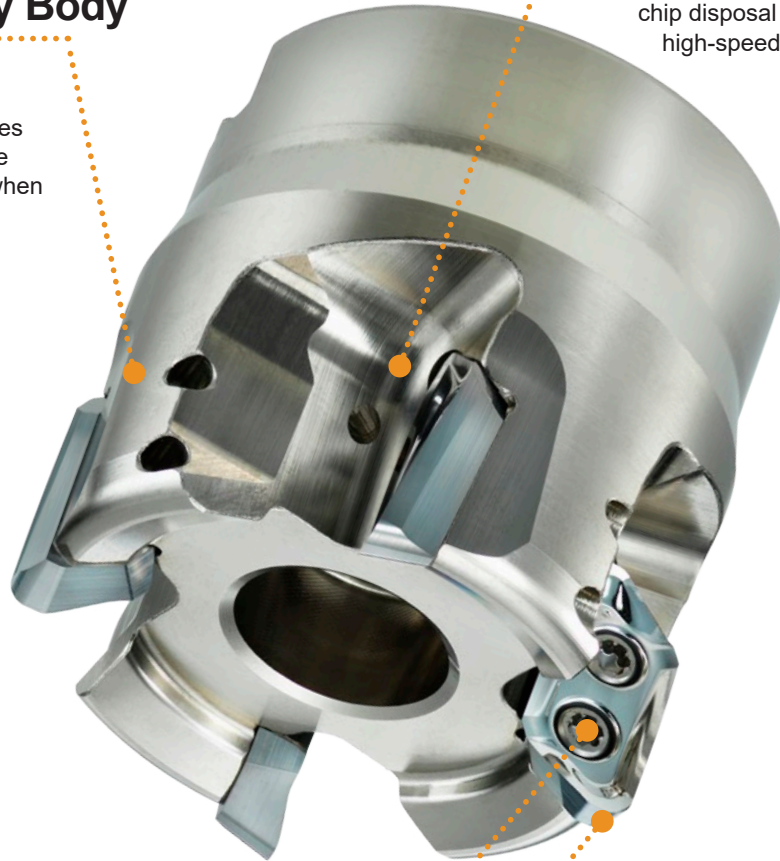
AXD4000A

High Rigidity Body

High rigidity body with modified insert seat withstands high stresses caused by cutting force and centrifugal force when performing high speed machining.

Optimal Designed Chip Pocket

Chip pocket specifically designed for optimal chip disposal during high-speed and ultra-high-speed machining operations.



High Reliability

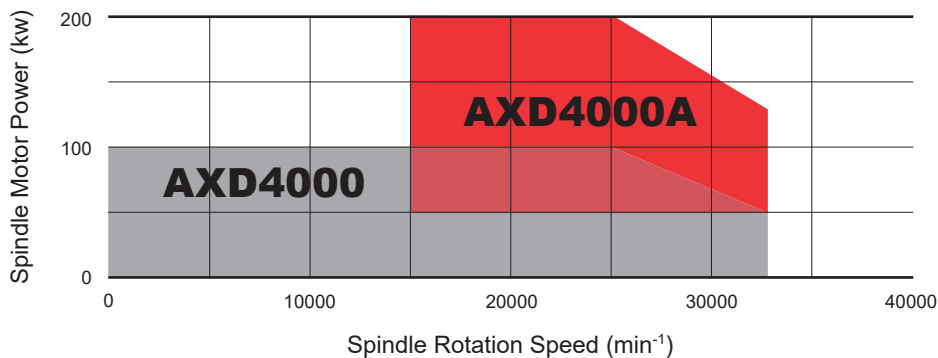
Improved anti-fly screw design ensures 100% contact with insert hole and 2x torque specifications compared to AXD4000 to ensure tightness and prevent loosening of screw during continuous high-speed machining operations.

Stable Machining

Standard and proven AXD4000 insert with sharp edge and tough carbide grade effectuates lower cutting force and substantial fracture resistance.

How to Choose AXD4000A or AXD4000

AXD4000A is specifically engineered for continuous high-speed and ultra-high-speed machining of aluminum alloys, especially over 80kW motor power.



