DLC Carbide End Mills for Non-ferrous Materials

AE-N SERIES

AE-TS-N · AE-TL-N · AE-VTS-N · AE-LNBD-N · PXAL

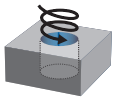
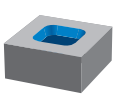
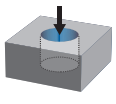
Volume 2

INDEX

Standard specification suitable for non-ferrous material processing

High performance type that supports a wide range of applications

APPLICATION

Application			Slot Milling	Side Milling	Helical Milling	Contour Milling	Ramping	Deep Side Milling	Plunging	Trochoidal Milling
										
Standard	AE-TS-N Short		◎	☆	◎	◎	◎	☆	◎	☆
Standard	AE-TL-N Long	3 x D flute length	○	☆	◎	○	○	☆	○	☆
Standard	AE-TL-N Long	5 x D flute length	△	☆	○	△	△	☆	△	☆
High Performance	AE-VTS-N Short		☆	☆	☆	☆	☆	☆	☆	☆
High Performance	PXAL Exchangeable Head		☆	☆	☆	☆	☆	☆	☆	☆

△ → ○ → ◎ → ☆
(Fair) (Best)

FEATURES OF DLC COATING

DLC coating revolutionizes the processing of non-ferrous materials!

OSG's DLC coating gives a shiny surface! This shiny and smooth surface optimizes end mill performance particularly in non-ferrous materials such as aluminum alloys, which require welding resistance and lubricity.

Two types of DLC coatings to accommodate specific application needs

DLC-IGUSS

- Thick coating type for long tool life
- Thick coating type suppresses wear on the cutting edge to enable high durability and long tool life.
- Applicable tools : AE-VTS-N • PXAL

DLC-SUPER HARD

- Thin coating type with emphasis on sharpness
- High adhesion to the base material to enable sharp cutting performance and high welding resistance.
- Applicable tools : AE-TS-N • AE-TL-N

Name of Coating	Coating Color	Coating Type	(GPa) Hardness	Oxidation Temperature (C°)	Coefficient of Friction	(μm)Coating Thickness	Coating Temperature (C°)	Surface roughness	Wear Resistance	Welding Resistance	Toughness
DLC-IGUSS	Interference Color	DLC(SP^3 Rich)	60	550	0.10	0.8	400	☆	◎	☆	○
DLC-SUPER HARD	Interference Color	DLC(SP^3 Rich)	60	550	0.10	0.2	400	☆	◎	☆	○

(Good) ○ → ◎ → ☆ (Best)

Abrasion resistance and welding resistance

OSG's DLC coating has high wear resistance and anti-adhesion properties, which enable stable tool life in non-ferrous material applications with high tendency to weld.

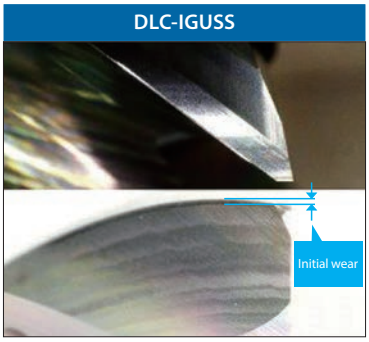
Wear resistance

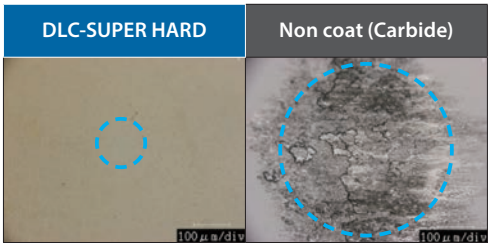
Milling in A5052

Tool	Carbide Square End Mill 3 Flutes
Work Material	A5052
Cutting Speed	200m/min (6.370 min^{-1})
Feed	0,08mm/t (1.530mm/min)
Depth of Cut	ap = 5mm ae = 8mm
Coolant	AirBlow
Machine	Vertical Machining Center
Machine Length	50m

Welding resistance

Surface condition after pin-on-disc test





Test Material	A7075
Test Environment	Open atmosphère

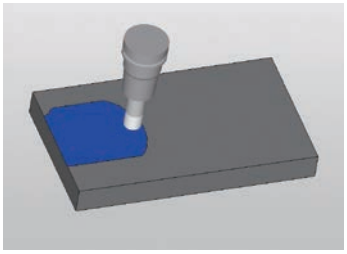
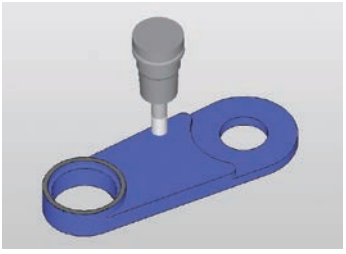
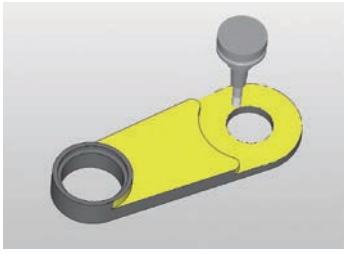
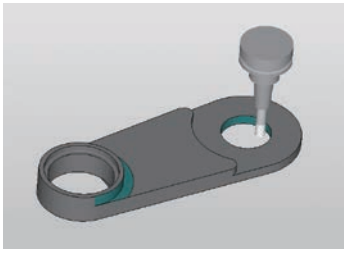
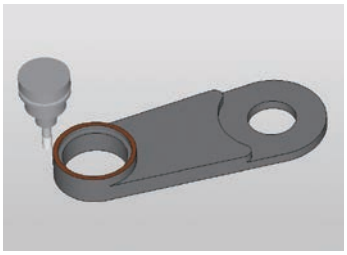
CUTTING DATA ON ALUMINUM PART PROCESSING

Suitable for a wide range of applications

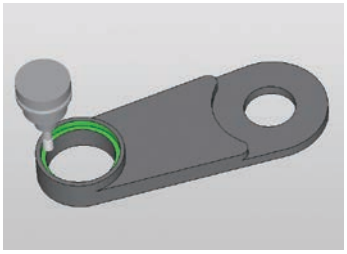
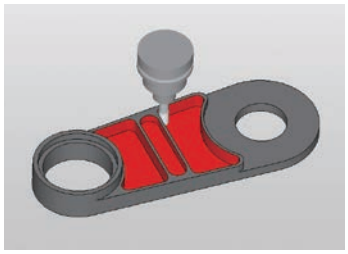
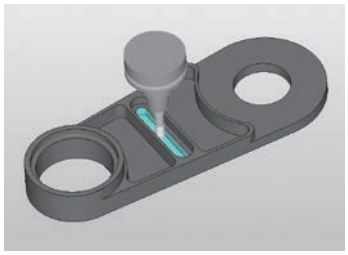
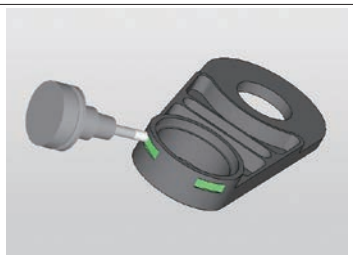
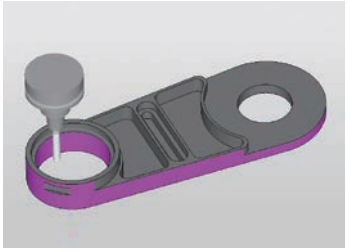
Coolant	MQL	**Holder**	Shrink Fit	**Machine**	5 axis Machining center
Max. RPM	25.000 min^{-1}	**Work Material**	A5052	**Main Spindle**	HSK63

MQL is used for taking a video.

Watch it in action

Process	Milling Part	Milling Method		Milling Process	Tool
①	Top	Face Milling		Roughing	PXAL250C25-03R100
②	Overall	Contour Milling		Roughing	PXAL200C20-03R100
③	Top	Face Milling		Finishing	AE-TS- N Ø12×36
④	Boss, Hole Side	Side Milling		Finishing	
⑤	Hole Top	Face Milling		Finishing	AE-VTS- N Ø12×36

CUTTING DATA ON ALUMINUM PART PROCESSING

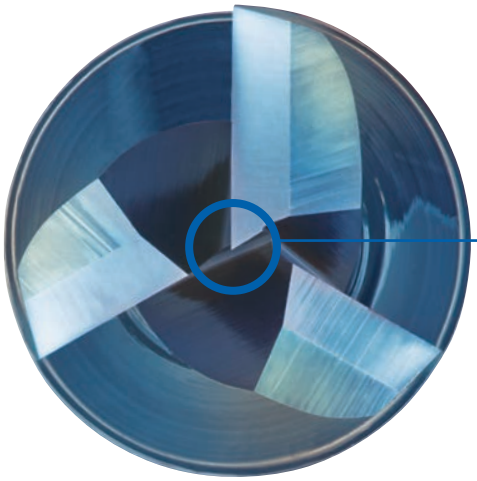
Process	Milling Part	Milling Method	Milling Process	Tool
⑥	Counterbore Wall	Side Milling 	Finishing	AE-VTS- N Ø12×36
⑦	Groove	Pocket Milling 	Roughing Finishing	
⑧	Bottom	Pocket Milling 	Roughing Finishing	AE-VTS- N Ø10×30
⑨	Slot	Slot Milling 5-axis 	Finishing	AE-TS- N Ø10×30
⑩	Outer circumference, lower counterbore	Side Milling 	Finishing	AE-TL- N Ø8×40

KEY FEATURES: AE-TS-N • AE-TL-N

1. Cutting edge specification that achieves both rigidity and sharpness. Achieves high durability and good surface finish
2. New flute form. Facilitates excellent chip evacuation.
3. DLC-SUPER HARD Coating

Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Furthermore, its excellent sharpness and ability to suppress burrs enable superior surface finish.

STANDARD SPECIFICATION SUITABLE FOR NON-FERROUS MATERIAL PROCESSING



Large core design

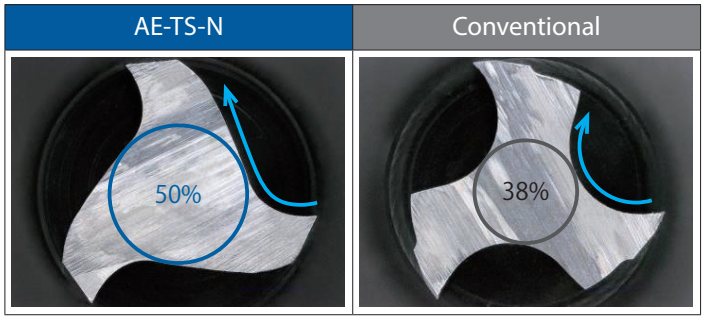
High rigidity prevents chattering

Center cutting edge

Can be used for plunging

Balancing rigidity and chip evacuation capability

Rigidity is enhanced by increasing the core thickness, which enables the suppression of chattering. By adopting an optimal flute form, high rigidity can be maintained while ensuring trouble-free chip evacuation.



Arrow: indicates chip discharge direction

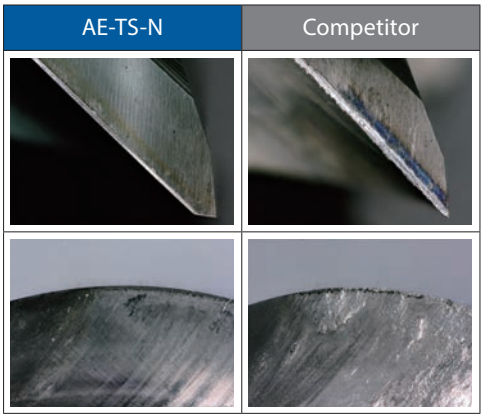
CUTTING DATA

High Quality

High welding resistance
By adopting the DLC coating, high welding resistance is achieved even with air blow.