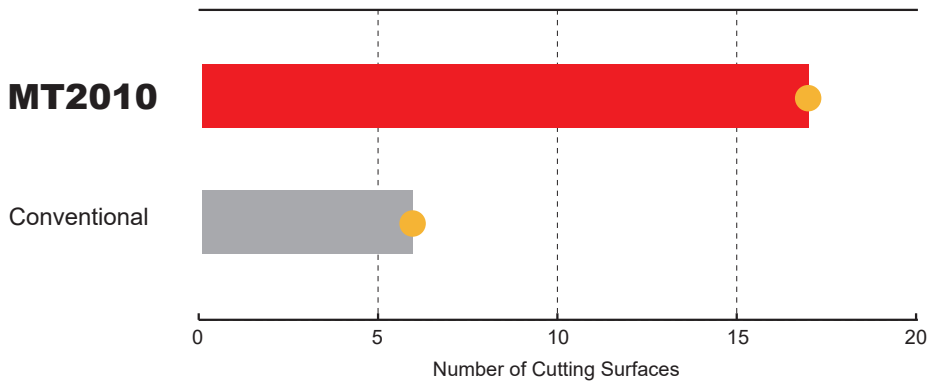
Cemented Carbide for High-speed Processing of Extra Super Duralumin and Aluminum / Lithium alloy

MT2010 NEW

High-grade cemented carbide grade suitable for ultra-high speed machining at cutting speeds up to 16,500 SFM combined with excellent wear-resistance and toughness.

Cutting Performance

Al-Li Alloy : Comparison of Wear Resistance



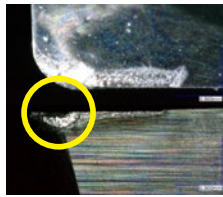
Photographed after 17-side machining.



MT2010

Can be used continuously.

Photographed after 6-side machining.



Conventional

Fractured from wear.

<Cutting Conditions>

Workpiece : Al-Li Alloy
 Material : AXD4000A-050A04RD
 Tool : XDGX175004PDFR-GM
 Inserts (Grade): MT2010
 Cutting Speed : vc=17000 SFM
 Feed per Tooth: fz= .006 IPT
 Depth of Cut : ap= .059 inch
 Width of Cut : ae= 1.535 inch
 Cutting Mode : Wet Cutting
 Single Insert

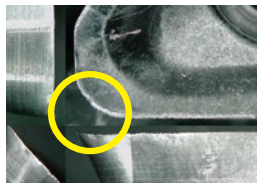
A7050 : Comparison of Fracture Resistance

After machining 90 seconds.



MT2010

Can be used continuously.



Conventional

Chipping occurred.

<Cutting Conditions>

Workpiece : A7050
 Material : AXD4000A-050A04RD
 Tool : XDGX175004PDFR-GM
 Inserts (Grade): MT2010
 Cutting Speed : vc=17000 SFM
 Feed per Tooth: fz= .008 IPT
 Depth of Cut : ap= .197 inch
 Width of Cut : ae= 1.969 inch
 Cutting Mode : Wet Cutting

For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

MULTI FUNCTIONAL MILLING

<ALUMINUM ALLOY MATERIAL CUTTING>



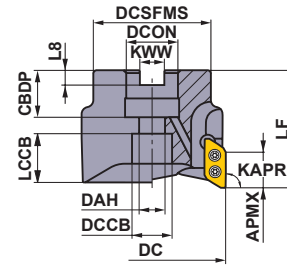
AXD4000A

NEW

P M K **N** S H



ø2.000"



Right hand tool holder only.

(inch)

DC	Set Bolt	Geometry
ø2.000"	HSCU37513H	

Arbor Type

KAPR : 90°

GAMP: +10° GAMF: +21°

DCON=inch size, With Coolant Hole

(inch)

DC	Type	Insert Corner Radius RE	Order Number	Stock	* No.T	LF	DCON	WT (kg)	APMX	RPMX (min ⁻¹)	Insert Type
											R
2.000	D	.016-.126	AXD4000AUR2.0004AAD	●	4	2.000	.750	.9	.610	34000	XDGX1750
2.000	E	.157-.197	AXD4000AUR2.0004AAE	●	4	2.000	.750	.9	.583	34000	XDGX1750

* Number of Teeth

Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.