Tool	AE-TS-N φ10×30	Non-coated Competitor φ10 3 Flutes
Work Material	A7075	
Milling Method	Slot Milling	
Cutting Speed	300m/min (9,550min^{-1})	
Feed	1,432mm/min(0.05mm/t)	
Depth of Cut	ap =10mm	
Coolant	AirBlow	
Machine	Vertical Machining Center	

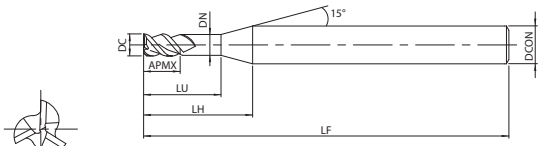
Cutting edge condition after milling 11 m



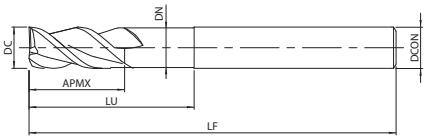
AE-TS-N

Milling | Solid carbide

Type 1



Type 2



- First choice in quality and performance
- Carbide End Mill for Non-Ferrous Materials
- 3 flutes, Short type

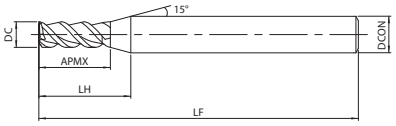
1,5 x D flute length (Neck length 3 x D)

EDP	DC x LU	LF	APMX	LH	DCON	DN	Type	Price
8557330	3 x 9	55	4,5	14,9	6	2,85	1	
8557331	4 x 12	55	6	16	6	3,8	1	
8557332	5 x 15	55	7,5	17,1	6	4,8	1	
8557333	6 x 18	60	9	-	6	5,8	2	
8557334	8 x 24	70	12	-	8	7,7	2	
8557335	10 x 30	75	15	-	10	9,7	2	
8557336	12 x 36	80	18	-	12	11,7	2	

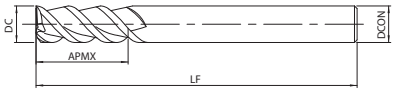
AE-TL-N

Milling | Solid carbide

Type 1



Type 2



- First choice in quality and performance
- Carbide End Mill for Non-Ferrous Materials
- 3 flutes, Long type

3 x D flute length

EDP	DC x APMX	LF	LH	DCON	L/D	Type	Price
8557340	3 x 9	55	17	6	3	1	
8557341	4 x 12	55	18,1	6	3	1	
8557342	5 x 15	55	19,3	6	3	1	
8557343	6 x 18	60	-	6	3	2	
8557344	8 x 24	70	-	8	3	2	
8557345	10 x 30	75	-	10	3	2	
8557346	12 x 36	80	-	12	3	2	

5 x D flute length

EDP	DC x APMX	LF	LH	DCON	L/D	Type	Price
8557350	3 x 15	55	23	6	5	1	
8557351	4 x 20	60	26,1	6	5	1	
8557352	5 x 25	65	29,3	6	5	1	
8557353	6 x 30	75	-	6	5	2	
8557354	8 x 40	90	-	8	5	2	
8557355	10 x 50	100	-	10	5	2	
8557356	12 x 60	110	-	12	5	2	

CUTTING CONDITIONS

Milling | Endmills | Cutting conditions

AE-TS-N

Slot Milling

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	300		300		150	
DC X LU	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	32.000	1.720	32.000	1.720	16.000	960
4 x 12	24.000	1.780	24.000	1.780	12.000	1.030
5 x 15	19.200	1.840	19.200	1.840	9.600	1.090
6 x 18	16.000	1.900	16.000	1.900	8.000	1.160
8 x 24	12.000	2.030	12.000	2.030	6.000	1.300
10 x 30	9.600	2.150	9.600	2.150	4.800	1.430
12 x 36	8.000	2.270	8.000	2.270	4.000	1.560
Depth of cut	ap: 1D				ap: 0,5D	

1. The above milling condition is a guideline for the overhang length is 4×D.
2. Use a rigid and precise machine and holder.
3. The indicated speeds and feeds are for milling with water-soluble coolant.
4. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
5. Reduce speed and feed as well as depth of cut when high precision is required.
6. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.10).
7. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

Side Milling

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	300		300		150	
DC X LU	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	32.000	2.150	32.000	2.150	16.000	640
4 x 12	24.000	2.230	24.000	2.230	12.000	690
5 x 15	19.200	2.300	19.200	2.300	9.600	740
6 x 18	16.000	2.380	16.000	2.380	8.000	800
8 x 24	12.000	2.540	12.000	2.540	6.000	940
10 x 30	9.600	2.690	9.600	2.690	4.800	1.070
12 x 36	8.000	2.840	8.000	2.840	4.000	1.150
Depth of cut	ap: 1,5D; ae: 0,2D					

1. The above milling condition is a guideline for the overhang length is 4×D.
2. Use a rigid and precise machine and holder.
3. The indicated speeds and feeds are for milling with water-soluble coolant.
4. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
5. Reduce speed and feed as well as depth of cut when high precision is required.
6. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.10).
7. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

CUTTING CONDITIONS

AE-TS-N

Plunging

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	80		80		60	
DC X LU	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	8.500	400	8.500	400	6.400	120
4 x 12	6.400	400	6.400	400	4.800	120
5 x 15	5.100	400	5.100	400	3.800	120
6 x 18	4.200	450	4.200	450	3.100	130
8 x 24	3.200	500	3.200	500	2.400	150
10 x 30	2.550	500	2.550	500	1.900	150
12 x 36	2.100	500	2.100	500	1.600	150
Depth of cut	ap 1D				ap 0,5D	

1. The above milling condition is a guideline for the overhang length is 4×D.
2. Use a rigid and precise machine and holder.
3. The indicated speeds and feeds are for milling with water-soluble coolant.
4. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
5. Reduce speed and feed as well as depth of cut when high precision is required.
6. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.10).
7. When the chips wind around the end mill, reduce the speed and feed.
8. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

Cutting Condition Guide for Changes in Overhang Length

DC≥Ø6

 Work Material		Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
	L/D	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
Slot milling	5	70%		70%		70%	
	6	50%		50%		50%	
Side milling	5	70%		70%		70%	
	6	50%		50%		50%	
Plunging	5	80%		80%		80%	
	6	60%		60%		60%	

CUTTING CONDITIONS

AE-TL-N 3xD flute length

Slot Milling

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	240		240		120	
DC x APMX	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	25.600	1.380	25.600	1.380	12.800	770
4 x 12	19.200	1.420	19.200	1.420	9.600	820
5 x 15	15.360	1.470	15.360	1.470	7.680	870
6 x 18	12.800	1.520	12.800	1.520	6.400	930
8 x 24	9.600	1.620	9.600	1.620	4.800	1.040
10 x 30	7.680	1.720	7.680	1.720	3.840	1.140
12 x 36	6.400	1.820	6.400	1.820	3.200	1.250
Depth of cut	ap 1D				ap 0,5D	

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

Side Milling

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	240		240		120	
DC x APMX	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	25.600	1.720	25.600	1.720	12.800	770
4 x 12	19.200	1.780	19.200	1.780	9.600	780
5 x 15	15.360	1.840	15.360	1.840	7.680	790
6 x 18	12.800	1.900	12.800	1.900	6.400	810
8 x 24	9.600	2.030	9.600	2.030	4.800	830
10 x 30	7.680	2.150	7.680	2.150	3.840	860
12 x 36	6.400	2.270	6.400	2.270	3.200	880
Depth of cut	ap 3D	ae 0,1D				

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

CUTTING CONDITIONS

AE-TL-N 3xD flute length

Plunging

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	70		70		50	
DC x APMX	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	7.500	350	7.500	350	5.300	100
4 x 12	5.600	350	5.600	350	3.980	100
5 x 15	4.460	350	4.460	350	3.180	100
6 x 18	3.680	400	3.680	400	2.650	110
8 x 24	2.800	450	2.800	450	1.990	120
10 x 30	2.230	450	2.230	450	1.590	120
12 x 36	1.840	450	1.840	450	1.330	120
Depth of cut	ap 1D				ap 0,5D	

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. When the chips wind around the end mill, reduce the speed and feed.
6. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

AE-TL-N 5xD flute length

Side Milling

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	100		100		50	
DC x APMX	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 15	10.600	640	10.600	640	5.300	200
4 x 20	8.000	690	8.000	690	4.000	210
5 x 25	6.400	730	6.400	730	3.200	230
6 x 30	5.300	780	5.300	780	2.600	240
8 x 40	4.000	870	4.000	870	2.000	260
10 x 50	3.200	960	3.200	960	1.600	290
12 x 60	2.700	1.050	2.700	1.050	1.300	320
Depth of cut	ap 5D, ae 0,1D					

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

KEY FEATURES: AE-VTS-N

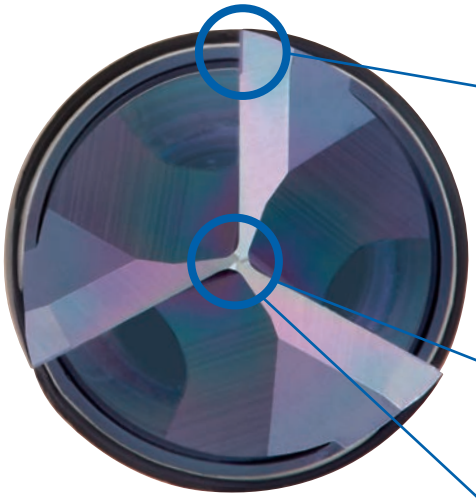
1. Variable lead and unequal spacing teeth

2. Stable and high efficiency milling is made possible by the suppression of chattering

3. DLC-IGUSS Coating

Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Moreover, tool durability is also improved.

SUITABLE FOR A WIDE RANGE OF APPLICATIONS! HIGH EFFICIENCY AND HIGH QUALITY PROCESSING



Flat cutting edge

Achieves higher precision machined surface quality

Large core design

High rigidity prevents chattering

Center cutting edge

Can be used for plunging

3 cutting edges that connect at the center

The cutting load is equalized among the cutting edges with greater stability to enable high speed milling*

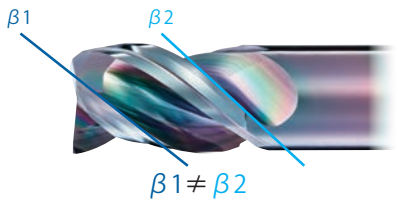
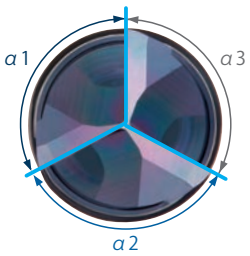
*Effective for plunging and ramping

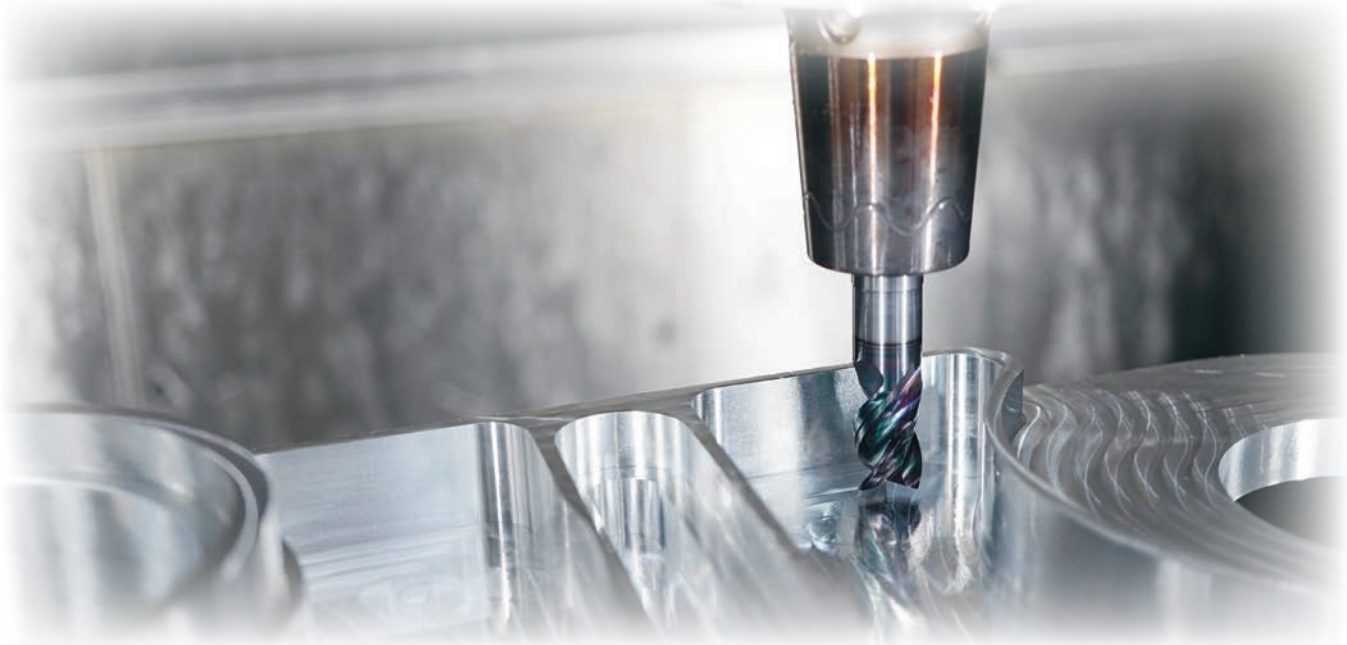
Variable lead and unequal spacing teeth

Stable and high efficiency milling is made possible by the suppression of chattering

Suppression of Vibration

Variable lead and unequal spacing teeth geometry enable stable and high efficiency milling

Variable Leads	Unequal Spacing Teeth
	

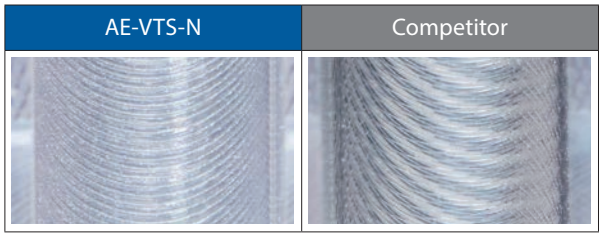


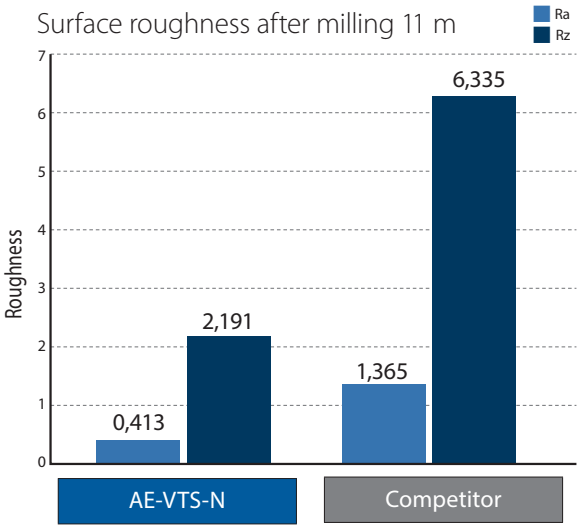
SUITABLE FOR A WIDE RANGE OF APPLICATIONS! HIGH EFFICIENCY AND HIGH QUALITY PROCESSING

Good machined surface quality even under high speed cutting condition

Due to the anti-welding effect of the DLC coating, the anti-vibration effect of the variable lead and unequal spacing teeth geometry, and the effect of the flat cutting edge specification, good machined surface can be achieved even under aggressive cutting condition.

Tool	AE-VTS-N φ10×30	Non-coated Competitor φ10 3 Flutes
Work Material	A7075	
Milling Method	Slot Milling	
Cutting Speed	408m/min (13.000min^{-1})	300m/min (9.550min^{-1})
Feed	4.780mm/min(0.123mm/t)	1.432mm/min(0.05mm/t)
Depth of Cut	ap =10mm	
Coolant	Water Soluble	
Machine	Vertical Machining Center (BT40)	

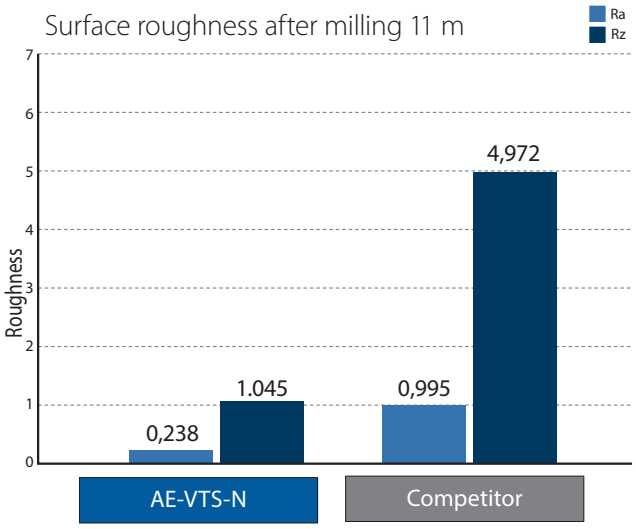




Excellent surface finish

Due to the effect of the DLC coating and the flat cutting edge specification, excellent machined surface quality is achieved.

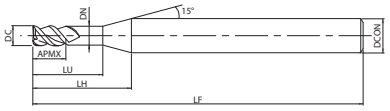
Tool	AE-VTS-N φ10×30	Non-coated Competitor φ10 3 Flutes
Work Material	A7075	
Milling Method	Slot Milling	
Cutting Speed	300m/min (9.550min^{-1})	
Feed	1.432mm/min(0.05mm/t)	
Depth of Cut	ap =10mm	
Coolant	Water Soluble	
Machine	Vertical Machining Center (BT40)	



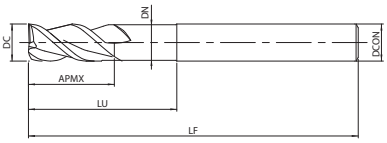
AE-VTS-N

Milling | Solid carbide

Type 1



Type 2



- First choice in quality and performance
- Carbide End Mill for Non-Ferrous Materials High Performance
- 3 flutes, Short type

1,5 x D flute length (Neck length 3 x D)

EDP	DC x LU	LF	APMX	LH	DCON	DN	Type	Price
8557360	3 x 9	55	4,5	14,9	6	2,85	1	
8557361	4 x 12	55	6	16	6	3,8	1	
8557362	5 x 15	55	7,5	17,1	6	4,8	1	
8557363	6 x 18	60	9	-	6	5,8	2	
8557364	8 x 24	70	12	-	8	7,7	2	
8557365	10 x 30	75	15	-	10	9,7	2	
8557366	12 x 36	80	18	-	12	11,7	2	

CUTTING CONDITIONS

AE-VTS-N

Slot Milling

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	300~400		300~400		150	
DC X LU	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	32.000	3.060	32.000	3.820	16.000	1.430
4 x 12	24.000	3.170	24.000	3.960	12.000	1.530
5 x 15	19.200	3.270	19.200	4.090	9.600	1.640
6 x 18	18.500	3.380	18.500	4.230	9.300	1.740
8 x 24	16.000	3.610	16.000	4.510	8.000	1.940
10 x 30	13.000	3.820	13.000	4.780	4.800	2.150
12 x 36	11.000	4.040	11.000	5.050	4.000	2.360
Depth of cut	ap: 1D				ap: 0,5D	

1. The above milling condition is a guideline for the overhang length is 4×D.
2. Use a rigid and precise machine and holder.
3. The indicated speeds and feeds are for milling with water-soluble coolant.
4. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
5. Reduce speed and feed as well as depth of cut when high precision is required.
6. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.18).
7. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

Side Milling

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	300~400		300~400		150~200	
DC X LU	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	32.000	3.820	32.000	3.820	16.000	1.600
4 x 12	24.000	3.960	24.000	3.960	12.000	1.700
5 x 15	19.200	4.090	19.200	4.090	9.600	1.830
6 x 18	18.500	4.230	18.500	4.230	9.300	1.950
8 x 24	16.000	4.510	16.000	4.510	8.000	2.180
10 x 30	13.000	4.780	13.000	4.780	6.400	2.400
12 x 36	11.000	5.050	11.000	5.050	5.300	2.650
Depth of cut	ap: 1,5D, ae: 0,2D				ap: 1,5D, ae: 0,1D	

1. The above milling condition is a guideline for the overhang length is 4×D.
2. Use a rigid and precise machine and holder.
3. The indicated speeds and feeds are for milling with water-soluble coolant.
4. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
5. Reduce speed and feed as well as depth of cut when high precision is required.
6. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.18).
7. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

CUTTING CONDITIONS

AE-VTS-N

Plunging

	Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
Vc (m/min)	150		150		75	
DC X LU	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
3 x 9	15.900	500	15.900	500	8.000	150
4 x 12	12.000	500	12.000	500	6.000	150
5 x 15	9.600	500	9.600	500	4.800	150
6 x 18	8.000	600	8.000	600	4.000	180
8 x 24	6.000	700	6.000	700	3.000	210
10 x 30	4.800	700	4.800	700	2.400	210
12 x 36	4.000	700	4.000	700	2.000	210
Depth of cut	ap 1D				ap 0,5D	

1. The above milling condition is a guideline for the overhang length is 4×D.
2. Use a rigid and precise machine and holder.
3. The indicated speeds and feeds are for milling with water-soluble coolant.
4. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
5. Reduce speed and feed as well as depth of cut when high precision is required.
6. Adjust the speed and feed accordingly when the overhang length is longer than specified.
7. When the chips wind around the end mill, reduce the speed and feed.
8. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

Cutting Condition Guide for Changes in Overhang Length

DC≥Ø6

 Work Material		Aluminum Alloy Expanding Material • Magnesium Alloy A5052 • A7075 • AZ91• AZ80A		Aluminum Alloy Casting AC4C • ADC		Copper Alloy • Brass C1100	
	L/D	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)	S (min^{-1})	F (mm/min)
Slot milling	5	70%		70%		70%	
	6	50%		50%		50%	
Side milling	5	70%		70%		70%	
	6	50%		50%		50%	
Plunging	5	80%		80%		80%	
	6	60%		60%		60%	

KEY FEATURES: AE-LNBD-N

Milling beautiful copper electrodes without burrs!

Excellent machined surface accuracy

Beautiful edge without burrs

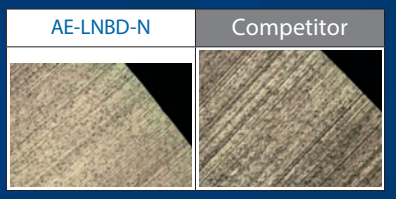
Ball specifications that enable high quality milling

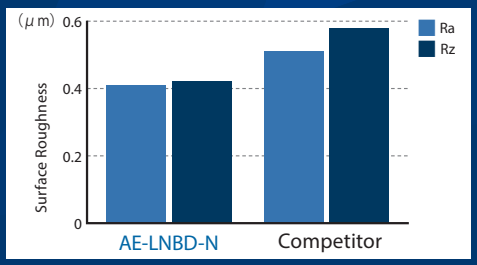
1 Optimal cutting edge shape for milling copper alloy

2 Superior ball R precision

R ± 0.002	R ± 0.003	R ± 0.004
RE≤0,2	0,2≤RE≤1,5	1,5<RE

3 High quality primary relief surface

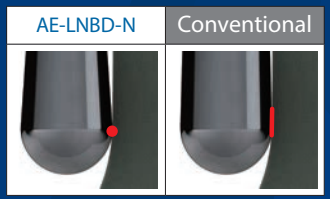




Teardrop-shaped outer periphery

Strong back taper geometry enables milling by point, which prevents chattering and chipping, resulting in improvement of surface accuracy.

Note: Teardrop-shaped specification does not apply to items above R2.



Superior shank accuracy

Supports h4 tolerance (0/0,004)

UNIQUE DLC COATING THAT REVAMPS COPPER ELECTRODE MACHINING

Due to its smooth surface and extremely low coefficient of friction, DLC coating is extremely effective against non-ferrous metals such as copper alloys, which require welding resistance and lubricity.

DLC-IGUSS coating

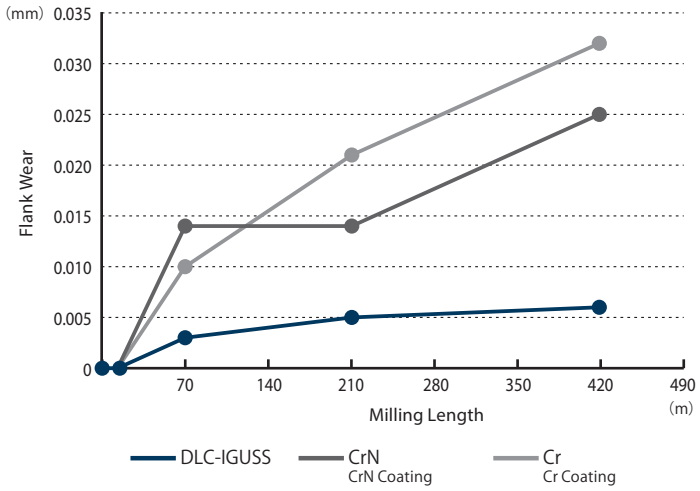
Name of Coating	Coating Color	Coating Type	(GPa) Hardness	Oxidation Temperature (C°)	Coefficient of Friction	(μm)Coating Thickness	Coating Temperature (C°)	Surface roughness	Wear Resistance	Welding Resistance	Toughness
DLC-IGUSS	Interference Color	DLC(SP^3 Rich)	60	550	0.10	0.8	400	☆	◎	☆	○

(Good) ○ → ◎ → ☆ (Best)

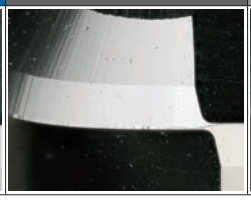
Wear resistance

DLC-IGUSS is effective in suppressing wear against tough-pitch copper (C1100), and stable machining accuracy can be obtained for a long period of time.