RPMX (max. rev/min) for holders must also be considered.

Note 2) Tool should be set with balancing quality of G6.3 (ISO1940) or ISO16084, in case over 6000 min⁻¹ spindle rotation.

Note 3) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.

Note 4) Note for inserts with a corner radius of .063 and above, as corner radius increases the LF dimensions decrease.

Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
2.000	AXD4000AUR2.0004AAD	.750	.748	.413	.630	.560	1.750	.313	.187
2.000	AXD4000AUR2.0004AAE	.750	.748	.413	.630	.527	1.750	.313	.187

Spare Parts

	*		
Clamp Screw		Wrench	Anti-seize Lubricant
TPS3SB		TIP10D	MK1KS

* Clamp Torque (lbf-in) : TPS3SB = 26.6

Note 1) Clamp screw and wrench of AXD4000A are different from AXD4000.

Dimensions and Symbols (ISO 13399 Compliance)

DC = Cutting Diameter

LF = Functional Length

DCON = Connection Diameter

WT = Weight of Item

APMX = Depth of Cut Max.

RPMX = Rotational Speed Max.

CBDP = Connection Bore Depth

DAH = Diameter Access Hole

DCCB = Counterbore Diameter Connection Bore

LCCB = Counterbore Depth Connection Bore

DCSFMS = Contact Surface Diameter Machine Side

KWW = Keyway Width

MULTI FUNCTIONAL MILLING

<ALUMINUM ALLOY MATERIAL CUTTING>



AXD4000A

NEW

- P M K **N** S H



Metric Standard

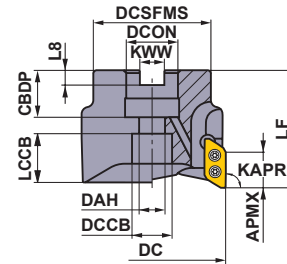
Arbor Type

KAPR : 90°

GAMP : +10° GAMF : +21°

DCON = inch size, With Coolant Hole

ø50



Right hand tool holder only.

DC	Set Bolt	Geometry
ø50	HSC10030H	

(mm)

DC	Type	Insert Corner Radius RE	Order Number	Stock R	* No.T	LF	DCON	WT (kg)	APMX	RPMX (min ⁻¹)	Insert Type
50	D	0.4—3.2	AXD4000A-050A04RD	★	4	50	22	0.4	15.5	34000	XDGX1750
50	E	4.0—5.0	AXD4000A-050A04RE	★	4	50	22	0.4	14.8	34000	XDGX1750

(mm)

* Number of Teeth

Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.

RPMX (max. rev/min) for holders must also be considered.

Note 2) Tool should be set with balancing quality of G6.3 (ISO1940) or ISO16084, in case over 6000 min⁻¹ spindle rotation.

Note 3) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.

Note 4) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF dimensions decrease.

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
50	AXD4000A-050A04RD	22	20	11	17	15.4	45	10.4	6.3
50	AXD4000A-050A04RE	22	20	11	17	14.6	45	10.4	6.3

Spare Parts

	*		
Clamp Screw		Wrench	Anti-seize Lubricant
TPS3SB		TIP10D	MK1KS

* Clamp Torque (lbf-in) : TPS3SB = 26.6

Note 1) Clamp screw and wrench of AXD4000A are different from AXD4000.

Dimensions and Symbols (ISO 13399 Compliance)

DC = Cutting Diameter

LF = Functional Length

DCON = Connection Diameter

WT = Weight of Item

APMX = Depth of Cut Max.

RPMX = Rotational Speed Max.

CBDP = Connection Bore Depth

DAH = Diameter Access Hole




DCCB = Counterbore Diameter Connection Bore

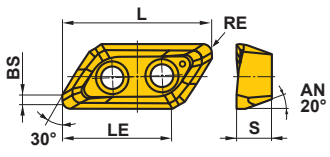
LCCB = Counterbore Depth Connection Bore

DCSFMS = Contact Surface Diameter Machine Side

KWW = Keyway Width

For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

Inserts											(inch)	
Workpiece Material	N	Aluminum Alloys	●	★			●	★	Cutting Conditions (Guide): ●:Stable Cutting ●:General Cutting ★:Unstable Cutting Edge Preparation: F:Sharp E:Round			
	Shape	Order Number	Class	Stock		Dimensions					Geometry	
Coated				Carbide	L	LE	S	BS	RE*			
			Edge Preparation	LC15TF	MP9120		MT2010	TF15				
 Strong Cutting Edge GM Breaker	XDGX175004PDFR-GM	G F				●	●	.906	.689	.197	.066	.016
	XDGX175008PDFR-GM	G F				●	●	.906	.689	.197	.047	.031
	XDGX175012PDFR-GM	G F				●	●	.906	.689	.197	.035	.047
	XDGX175016PDFR-GM	G F				●	●	.866	.689	.197	.054	.063
	XDGX175020PDFR-GM	G F				●	●	.866	.689	.197	.033	.079
	XDGX175024PDFR-GM	G F				●	●	.866	.689	.197	.017	.094
	XDGX175030PDFR-GM	G F				●	●	.831	.689	.197	.023	.118
	XDGX175032PDFR-GM	G F				●	●	.831	.689	.197	.015	.126
	XDGX175040PDFR-GM	G F				●	●	.787	.689	.197	.020	.157
	XDGX175050PDFR-GM	G F				●	●	.764	.689	.197	.014	.197
 Strong Cutting Edge Fracture Resistance Type GM Breaker	XDGX175004PDER-GM	G E	●					.906	.689	.197	.066	.016
	XDGX175008PDER-GM	G E	●					.906	.689	.197	.047	.031
	XDGX175012PDER-GM	G E	●					.906	.689	.197	.035	.047
	XDGX175016PDER-GM	G E	●					.866	.689	.197	.054	.063
	XDGX175020PDER-GM	G E	●					.866	.689	.197	.033	.079
	XDGX175024PDER-GM	G E	●					.866	.689	.197	.017	.094
	XDGX175030PDER-GM	G E	●					.831	.689	.197	.023	.118
	XDGX175032PDER-GM	G E	●					.831	.689	.197	.015	.126
	XDGX175040PDER-GM	G E	●					.787	.689	.197	.020	.157
	XDGX175050PDER-GM	G E	●					.764	.689	.197	.014	.197
 Low Cutting Resistance GL Breaker	XDGX175004PDFR-GL	G F	★				●	.906	.689	.197	.067	.016
	XDGX175008PDFR-GL	G F	★				●	.906	.689	.197	.052	.031
	XDGX175012PDFR-GL	G F	★				●	.906	.689	.197	.037	.047
	XDGX175016PDFR-GL	G F	★				●	.866	.689	.197	.056	.063
	XDGX175020PDFR-GL	G F	★				●	.866	.689	.197	.041	.079
	XDGX175024PDFR-GL	G F	★				●	.866	.689	.197	.026	.094
	XDGX175030PDFR-GL	G F	★				●	.831	.689	.197	.033	.118
	XDGX175032PDFR-GL	G F	★				●	.831	.689	.197	.026	.126
	XDGX175040PDFR-GL	G F	★				●	.787	.689	.197	.033	.157
	XDGX175050PDFR-GL	G F	★				●	.764	.689	.197	.016	.197



● = NEW

* The insert nose R differs from radius form which is remains on workpiece material after machining due to the effects of the axial rake angle at the time of setting.
GM breaker is recommended if stress the dimensional precision of the workpiece shape.

Holder And Insert Corner Radius Combination

Holder	D Type Holder								E Type Holder	
	AXD4000AUR2.0004AAD, AXD4000A-050A04RD									
Applicable Insert Corner R (RE)	R.016"	R.031"	R.047"	R.063"	R.079"	R.094"	R.118"	R.126"	R.157"	R.197"
	XDGX175004PD-R	XDGX175008PD-R	XDGX175012PD-R	XDGX175016PD-R	XDGX175020PD-R	XDGX175024PD-R	XDGX175030PD-R	XDGX175032PD-R	XDGX175040PD-R	XDGX175050PD-R




Note 1) Other combinations of holder and insert corner R are not acceptable.