Tool	2 Flutes Carbide Ball End Mill
Work Material	C1100
Milling Method	Pick Milling
Cutting Speed	141m/min (15.000 min^{-1})
Feed	1.500mm/min (0,05 mm/t)
Depth of Cut	ap = 1,5mm Pf = 0,05mm
Coolant	Water Soluble
Machine	Vertical Machining Center (BT40)



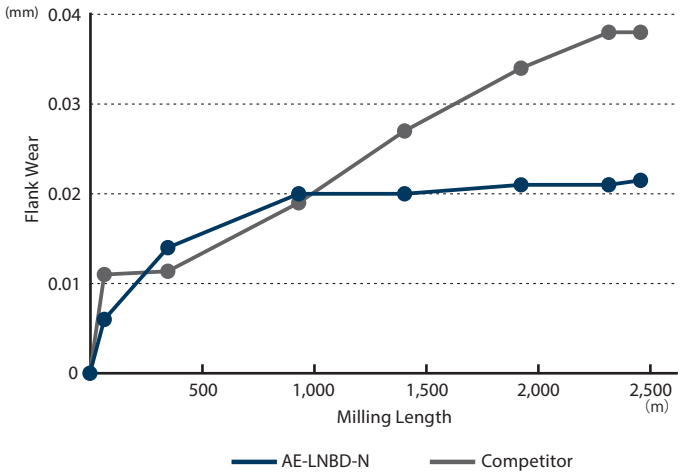
Wear condition of ball flank after milling 420m

DLC-IGUSS	CrN Coating	Cr Coating
		

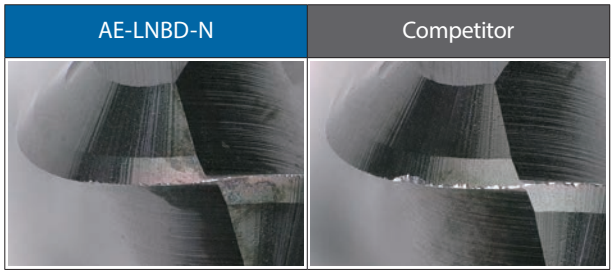
Long Tool Life

DLC-IGUSS coating enables consistent tool wear

Tool	AE-LNBD-N R1X10X4
Work Material	C1100
Milling Method	Pick Milling
Cutting Speed	126m/min (20.000 min^{-1})
Feed	2.000mm/min (0,05 mm/t)
Depth of Cut	ap = 0,2mm (0,1D) Pf = 0,4mm (0,2D)
Coolant	Water Soluble
Machine	Horizontal Machining Center (BT40)

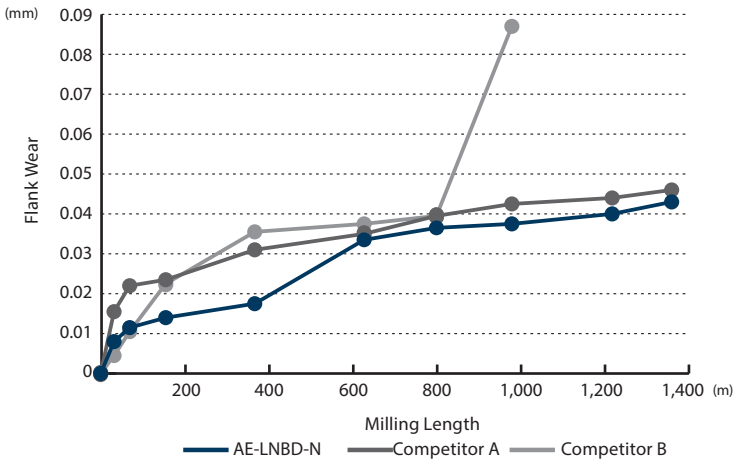


Wear condition of ball flank after milling 2.480m



Exhibits superior endurance in copper tungsten

Tool	AE-LNBD-N R1X10X4
Work Material	Copper Tungsten
Milling Method	Pick Milling
Cutting Speed	101m/min (16.000 min^{-1})
Feed	1.400mm/min (0,04 mm/t)
Depth of Cut	ap = 0,2mm (0,1D) Pf = 0,4mm (0,2D)
Coolant	Water Soluble
Machine	Horizontal Machining Center (BT40)



Wear condition of ball flank

CUTTING DATA

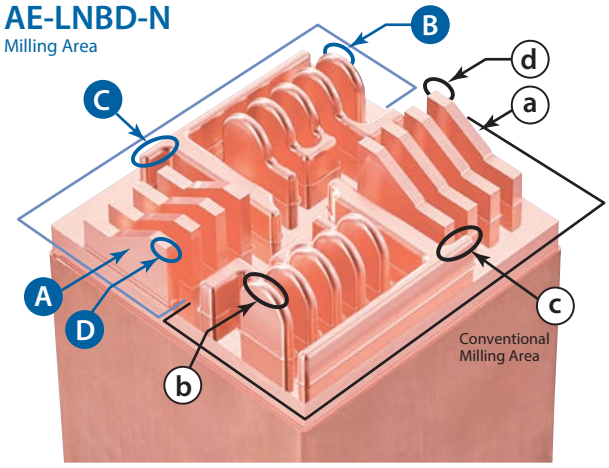
Achieves good machined surface without burrs compared to conventional products

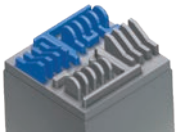
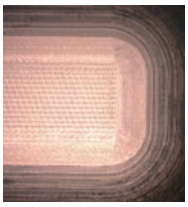
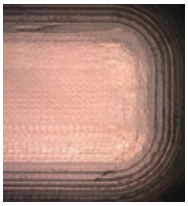
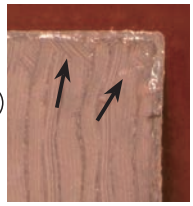
(C1100)
Work Material : Tough-Pitch Copper
Work Size: 60×60 (Milling Depth 10mm)

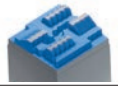
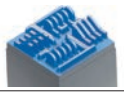
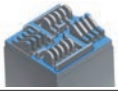
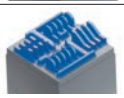
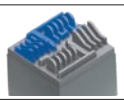
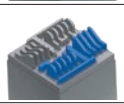
(HSK-E32)
Machine : Vertical Machining Center
Coolant:MQL*

* MQL is used for filming the video.

Watch it in action



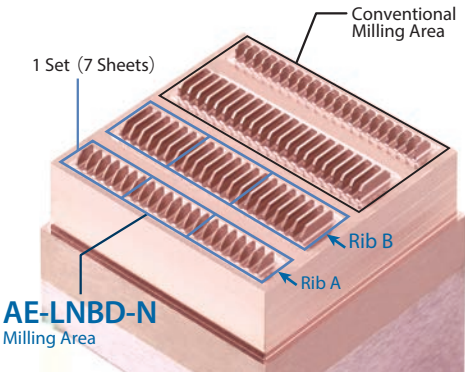
Tool	Process	Condition of Machined Surface			Condition of Burrs
AE-LNBD-N R1×10×4	⑤ 	A  Ra : 0.1125μm	B 	C 	D 
Conventional (Cr Coating) R1×10×4	⑥ 	ⓐ  Ra : 0.19125μm	ⓑ  Tear	ⓒ  Collapse of Shape	ⓓ  Burrs

Process	Milling Part	Milling Process	Tool	Cutting Speed (m/min)	Feed (mm/min)	ap (mm)	Pf (mm)
①	Overall 	Contouring Line Long Flute High Efficiency Roughing	AE-TL-N 3×15	50 (5.300min^{-1})	600 (0,038mm/t)	11	0,3
②	Overall 	Contouring Line Roughing	AE-LNBD-N R1×10×4	105 (16.800min^{-1})	1,500 (0,045mm/t)	0,25	0,25
③	Surface Plane 	Frontal Milling Semi-roughing	AE-TL-N 3×15	50 (5.300min^{-1})	400 (0,025mm/t)	0,1	1
④	Overall 	Contouring Line Semi-finishing	AE-LNBD-N R1×10×4	105 (16.800min^{-1})	1,500 (0,045mm/t)	0,25	0,25
⑤	Left Shape 	Contouring Line High-precision Finishing	AE-LNBD-N R1×10×4	127 (20.160min^{-1})	750 (0,019mm/t)	0,03	0,03
⑥	Right Shape 	Contouring Line High-precision Finishing	Conventional (Cr Coating) R1×10×4	127 (20.160min^{-1})	750 (0,019mm/t)	0,03	0,03

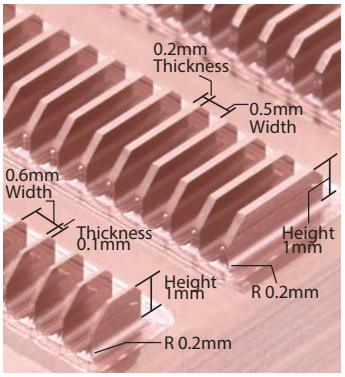
Achieves consistent tool wear over time and machining accuracy compared to conventional products

Work materials of ① and② are processed under the following cutting conditions

Tool	AE-LNBD-N R0,2X1X4	Conventional (Cr Coating)
Work Material	① Copper Tungsten ② Tough-Pitch Copper	
Milling Method	Contour and High Precision Finishing	
Cutting Speed	Vc=75m/min (60.000 min^{-1})	
Feed	Vf=600mm/min (0,005 mm/t)	
Depth of Cut	ap = 0,005mm Pf = 0,005mm	
Coolant	Non-Water Soluble	
Machine	Android II (HSK-E25)	



Work size: 19x19 (milling depth 1mm)

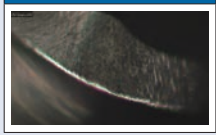
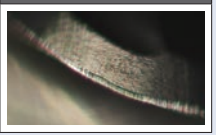


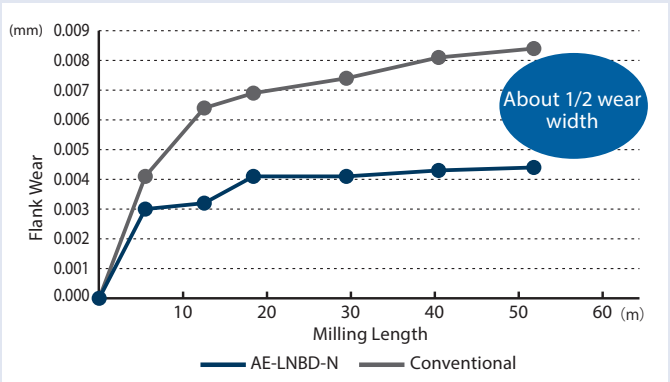
Enlarged photo

① Machining Copper Tungsten

■ Stable wear transition

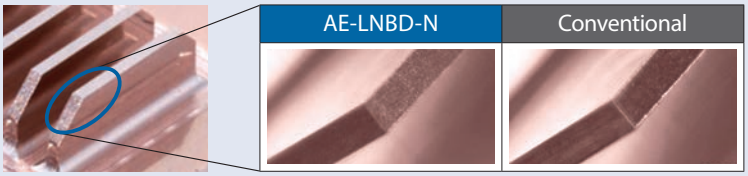
52,1m
Wear comparison after milling 52,1 m

AE-LNBD-N	Conventional
	



②Machining Tough-Pitch Copper

■Good edge without burrs

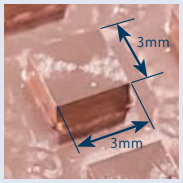


■Stable machining accuracy with little dimensional change

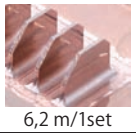
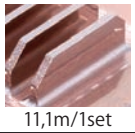
Evaluation method of cutting test

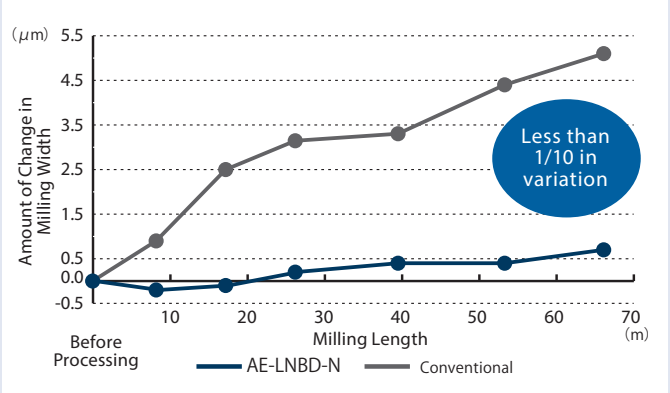
① Milling 1 set of tough-pitch copper ribs (7 sheets)

② Dimensional measurement by processing a copper alloy block for dimensional measurement of each set of ribs



Block of copper alloy for dimensional measurement

Cutting length of 1 set of ribs	
Rib A	Rib B
	
6,2 m/1set	11,1m/1set

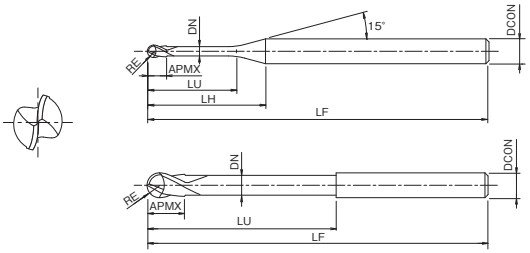


AE-LNBD-N NEW

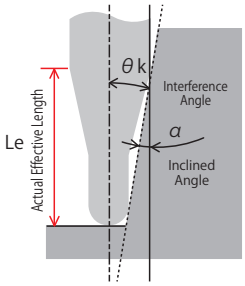
Milling | Solid carbide

Type 1

Type 2



- First choice in quality and performance
- DLC Carbide End Mill for Copper Electrodes
- 2-flute long neck ball type for high precision finishing
- Also for aluminium cast & die cast



N Cu | N W-Cu | N AC, ADC

A | CARBIDE | DLC-IGUSS | 30° | SHANK h4 | SHRINK FIT | R ± 0.002 (RE≦0,2) | R ± 0.003 (0,2<RE≦1,5) | R ± 0.004 (1,5<RE)

EDP	ZEFP	RE	LU	LF	APMX	LH	DCON	DN	Φk	Effective length by inclined angles Le (α)*					Type	Price
										0,5°	1°	1,5°	2°	3°		
3056370	2	R0,05	0,3	45	0,08	7,6	4	0,09	14,52°	0,3	0,31	0,32	0,33	0,36	1	
3056371	2	R0,05	0,5	45	0,08	7,8	4	0,09	14,07°	0,53	0,56	0,59	0,62	0,67	1	
3056372	2	R0,075	0,3	45	0,12	7,5	4	0,135	14,55°	0,3	0,31	0,32	0,33	0,35	1	
3056373	2	R0,075	0,5	45	0,12	7,7	4	0,135	14,12°	0,52	0,55	0,58	0,6	0,65	1	
3056374	2	R0,075	1	45	0,12	8,2	4	0,135	13,29°	1,05	1,1	1,14	1,18	1,27	1	
3056375	2	R0,1	0,3	45	0,16	7,4	4	0,19	14,59°	0,3	0,31	0,32	0,33	0,34	1	
3056376	2	R0,1	0,5	45	0,16	7,6	4	0,19	14,12°	0,53	0,56	0,58	0,61	0,66	1	
3056377	2	R0,1	1	45	0,16	8,1	4	0,19	13,28°	1,06	1,11	1,15	1,19	1,28	1	
3056378	2	R0,1	1,5	45	0,16	8,6	4	0,19	12,53°	1,58	1,65	1,7	1,76	1,9	1	
3056379	2	R0,15	0,6	45	0,24	7,5	4	0,285	14,02°	0,63	0,65	0,68	0,7	0,75	1	
3056380	2	R0,15	1	45	0,24	7,9	4	0,285	13,33°	1,05	1,09	1,13	1,17	1,25	1	
3056381	2	R0,15	1,5	45	0,24	8,4	4	0,285	12,56°	1,57	1,63	1,68	1,74	1,87	1	
3056382	2	R0,15	2	45	0,24	8,9	4	0,285	11,87°	2,09	2,16	2,24	2,32	2,49	1	
3056383	2	R0,2	1	45	0,3	7,7	4	0,38	13,38°	1,04	1,08	1,11	1,15	1,23	1	
3056384	2	R0,2	2	45	0,3	8,7	4	0,38	11,87°	2,08	2,15	2,22	2,3	2,47	1	
3056385	2	R0,2	3	45	0,3	9,7	4	0,38	10,66°	3,12	3,22	3,33	3,45	3,71	1	
3056386	2	R0,2	4	45	0,3	10,7	4	0,38	9,68°	4,15	4,29	4,44	4,6	4,95	1	
3056387	2	R0,25	1	45	0,4	7,6	4	0,475	13,43°	1,03	1,07	1,1	1,13	1,2	1	
3056388	2	R0,25	2	45	0,4	8,6	4	0,475	11,87°	2,07	2,14	2,21	2,28	2,45	1	
3056389	2	R0,25	3	45	0,4	9,6	4	0,475	10,63°	3,11	3,21	3,32	3,43	3,69	1	
3056390	2	R0,25	4	45	0,4	10,6	4	0,475	9,63°	4,14	4,28	4,42	4,58	4,93	1	
3056391	2	R0,25	5	45	0,4	11,6	4	0,475	8,79°	5,18	5,35	5,53	5,73	6,18	1	
3056392	2	R0,3	1	45	0,5	7,3	4	0,55	13,5°	1,02	1,05	1,07	1,1	1,17	1	
3056393	2	R0,3	2	45	0,5	8,3	4	0,55	11,89°	2,06	2,12	2,18	2,25	2,41	1	
3056394	2	R0,3	3	45	0,5	9,3	4	0,55	10,62°	3,09	3,19	3,29	3,4	3,66	1	
3056395	2	R0,3	4	45	0,5	10,3	4	0,55	9,59°	4,12	4,26	4,4	4,55	4,9	1	
3056396	2	R0,3	5	45	0,5	11,3	4	0,55	8,74°	5,16	5,33	5,51	5,7	6,14	1	
3056397	2	R0,3	6	45	0,5	12,3	4	0,55	8,02°	6,19	6,4	6,62	6,85	7,39	1	
3056398	2	R0,4	2	45	0,6	8	4	0,75	11,87°	2,05	2,11	2,17	2,24	2,39	1	
3056399	2	R0,4	3	45	0,6	9,1	4	0,75	10,53°	3,09	3,18	3,28	3,39	3,63	1	
3056400	2	R0,4	4	45	0,6	10	4	0,75	9,46°	4,12	4,25	4,39	4,54	4,88	1	
3056401	2	R0,4	6	45	0,6	12	4	0,75	7,86°	6,19	6,39	6,61	6,84	7,36	1	
3056402	2	R0,4	8	45	0,6	14	4	0,75	6,72°	8,25	8,53	8,82	9,14	9,85	1	
3056403	2	R0,5	2	45	0,8	7,6	4	0,95	11,85°	2,05	2,1	2,16	2,22	2,37	1	
3056404	2	R0,5	3	45	0,8	8,6	4	0,95	10,44°	3,08	3,17	3,27	3,37	3,61	1	
3056405	2	R0,5	4	45	0,8	9,6	4	0,95	9,32°	4,12	4,24	4,38	4,52	4,85	1	
3056406	2	R0,5	5	45	0,8	10,6	4	0,95	8,42°	5,15	5,31	5,49	5,67	6,1	1	
3056407	2	R0,5	6	45	0,8	11,6	4	0,95	7,68°	6,18	6,38	6,59	6,82	7,34	1	
3056408	2	R0,5	8	45	0,8	13,6	4	0,95	6,52°	8,25	8,52	8,81	9,12	9,83	1	
3056409	2	R0,5	10	45	0,8	15,6	4	0,95	5,67°	10,32	10,66	11,03	11,42	12,31	1	
3056410	2	R0,5	12	45	0,8	17,6	4	0,95	5,01°	12,39	12,8	13,24	13,72	14,8	1	
3056411	2	R0,75	4	45	1,2	8,8	4	1,45	8,8°	4,18	4,33	4,46	4,6	4,92	1	
3056412	2	R0,75	6	45	1,2	10,8	4	1,45	7,09°	6,27	6,47	6,68	6,9	7,4	1	
3056413	2	R0,75	12	55	1,2	16,8	4	1,45	4,46°	12,48	12,89	13,33	13,8	14,86	1	

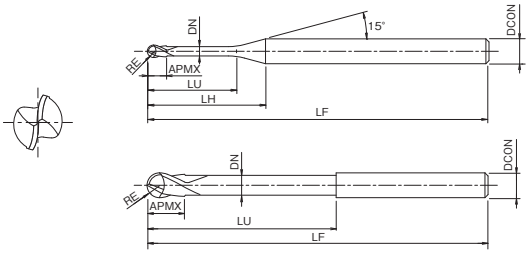
* If there is no value in the actual effective length (Le column) for the work gradient angle α, it indicates no interference.

AE-LNBD-N NEW

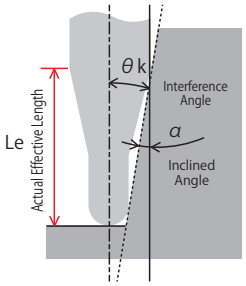
Milling | Solid carbide

Type 1

Type 2



- First choice in quality and performance
- DLC Carbide End Mill for Copper Electrodes
- 2-flute long neck ball type for high precision finishing
- Also for aluminium cast & die cast



N Cu | N W-Cu | N AC, ADC

A | CARBIDE | DLC-IGUSS | 30° | SHANK h4 | SHRINK FIT | R ± 0.002 RE≦0,2 | R ± 0.003 0,2<RE≦1,5 | R ± 0.004 1,5<RE

EDP	ZEFP	RE	LU	LF	APMX	LH	DCON	DN	Φk	Effective length by inclined angles Le (α)*					Type	Price
										0,5°	1°	1,5°	2°	3°		
3056414	2	R0,75	18	55	1,2	22,8	4	1,45	3,25°	18,68	19,31	19,98	20,7	22,32	1	
3056415	2	R1	4	50	1,6	8,2	4	1,95	7,88°	4,22	4,44	4,65	4,86	5,26	1	
3056416	2	R1	6	50	1,6	10,2	4	1,95	6,2°	6,35	6,67	6,96	7,23	7,75	1	
3056417	2	R1	8	50	1,6	12,2	4	1,95	5,1°	8,47	8,87	9,22	9,54	10,24	1	
3056418	2	R1	10	50	1,6	14,2	4	1,95	4,34°	10,58	11,05	11,45	11,84	12,73	1	
3056419	2	R1	12	50	1,6	16,2	4	1,95	3,77°	12,68	13,21	13,67	14,14	15,21	1	
3056420	2	R1	14	50	1,6	18,2	4	1,95	3,33°	14,78	15,36	15,88	16,44	17,7	1	
3056421	2	R1	16	50	1,6	20,2	4	1,95	2,99°	16,87	17,5	18,1	18,74	–	1	
3056422	2	R1	20	60	1,6	24,2	4	1,95	2,47°	21,04	21,78	22,53	23,34	–	1	
3056423	2	R1	25	60	1,6	29,2	4	1,95	2,04°	26,24	27,13	28,07	29,09	–	1	
3056424	2	R1,5	10	55	2,4	15,8	6	2,85	5,95°	10,44	10,83	11,18	11,55	12,37	1	
3056425	2	R1,5	12	55	2,4	17,8	6	2,85	5,23°	12,53	12,98	13,4	13,85	14,85	1	
3056426	2	R1,5	14	55	2,4	19,8	6	2,85	4,67°	14,62	15,12	15,62	16,15	17,34	1	
3056427	2	R1,5	16	55	2,4	21,8	6	2,85	4,21°	16,7	17,26	17,83	18,45	19,83	1	
3056428	2	R1,5	20	55	2,4	25,8	6	2,85	3,53°	20,85	21,54	22,27	23,05	24,8	1	
3056429	2	R1,5	25	65	2,4	30,8	6	2,85	2,93°	26,03	26,89	27,81	28,8	–	1	
3056430	2	R1,5	30	65	2,4	35,8	6	2,85	2,5°	31,2	32,24	33,35	34,54	–	1	
3056431	2	R2	10	60	3,2	14	6	3,85	4,75°	10,42	10,79	11,13	11,47	12,25	1	
3056432	2	R2	15	60	3,2	19	6	3,85	3,37°	15,64	16,16	16,67	17,22	18,47	1	
3056433	2	R2	20	65	3,2	24	6	3,85	2,61°	20,84	21,51	22,21	22,97	–	1	
3056434	2	R2	25	65	3,2	29	6	3,85	2,13°	26,02	26,85	27,75	28,72	–	1	
3056435	2	R2	30	80	3,2	34	6	3,85	1,79°	31,18	32,2	33,3	–	–	1	
3056436	2	R2	40	80	3,2	44	6	3,85	1,37°	41,52	42,9	–	–	–	1	
3056437	2	R3	10	70	4,8	–	6	5,85	–	–	–	–	–	–	2	
3056438	2	R3	15	70	4,8	–	6	5,85	–	–	–	–	–	–	2	
3056439	2	R3	20	70	4,8	–	6	5,85	–	–	–	–	–	–	2	
3056440	2	R3	30	90	4,8	–	6	5,85	–	–	–	–	–	–	2	
3056441	2	R3	50	90	4,8	–	6	5,85	–	–	–	–	–	–	2	

* If there is no value in the actual effective length (Le column) for the work gradient angle α, it indicates no interference.