● : USA Stock ★ : Stocked in Japan (10 inserts in one case)

Inserts to be used with the AXD4000A ,which include clamping screws, must be ordered via Kit-order numbers referenced below.

Insert Kit

Package contents of insert kit (10 inserts and 20 clamp screws)

Workpiece Material	N Aluminum Alloys	●				●				✦				Cutting Conditions (Guide): ● :Stable Cutting ● :General Cutting ✦ :Unstable Cutting
		Coated		Carbide		Inserts		Clamp Screw		Use				
		LC15TF	MP9120	MT2010	TF15	Order Number	Pieces	Order Number	Pieces					
Strong Cutting Edge GM Breaker 	K-XDGX175004PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175004PDFR-GM	10	TPS3SB	20		First Recommendation High Speed, High Efficiency and High Load Machining			
	K-XDGX175008PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175008PDFR-GM	10	TPS3SB	20					
	K-XDGX175012PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175012PDFR-GM	10	TPS3SB	20					
	K-XDGX175016PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175016PDFR-GM	10	TPS3SB	20					
	K-XDGX175020PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175020PDFR-GM	10	TPS3SB	20					
	K-XDGX175024PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175024PDFR-GM	10	TPS3SB	20					
	K-XDGX175030PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175030PDFR-GM	10	TPS3SB	20					
	K-XDGX175032PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175032PDFR-GM	10	TPS3SB	20					
	K-XDGX175040PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175040PDFR-GM	10	TPS3SB	20					
	K-XDGX175050PDFR-GM			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	XDGX175050PDFR-GM	10	TPS3SB	20					
Strong Cutting Edge Fracture Resistance Type GM Breaker 	K-XDGX175004PDER-GM	<input type="checkbox"/>				XDGX175004PDER-GM	10	TPS3SB	20	First Recommendation High Speed, High Efficiency and High Load Machining				
	K-XDGX175008PDER-GM	<input type="checkbox"/>				XDGX175008PDER-GM	10	TPS3SB	20					
	K-XDGX175012PDER-GM	<input type="checkbox"/>				XDGX175012PDER-GM	10	TPS3SB	20					
	K-XDGX175016PDER-GM	<input type="checkbox"/>				XDGX175016PDER-GM	10	TPS3SB	20					
	K-XDGX175020PDER-GM	<input type="checkbox"/>				XDGX175020PDER-GM	10	TPS3SB	20					
	K-XDGX175024PDER-GM	<input type="checkbox"/>				XDGX175024PDER-GM	10	TPS3SB	20					
	K-XDGX175030PDER-GM	<input type="checkbox"/>				XDGX175030PDER-GM	10	TPS3SB	20					
	K-XDGX175032PDER-GM	<input type="checkbox"/>				XDGX175032PDER-GM	10	TPS3SB	20					
	K-XDGX175040PDER-GM	<input type="checkbox"/>				XDGX175040PDER-GM	10	TPS3SB	20					
	K-XDGX175050PDER-GM	<input type="checkbox"/>				XDGX175050PDER-GM	10	TPS3SB	20					
Low Cutting Resistance GL Breaker 	K-XDGX175004PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175004PDFR-GL	10	TPS3SB	20	General Machining				
	K-XDGX175008PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175008PDFR-GL	10	TPS3SB	20					
	K-XDGX175012PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175012PDFR-GL	10	TPS3SB	20					
	K-XDGX175016PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175016PDFR-GL	10	TPS3SB	20					
	K-XDGX175020PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175020PDFR-GL	10	TPS3SB	20					
	K-XDGX175024PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175024PDFR-GL	10	TPS3SB	20					
	K-XDGX175030PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175030PDFR-GL	10	TPS3SB	20					
	K-XDGX175032PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175032PDFR-GL	10	TPS3SB	20					
	K-XDGX175040PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175040PDFR-GL	10	TPS3SB	20					
	K-XDGX175050PDFR-GL	<input type="checkbox"/>			<input type="checkbox"/>	XDGX175050PDFR-GL	10	TPS3SB	20					

● = NEW

For safety reasons, clamping screws must be replaced at the same time as inserts.