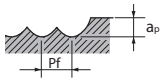
CUTTING CONDITIONS

Milling | Endmills | Cutting conditions

AE-LNBD-N

Work Material		Wrought aluminium alloy A7075				Aluminium alloy casting • Die casting <Si 13%				Copper C1020 - C1100				Copper Tungsten W70% - Cu30%			
RE	LU (mm)	S (min^{-1})	F (mm/min)	Depth of cut (mm)		S (min^{-1})	F (mm/min)	Depth of cut (mm)		S (min^{-1})	F (mm/min)	Depth of cut (mm)		S (min^{-1})	F (mm/min)	Depth of cut (mm)	
				ap	pf			ap	pf			ap	pf			ap	pf
R0,05	0,3	50.000	293	0,005	0,01	43.800	257	0,005	0,01	38.400	225	0,005	0,01	32.000	120	0,005	0,008
R0,05	0,5	50.000	234	0,005	0,01	43.800	205	0,005	0,01	38.400	180	0,005	0,01	32.000	96	0,005	0,008
R0,075	0,3	50.000	335	0,008	0,02	43.800	293	0,008	0,02	38.400	257	0,008	0,02	32.000	137	0,008	0,015
R0,075	0,5	50.000	293	0,008	0,02	43.800	257	0,008	0,02	38.400	225	0,008	0,02	32.000	120	0,008	0,021
R0,075	1	50.000	234	0,005	0,01	43.800	205	0,005	0,01	38.400	180	0,005	0,01	32.000	96	0,005	0,011
R0,1	0,3	50.000	586	0,020	0,04	43.800	513	0,02	0,04	38.400	450	0,02	0,04	32.000	240	0,02	0,03
R0,1	0,5	50.000	586	0,020	0,04	43.800	513	0,02	0,04	38.400	450	0,02	0,04	32.000	240	0,02	0,03
R0,1	1	50.000	293	0,020	0,04	43.800	257	0,02	0,04	38.400	225	0,02	0,04	32.000	120	0,02	0,03
R0,1	1,5	50.000	293	0,020	0,04	43.800	257	0,02	0,04	38.400	225	0,02	0,04	32.000	120	0,02	0,03
R0,15	0,6	50.000	1.172	0,020	0,06	43.800	1.027	0,02	0,06	38.400	900	0,02	0,06	32.000	480	0,02	0,045
R0,15	1	50.000	879	0,020	0,06	43.800	770	0,02	0,06	38.400	675	0,02	0,06	32.000	360	0,02	0,045
R0,15	1,5	50.000	879	0,020	0,06	43.800	770	0,02	0,06	38.400	675	0,02	0,06	32.000	360	0,02	0,045
R0,15	2	50.000	879	0,020	0,06	43.800	770	0,02	0,06	38.400	675	0,02	0,06	32.000	360	0,02	0,045
R0,2	1	50.000	1.172	0,025	0,1	43.800	1.027	0,025	0,1	38.400	900	0,025	0,1	32.000	480	0,025	0,075
R0,2	2	41.300	860	0,025	0,1	37.000	771	0,025	0,1	32.400	675	0,025	0,1	27.000	360	0,025	0,075
R0,2	3	41.300	860	0,025	0,1	37.000	771	0,025	0,1	32.400	675	0,025	0,1	27.000	360	0,025	0,075
R0,2	4	41.300	860	0,01	0,06	37.000	771	0,01	0,06	32.400	675	0,01	0,06	27.000	360	0,01	0,045
R0,25	1	50.000	1.465	0,04	0,1	43.800	1.283	0,04	0,1	38.400	1.125	0,04	0,1	32.000	600	0,04	0,075
R0,25	2	50.000	1.172	0,04	0,1	43.800	1.027	0,04	0,1	38.400	900	0,04	0,1	32.000	480	0,04	0,075
R0,25	3	41.300	860	0,04	0,1	37.000	771	0,04	0,1	32.400	675	0,04	0,1	27.000	360	0,04	0,075
R0,25	4	41.300	860	0,04	0,1	37.000	771	0,04	0,1	32.400	675	0,04	0,1	27.000	360	0,04	0,075
R0,25	5	32.100	573	0,04	0,1	28.700	513	0,04	0,1	25.200	450	0,04	0,1	21.000	240	0,04	0,075
R0,3	1	50.000	2.930	0,09	0,12	43.800	2.566	0,09	0,12	38.400	2.250	0,09	0,12	32.000	1.440	0,08	0,12
R0,3	2	50.000	2.198	0,09	0,12	43.800	1.925	0,09	0,12	38.400	1.688	0,09	0,12	32.000	1.080	0,08	0,12
R0,3	3	46.000	1.199	0,09	0,12	41.000	1.068	0,09	0,12	36.000	938	0,09	0,12	30.000	600	0,08	0,12
R0,3	4	45.900	1.196	0,09	0,12	41.000	1.068	0,09	0,12	36.000	938	0,09	0,12	30.000	600	0,08	0,12
R0,3	5	45.900	1.196	0,09	0,12	41.000	1.068	0,09	0,12	36.000	938	0,09	0,12	30.000	600	0,08	0,12
R0,3	6	38.300	719	0,09	0,12	34.000	638	0,09	0,12	30.000	563	0,09	0,12	25.000	360	0,08	0,12
R0,4	2	41.300	2.152	0,12	0,16	37.000	1.928	0,12	0,16	32.400	1.688	0,12	0,16	27.000	1.080	0,11	0,16
R0,4	3	41.300	2.152	0,12	0,16	37.000	1.928	0,12	0,16	32.400	1.688	0,12	0,16	27.000	1.080	0,11	0,16
R0,4	4	41.300	2.152	0,12	0,16	37.000	1.928	0,12	0,16	32.400	1.688	0,12	0,16	27.000	1.080	0,11	0,16
R0,4	6	36.700	1.195	0,12	0,12	32.800	1.068	0,12	0,12	28.800	938	0,12	0,12	24.000	600	0,11	0,12
R0,4	8	33.700	719	0,12	0,12	30.100	642	0,12	0,12	26.400	563	0,12	0,12	22.000	360	0,11	0,12
R0,5	2	42.800	2.388	0,15	0,2	38.300	2.137	0,15	0,2	33.600	1.875	0,15	0,2	28.000	1.200	0,14	0,2
R0,5	3	42.800	2.388	0,15	0,2	38.300	2.137	0,15	0,2	33.600	1.875	0,15	0,2	28.000	1.200	0,14	0,2
R0,5	4	42.800	2.388	0,15	0,2	38.300	2.137	0,15	0,2	33.600	1.875	0,15	0,2	28.000	1.200	0,14	0,2
R0,5	5	32.100	1.433	0,15	0,2	28.700	1.281	0,15	0,2	25.200	1.125	0,15	0,2	21.000	720	0,14	0,2
R0,5	6	32.100	1.433	0,15	0,2	28.700	1.281	0,15	0,2	25.200	1.125	0,15	0,2	21.000	720	0,14	0,2
R0,5	8	32.100	1.433	0,15	0,15	28.700	1.281	0,15	0,15	25.200	1.125	0,15	0,15	21.000	720	0,14	0,15
R0,5	10	27.500	955	0,12	0,12	24.600	854	0,12	0,12	21.600	750	0,12	0,12	18.000	480	0,11	0,12
R0,5	12	27.500	955	0,12	0,12	24.600	854	0,12	0,12	21.600	750	0,12	0,12	18.000	480	0,11	0,12
R0,75	4	30.600	2.869	0,24	0,3	27.400	2.569	0,24	0,3	24.000	2.250	0,24	0,3	20.000	1.440	0,22	0,3
R0,75	6	27.500	2.387	0,24	0,3	24.600	2.135	0,24	0,3	21.600	1.875	0,24	0,3	18.000	1.200	0,22	0,3
R0,75	12	26.000	1.434	0,24	0,24	23.300	1.285	0,24	0,24	20.400	1.125	0,24	0,24	17.000	720	0,22	0,24
R0,75	18	19.900	957	0,18	0,18	17.800	856	0,18	0,18	15.600	750	0,18	0,18	13.000	480	0,16	0,18
R1	4	25.200	3.341	0,3	0,56	22.600	2.996	0,3	0,56	19.800	2.625	0,3	0,56	16.500	1.680	0,27	0,56
R1	6	25.200	3.341	0,3	0,56	22.600	2.996	0,3	0,56	19.800	2.625	0,3	0,56	16.500	1.680	0,27	0,56
R1	8	25.200	3.341	0,3	0,56	22.600	2.996	0,3	0,56	19.800	2.625	0,3	0,56	16.500	1.680	0,27	0,56
R1	10	21.400	2.388	0,3	0,56	19.200	2.143	0,3	0,56	16.800	1.875	0,3	0,56	14.000	1.200	0,27	0,56
R1	12	21.400	2.388	0,3	0,56	19.200	2.143	0,3	0,56	16.800	1.875	0,3	0,56	14.000	1.200	0,27	0,56
R1	14	21.400	2.388	0,3	0,56	19.200	2.143	0,3	0,56	16.800	1.875	0,3	0,56	14.000	1.200	0,27	0,56
R1	16	21.400	2.388	0,3	0,42	19.200	2.143	0,3	0,42	16.800	1.875	0,3	0,42	14.000	1.200	0,27	0,42
R1	20	16.800	1.194	0,3	0,42	15.000	1.066	0,3	0,42	13.200	938	0,3	0,42	11.000	600	0,27	0,42
R1	25	16.800	1.194	0,3	0,42	15.000	1.066	0,3	0,42	13.200	938	0,3	0,42	11.000	600	0,27	0,42
R1,5	10	18.400	2.875	0,4	0,84	16.400	2.563	0,4	0,84	14.400	2.250	0,4	0,84	12.000	1.440	0,36	0,84
R1,5	12	15.300	2.869	0,4	0,84	13.700	2.569	0,4	0,84	12.000	2.250	0,4	0,84	10.000	1.440	0,36	0,84
R1,5	14	15.300	2.869	0,4	0,84	13.700	2.569	0,4	0,84	12.000	2.250	0,4	0,84	10.000	1.440	0,36	0,84
R1,5	16	15.300	1.434	0,4	0,84	13.700	1.284	0,4	0,84	12.000	1.125	0,4	0,84	10.000	720	0,36	0,84
R1,5	20	15.300	1.434	0,4	0,84	13.700	1.284	0,4	0,84	12.000	1.125	0,4	0,84	10.000	720	0,36	0,84
R1,5	25	15.300	1.434	0,4	0,84	13.700	1.284	0,4	0,84	12.000	1.125	0,4	0,84	10.000	720	0,36	0,84
R1,5	30	13.800	1.199	0,4	0,84	12.300	1.068	0,4	0,84	10.800	938	0,4	0,84	9.000	600	0,36	0,84
R2	10	13.800	3.833	1,0	1,28	12.300	3.417	1	1,28	10.800	3.000	1,0	1,3	9.000	1.920	0,9	1,3
R2	15	13.800	2.875	1,0	1,28	12.300	2.563	1	1,28	10.800	2.250	1,0	1,3	9.000	1.440	0,9	1,3
R2	20	10.700	1.911	1,0	1,28	9.600	1.714	1	1,28	8.400	1.500	1,0	1,3	7.000	960	0,9	1,3
R2	25	10.700	1.911	1,0	1,28	9.600	1.714	1	1,28	8.400	1.500	1,0	1,3	7.000	960	0,9	1,3
R2	30	10.700	1.911	0,8	1,28	9.600	1.714	0,8	1,28	8.400	1.500	0,8	1,3	7.000	960	0,7	1,3
R2	40	7.700	1.204	0,7	1,28	6.800	1.063	0,7	1,28	6.000	938	0,7	1,3	5.000	600	0,6	1,3
R3	10	13.800	4.313	1,2	1,8	12.300	3.844	1,2	1,8	10.800	3.375	1,2	1,8	9.000	2.160	1,1	1,8
R3	15	13.800	4.313	1,2	1,8	12.300	3.844	1,2	1,8	10.800	3.375	1,2	1,8	9.000	2.160	1,1	1,8
R3	20	10.700	2.388	1,2	1,8	9.600	2.143	1,2	1,8	8.400	1.875	1,2	1,8	7.000	1.200	1,1	1,8
R3	30	9.200	2.396	1,2	1,8	8.200	2.135	1,2	1,8	7.200	1.875	1,2	1,8	6.000	1.200	1,1	1,8
R3	50	7.700	1.444	0,8	1,8	6.800	1.275	0,8	1,8	6.000	1.125	0,8	1,8	5.000	720	0,7	1,8

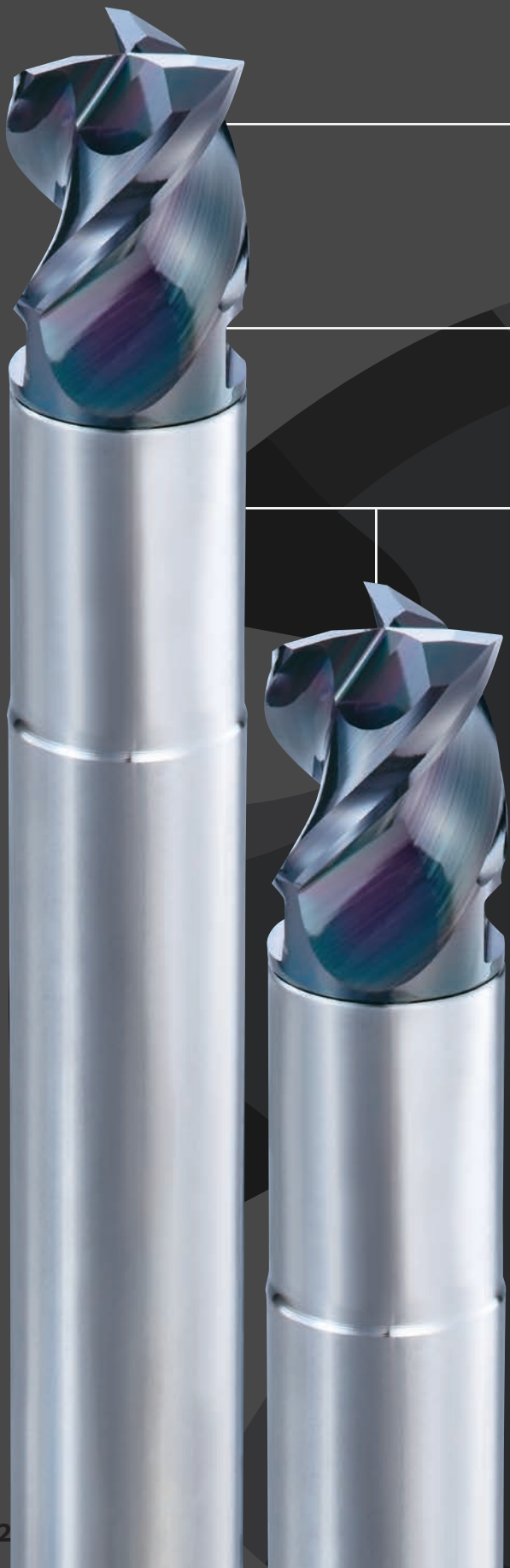
Depth of cut



1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Use a water soluble fluid.
4. Use a non-water-soluble cutting fluid if the machined surface and accuracy are of critical importance.
   Adjust the depth of cut and feed rate as necessary.
5. Always use a cutting fluid recommended by the cutting fluid manufacturer as the workpiece may discolor.

Caution : Sparks generated during operation or heat caused by tool breakage can cause fire.
Be sure to use all proper fire-prevention measures.

KEY FEATURES: PXAL



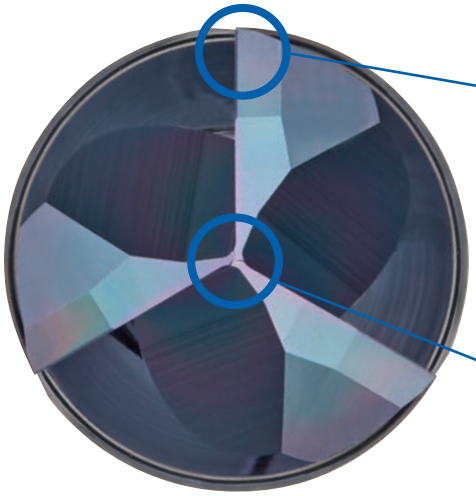
1 Suitable for large-diameter milling with high surface quality

2 Exchangeable Head End Mill PXM for Non-Ferrous Materials

3 DLC-IGUSS Coating

Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Moreover, tool durability is also improved.

SUITABLE FOR LARGE-DIAMETER MILLING WITH HIGH SURFACE QUALITY



Flat cutting edge

Achieves higher precision machined surface quality

Large core design

High rigidity prevents chattering

Center cutting edge

Can be used for plunging

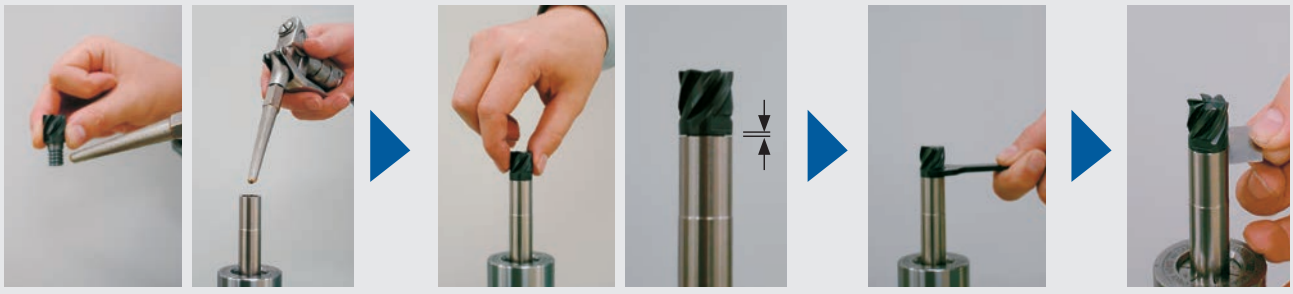
Utilizes XP4625 grade suitable for non-ferrous metal applications

By adopting a grade optimal for non-ferrous materials such as aluminum alloy, excellent wear resistance, welding resistance, and long tool life can be achieved.

Abundant lineup in various shapes and styles

An abundant lineup including square type, radius type, and reduced shank type are available to accommodate a wide range of applications.

Tightening procedure



1. Cleaning

Remove dirt and chips from the connecting thread and shank.

2. Initial Tightening

Tighten by hand

3. Final Tightening

Tighten with a spanner wrench

4. Confirmation

Confirm that there is no gap

Cautions during use

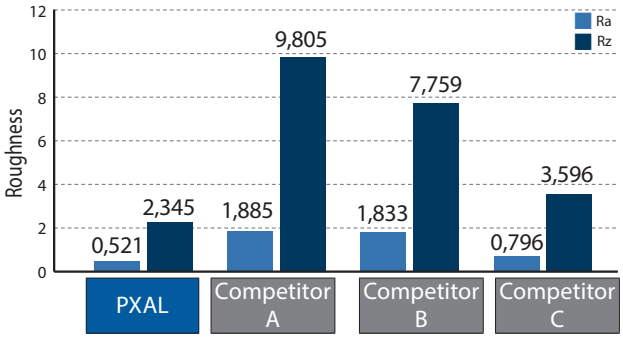
· Only use the spanner wrenches that are designed specifically for the PXM (P. 13). Please do not use alternative spanner wrenches sold on the market as a replacement.
· Please tighten until the head and the shank holder faces meet. Confirm that there is no gap.
· Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
· Please make sure that the spanner wrench is inserted properly and turn it slowly during use.

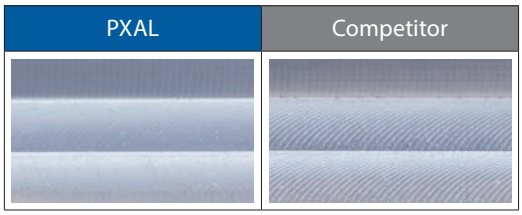
CUTTING DATA

Improved surface roughness by the effect of the flat cutting edge specification

Tool	Head: PXAL160C16-03R000 Holder: PXMZ-C16SS16-S100	Non-coated Competitor A, B, C
Size	Ø16	Ø16 3 flutes
Work Material	A7075	
Milling Method	Side Milling	
Cutting Speed	600m/min (12.000min^{-1})	
Feed	5.400mm/min(0.15mm/t)	
Depth of Cut	ap =8mm (0,5D) ae=4,8mm (0,3D)	
Overhang Length	50mm (L/D= 3,1)	
Coolant	Water Soluble	
Machine	Vertical Machining Center (BT40)	

Bottom surface roughness after milling 465 m

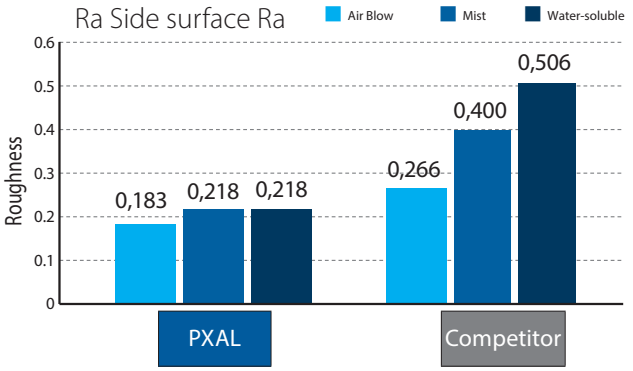


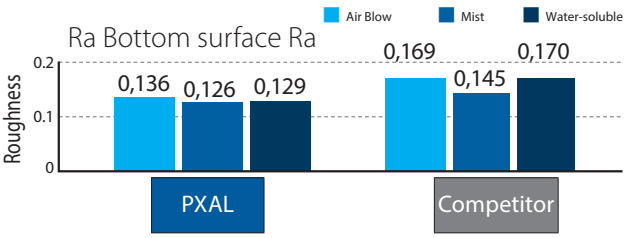


Achieves good surface finish regardless of coolant type

Tool	Head: PXAL160C16-03R000 Holder: PXMZ-C16SS16-S100	Non-coated Competitor
Size	Ø16	Ø16 3 flutes
Work Material	A7075	
Milling Method	Side Milling	
Cutting Speed	600m/min (12.000min^{-1})	
Feed	2.700mm/min(0.075mm/t)	
Depth of Cut	ap =8mm (0,5D) ae=4,8mm (0,3D)	
Overhang Length	50mm (L/D= 3,1)	
Machine	Vertical Machining Center (BT40)	

Surface roughness after milling 462 m

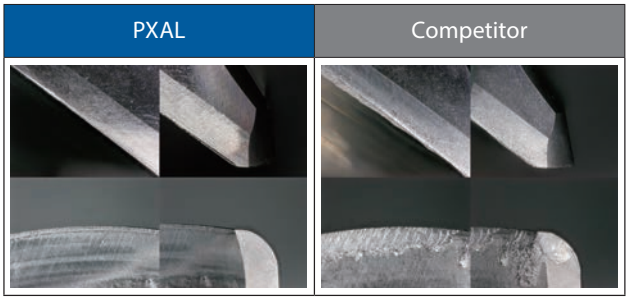




Welding suppression by DLC coating

Tool	Head: PXAL160C16-03R010 Holder: PXMZ-C16SS16-S100	Non-coated Competitor
Size	Ø16 x R1	Ø16 x R1 3 flutes
Work Material	A7075	
Cutting Speed	600m/min (12.000min^{-1})	
Feed	2.700mm/min(0.075mm/t)	
Milling Method	Side Milling	
Depth of Cut	ap =8mm (0,5D) ae=4,8mm (0,3D)	
Overhang Length	50mm	
Coolant	None Air Blow	
Machine	Vertical Machining Center (BT40)	

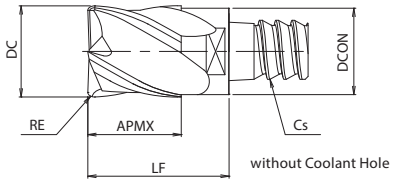
Cutting edge condition after milling 300 m



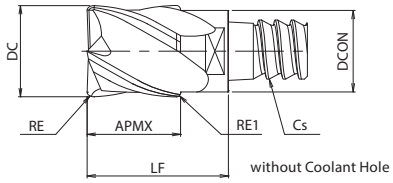
PXAL HEADS

Milling | Indexables

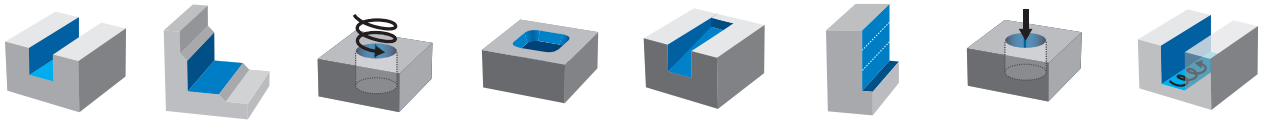
Type 1



Type 2



- Exchangeable Head End Mill
- Square, Corner Radius Type
- 3 flutes
- Non-ferrous materials, 10 -25 mm

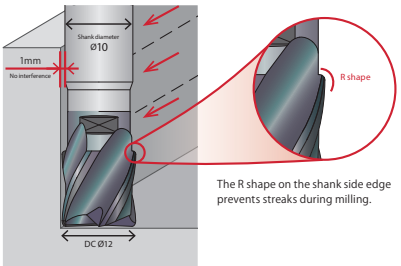


EDP	Designation	ZEFP	DC	RE	LF	FHA Helix Angle	APMX	DCON	Cs	Grade	Type	Price
7834930	PXAL100C10-03R000	3	10	0	16	45°	10	9,8	C10	XP4625	1	
7834931	PXAL100C10-03R100	3	10	1	16	45°	10	9,8	C10	XP4625	1	
7834932	PXAL100C10-03R250	3	10	2,5	16	45°	10	9,8	C10	XP4625	1	
7834933	PXAL120C10-03R000	3	12 ★	0	18	45°	12	9,8	C10	XP4625	2	
7834934	PXAL120C12-03R000	3	12	0	18	45°	12	11,7	C12	XP4625	1	
7834935	PXAL120C12-03R100	3	12	1	18	45°	12	11,7	C12	XP4625	1	
7834936	PXAL120C12-03R300	3	12	3	18	45°	12	11,7	C12	XP4625	1	
7834937	PXAL140C12-03R000	3	14 ★	0	20	45°	14	11,7	C12	XP4625	2	
7834938	PXAL160C16-03R000	3	16	0	23,5	45°	16	15,7	C16	XP4625	1	
7834939	PXAL160C16-03R100	3	16	1	23,5	45°	16	15,7	C16	XP4625	1	
7834940	PXAL160C16-03R200	3	16	2	23,5	45°	16	15,7	C16	XP4625	1	
7834941	PXAL160C16-03R300	3	16	3	23,5	45°	16	15,7	C16	XP4625	1	
7834942	PXAL160C16-03R400	3	16	4	23,5	45°	16	15,7	C16	XP4625	1	
7834943	PXAL180C16-03R000	3	18 ★	0	25,5	45°	18	15,7	C16	XP4625	2	
7834944	PXAL200C20-03R000	3	20	0	27,5	45°	20	19,6	C20	XP4625	1	
7834945	PXAL200C20-03R100	3	20	1	27,5	45°	20	19,6	C20	XP4625	1	
7834946	PXAL200C20-03R200	3	20	2	27,5	45°	20	19,6	C20	XP4625	1	
7834947	PXAL200C20-03R300	3	20	3	27,5	45°	20	19,6	C20	XP4625	1	
7834948	PXAL200C20-03R400	3	20	4	27,5	45°	20	19,6	C20	XP4625	1	
7834949	PXAL220C20-03R000	3	22 ★	0	29,5	45°	22	19,6	C20	XP4625	2	
7834950	PXAL250C25-03R000	3	25	0	35	45°	25	24	C25	XP4625	1	
7834951	PXAL250C25-03R100	3	25	1	35	45°	25	24	C25	XP4625	1	
7834952	PXAL250C25-03R300	3	25	3	35	45°	25	24	C25	XP4625	1	
7834953	PXAL250C25-03R500	3	25	5	35	45°	25	24	C25	XP4625	1	

★ PXAL
Reduced Shank Type

- The outer diameter of the reduced shank type is larger than the shank diameter, making it highly effective in the processing of die and mold applications that require vertical wall milling or pocketing.