Note 1) Use the GM type insert when using with a high-speed, high-power spindle machine that is the ideal choice for AXD4000A (spindle RPM of 20000 min⁻¹ or more, motor power of 80 kw or more).

Note 2) Clamp screw and wrench of AXD4000A are different from AXD4000.

Note 3) For insert dimensions, refer to page 6.

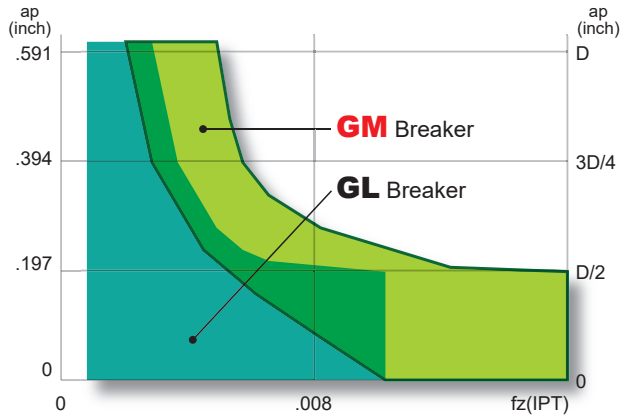
: Non stock, produced to order only.

Please order in the ① insert kit order number and ② insert grades.

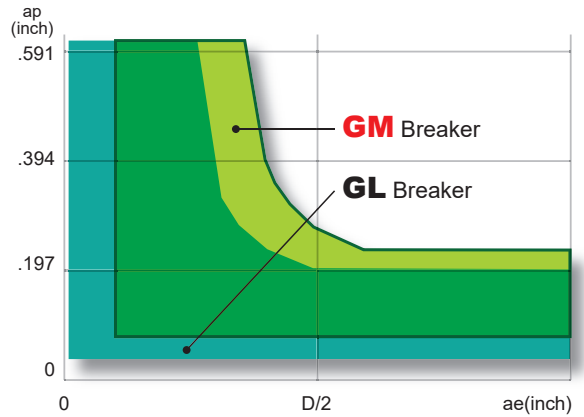
Selection of Insert

It is necessary to choose the best insert according to the cutting conditions. Please select an insert from the tables below. 1st recommendation for High Efficiency and High Load Machining on High-speed Spindles is the GM breaker with a strong cutting edge.

Selection of insert according to the feed per tooth and the required cutting depth

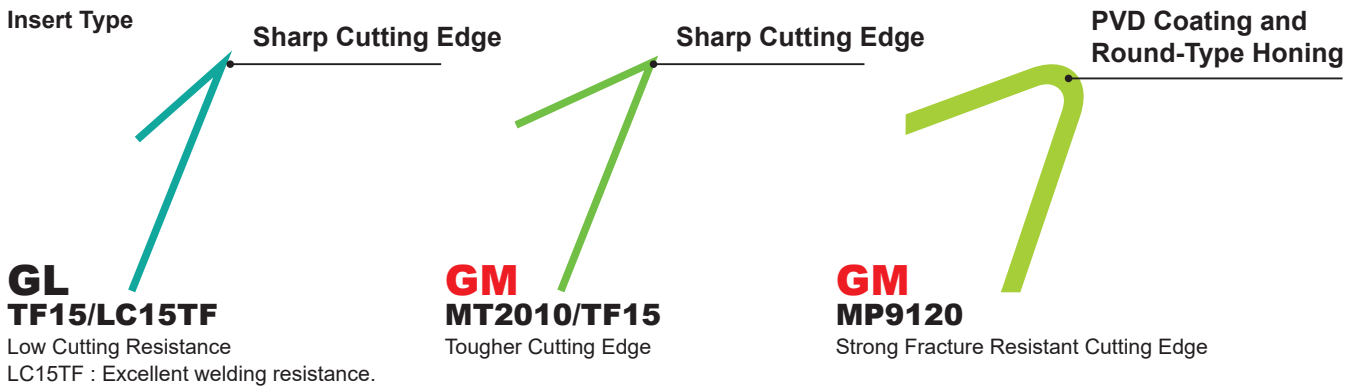


Selection of insert according to the width of cut and the required cutting depth

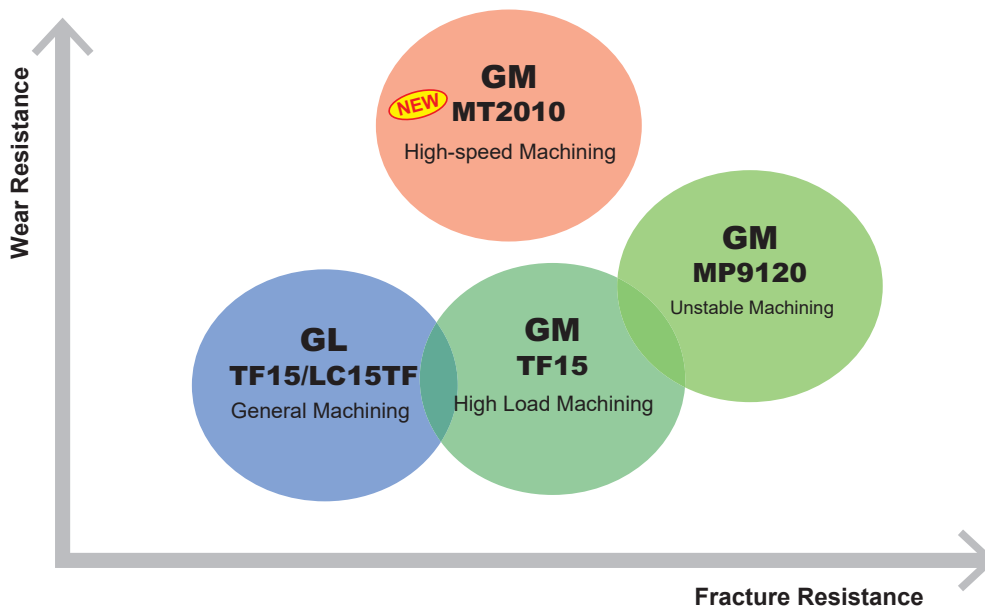


1st recommendation for machining aluminum alloys is GL breaker. Under high-load conditions such as deep or high feed cutting, it is advisable to use the GM breaker.

Selection of Insert According to Cutting Edge



Selection of insert according to wear resistance



Recommended Cutting Conditions

(inch)

Workpiece Material	Properties	Grade	Breaker	Cutting Speed vc (SFM)	Cutting Width ae	Depth of Cut ap	Feed per Tooth (IPT)
Aluminum Alloys	Content Si < 5%	MT2010 TF15 MP9120	GM	13120(6560–16500)	≤.5 DC	≤ .197	≤ .014
						≤ .394	≤ .012
					≤.75 DC	≤ .571	≤ .010
						≤ .197	≤ .012
		DC (Slot)	≤ .394	≤ .010			
			≤ .571	≤ .008			
		TF15 LC15TF	GL	13120(6560–16500)	≤.75 DC	≤ .197	≤ .008
						≤ .394	≤ .006
DC (Slot)	≤ .571				≤ .004		
	≤ .197				≤ .008		

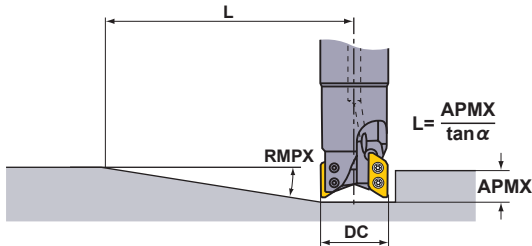
Note 1) The above cutting conditions are determined based on high workpiece materials and machine rigidity, where no vibration occurred. If vibrations occur make adjustments according to the machining conditions.

Note 2) Note, vibrations may occur in the following conditions.

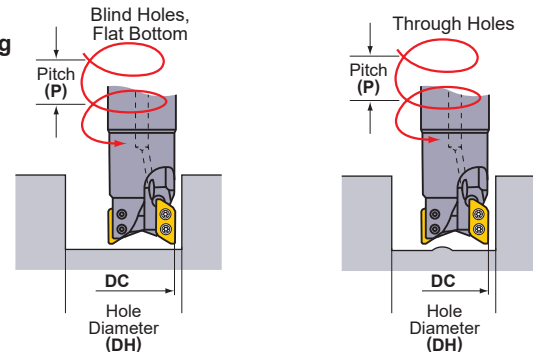
- When using long tool overhang.
- When pocket machining corner radii.
- When the workpiece materials has poor clamping rigidity or when the machine rigidity or workpiece materials rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

Ramping / Helical Milling / Drilling

Ramping



Helical Milling



Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

(inch)

DC	Type	Insert Corner R RE	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)		Drilling
			Max. Ramping Angle RMPX	Min. *1 Distance L	Max. Hole Diameter DH max.	Max. Pitch P max.	Min. Hole Diameter DH min.	Max. Pitch P max.	Min. Hole Diameter DH min.	Max. Pitch P max.	
1.969	D	.016–.047	8.2°	4.252	3.811 *2	.551	3.756	.551	3.197	.551	.217
		.063–.094	7.6°	4.606	3.717 *3	.512	3.685	.512	3.197	.512	.197
		.118–.126	6.9°	5.079	3.654 *4	.472	3.622	.472	3.197	.472	.177
		.157	6.3°	5.314	3.591	.394	3.543	.394	3.197	.394	.154
2.000	E	.197	5.8°	5.748	3.512	.354	3.496	.354	3.197	.354	.142
		.016–.047	8.7°	4.016	3.874 *2	.551	3.819	.551	3.260	.551	.217
		.063–.094	8.2°	4.252	3.780 *3	.512	3.748	.512	3.260	.512	.197
		.118–.126	7.6°	4.606	3.717 *4	.472	3.685	.472	3.260	.472	.177
2.000	E	.157	6.9°	4.843	3.654	.394	3.606	.394	3.260	.394	.154
		.197	6.5°	5.118	3.575	.354	3.559	.354	3.260	.354	.142

*1 Using the maximum ramping angle, the distance to reach the maximum depth of cut is as follows:

$L = (\text{maximum depth of cut } APMX / \tan \alpha)$. Maximum depth of cut D type is .610", E type is .583".

*2 Corner radius of .047". For other corner radii, use the following formula. $\{(\text{cutting edge diameter } DC) - (\text{corner radius } RE) - .022\} \times 2$

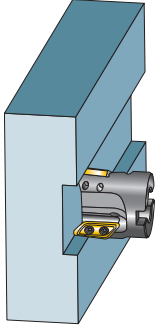
*3 Corner radius of .094". For other corner radii, use the following formula. $\{(\text{cutting edge diameter } DC) - (\text{corner radius } RE) - .022\} \times 2$

*4 Corner radius of .126". For other corner radii, use the following formula. $\{(\text{cutting edge diameter } DC) - (\text{corner radius } RE) - .022\} \times 2$

Note 1) The recommended ramping feed is .002 IPT or under.

For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

Application Examples

Tool		Conventional		AXD4000A-050A04RD	
Insert (Grade)				XDGX175030PDER-GM(MT2010)	
Workpiece					
Components		Aircraft Fuselage Parts			
Cutting Conditions	Spindle Speed n (min^{-1})	30000		32000	
	Cutting Speed vc (SFM)	15420		16405	
	Feed per Tooth fz (IPT)	.006		.010	
	Depth of Cut ap (inch)	.197		.197	
	Width of Cut ae (inch)	1.969		1.969	
	Metal Removal Rate M.R.R (in^3/min)	275		490	
Cutting Mode		Wet Cutting		Wet Cutting	
Machine Spindle Type		High Speed and High Power 5-axis MC			
Result		Compared to conventional grade; MT2010 achieved 1.8 times greater M.R.R while maintaining good machining stability.			

Memo

A series of horizontal dashed lines for writing.



For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

AXD4000A

For your safety

●Don't touch breakers and chips without gloves. ●Please machine within recommended application range, and exchange expired tools with new parts in advance. ●Please use safety cover and wear safety glasses. ●When using compounded cutting oils, please take fire prevention. ●When attaching inserts or spare parts, please use the attached wrench or driver. ●When using tools in revolution machining, please make a trial run to check run-out, vibration, abnormal sounds etc.

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(Tool specifications subject to change without notice.)