Example

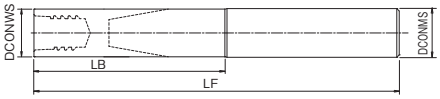


The R shape on the shank side edge prevents streaks during milling.

PXMZ

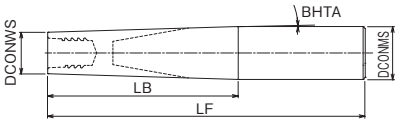
Milling | Indexables

Type 1



without Coolant Hole

Type 2



without Coolant Hole

- Straight Shank Holder for PXM
- Carbide Shank
- Shank & matching spanner sold as set

Head + LB

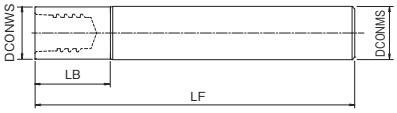
EDP	Designation	DCONWS	DCONMS	BHTA	LF	LB	Head + LB PXAL DC Ø10, 12, 16, 20, 25	Head + LB PXAL DC Ø12, 14, 18, 22 Reduced Shank Type	CS	Type	Price
48174025	PXMZ-C10SS10-S075CS	9,8	10	0°	75	17,3	33,3	35,3	C10	1	
48174023	PXMZ-C10SS10-L100CS	9,8	10	0°	100	37,3	53,3	55,3	C10	1	
48174026	PXMZ-C10TP12-LL130CS	9,8	12	0,9°	130	67	83	85	C10	2	
48174008	PXMZ-C12SS12-S075CS	11,7	12	0°	75	24	42	44	C12	1	
48174009	PXMZ-C12SS12-L100CS	11,7	12	0°	100	45,9	63,9	65,9	C12	1	
48174010	PXMZ-C12SS12-L115CS	11,7	12	0°	115	64,2	82,2	84,2	C12	1	
48174011	PXMZ-C12TP16-LL135CS	11,7	16	1,3°	135	83,8	101,8	103,8	C12	2	
48174012	PXMZ-C16SS16-S090CS	15,7	16	0°	90	39,2	62,7	64,7	C16	1	
48174013	PXMZ-C16SS16-L130CS	15,7	16	0°	130	61,2	84,7	86,7	C16	1	
48174014	PXMZ-C16SS16-L135CS	15,7	16	0°	135	84,2	107,7	109,7	C16	1	
48174015	PXMZ-C16TP20-LL165CS	15,7	20	1,1°	165	115	138,5	140,5	C16	2	
48174016	PXMZ-C20SS20-S090CS	19,6	20	0°	90	39,1	66,6	68,6	C20	1	
48174017	PXMZ-C20SS20-L150CS	19,6	20	0°	150	78,4	105,9	107,9	C20	1	
48174018	PXMZ-C20SS20-L180CS	19,6	20	0°	180	109,1	136,6	138,6	C20	1	
48174019	PXMZ-C20TP25-LL200CS	19,6	25	1,1°	200	140	167,5	169,5	C20	2	
48174020	PXMZ-C25SS25-L200CS	24	25	0°	200	96,6	131,6	–	C25	1	

1. Adjust the position of the coolant nozzles accordingly so that the chips do not get tangled.
2. Also compatible with PXMZ shank holder with coolant hole.

PXMZ

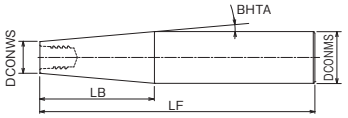
Milling | Indexables

Type 1



without Coolant Hole

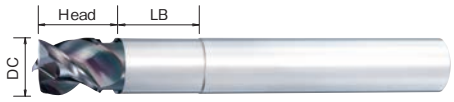
Type 2



without Coolant Hole

- Straight Shank Holder for PXM
- Steel Shank
- Shank & matching spanner sold as set

Head + LB



EDP	Designation	DCONWS	DCONMS	BHTA	LF	LB	Head + LB PXAL DC Ø10, 12, 16, 20, 25	Head + LB PXAL DC Ø12, 14, 18, 22 Reduced Shank Type	CS	Type	Price
48174021	PXMZ-C10SS10-S075	9,8	10	0°	75	12	28	30	C10	1	
48174001	PXMZ-C12SS12-S100	11,7	12	0°	100	18	36	38	C12	1	
48174002	PXMZ-C12TP20-S145	11,7	20	5°	145	47.4	65.4	67.4	C12	2	
48174003	PXMZ-C16SS16-S100	15,7	16	0°	100	23	46.5	48.5	C16	1	
48174004	PXMZ-C16TP25-S155	15,7	25	5°	155	53.1	76.6	78.6	C16	2	
48174005	PXMZ-C20SS20-S120	19,6	20	0°	120	28	55.5	57.5	C20	1	
48174006	PXMZ-C20TP32-S170	19,6	32	5°	170	70.8	98.3	100.3	C20	2	
48174007	PXMZ-C25SS25-S140	24	25	0°	140	34.5	69.5	—	C25	1	

1. Adjust the position of the coolant nozzles accordingly so that the chips do not get tangled.
2. Also compatible with PXMZ shank holder with coolant hole.

Accessories

Tool	EDP	Designation	Applicable Head Dia.	Cs	Recommended Tightening Torque	Price
Spanner	7801890	PXMP8-10	Ø10, Ø12	C10	10N•m	
	7801890	PXMP8-10	Ø12, Ø14	C12	12N•m	
	7801891	PXMP13-16	Ø16, Ø18	C16	30N•m	
	7801891	PXMP13-16	Ø20, Ø22	C20	50N•m	
	7801892	PXMP21	Ø25	C25	60N•m	

1. Please refer to p.21 for cautions during use.
2. Please refer to the table above for tightening torque.
3. Contact your nearest OSG sales representative for details of our dedicated adjustable torque wrench for tightening inserts.

CUTTING CONDITIONS

PXAL

Side milling L/D≤3

Ø	S (min^{-1})	F (mm/min)
	Aluminum Alloy Expanding Material A5052 • A7075	
10	16.000	4.800
12	13.300	3.990
14	11.400	3.420
16	10.000	3.600
18	8.900	3.210
20	8.000	3.840
22	7.300	3.510
25	6.400	3.840

Depth of cut	ap	ae
	0,7 D	0,2 D

PXAL

Side milling 3<L/D≤5

Ø	S (min^{-1})	F (mm/min)
	Aluminum Alloy Expanding Material A5052 • A7075	
10	9.600	2.310
12	8.000	1.920
14	6.900	1.660
16	6.000	1.730
18	5.400	1.560
20	4.800	1.850
22	4.400	1.690
25	3.900	1.880

Depth of cut	ap	ae
	0,7 D	0,08 D

PXAL

Side milling 5<L/D≤7

Ø	S (min^{-1})	F (mm/min)
	Aluminum Alloy Expanding Material A5052 • A7075	
10	6.400	1.390
12	5.400	1.170
14	4.600	1.000
16	4.000	1.040
18	3.600	940
20	3.200	1.110
22	2.900	1.010
25	2.600	1.130

Depth of cut	ap	ae
	0,7 D	0,04 D

CUTTING CONDITIONS

PXAL

Slot milling L/D≤3

	Aluminum Alloy Expanding Material A5052 • A7075	
Ø	S (min^{-1})	F (mm/min)
10	16.000	4.800
12	13.300	3.990
14	11.400	3.420
16	10.000	3.000
18	8.900	2.670
20	8.000	2.400
22	7.300	2.190
25	6.400	1.920
Depth of cut	ap 0,5 D	

PXAL

Slot milling 3<L/D≤5

	Aluminum Alloy Expanding Material A5052 • A7075	
Ø	S (min^{-1})	F (mm/min)
10	9.600	2.160
12	8.000	1.800
14	6.900	1.560
16	6.000	1.350
18	5.400	1.220
20	4.800	1.080
22	4.400	990
25	3.900	880
Depth of cut	ap 0,35 D	

PXAL

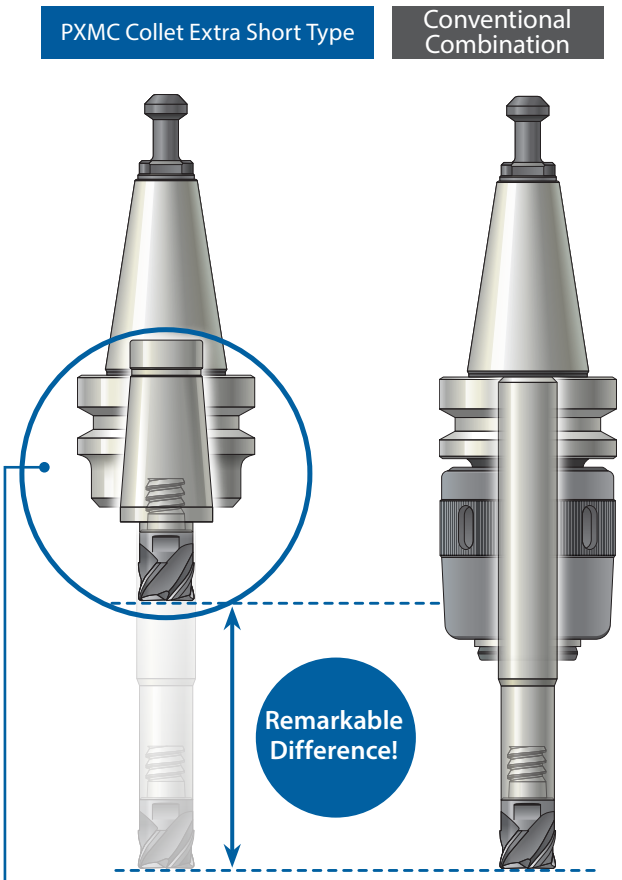
Slot milling 5<L/D≤7

	Aluminum Alloy Expanding Material A5052 • A7075	
Ø	S (min^{-1})	F (mm/min)
10	6.400	960
12	5.400	810
14	4.600	690
16	4.000	600
18	3.600	540
20	3.200	480
22	2.900	440
25	2.600	390
Depth of cut	ap 0,2 D	

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the depth of cut is large or when machines with low rigidity are used.
3. Please adjust the cutting condition when the overhang length is longer.
4. Please consider the overhang length as the total length of replaceable head and overhang length of shank holder.
5. When milling copper and copper alloys, lower the rotational speed by 20 to 40%, feed rate by 50 to 80%, and cutting depth by ap 50 to 80% in accordance with the table above.
6. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

KEY FEATURES: PXMC COLLET

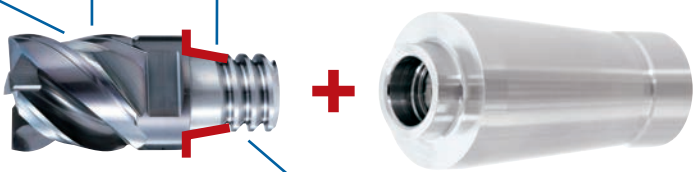
1. Powerful chip evacuation even on small machining center
2. The reduction of overhang length improves rigidity and rotational balance
3. A wide variety of exchangeable heads
   · Suitable for steel, stainless steel and aluminum
   · Wide processing range from roughing to finishing
4. Greater cost performance compared to monoblock type holders, only need to change the collet in case of trouble.



KEY FEATURES: PXM EXCHANGEABLE HEAD

All the knowledge and know-how acquired by designing solid carbide end mills are found in these exchangeable heads.
·Various types are available to meet variety of machining methods.

End Face + Taper = Double Face Clamping
·High rigidity and accuracy of tightening
·High precision of run out≤0,015mm
·High head replacing accuracy = ±0.03mm



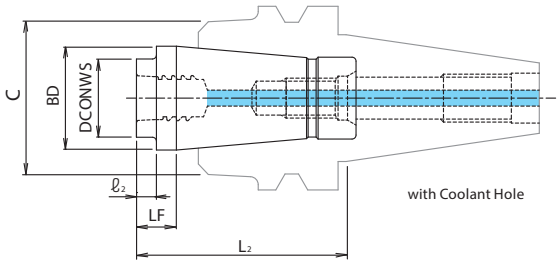
Applying buttress screw makes easy and reduces time to desorb heads

PXMC COLLET

Milling | Collets

Short

Extra Short

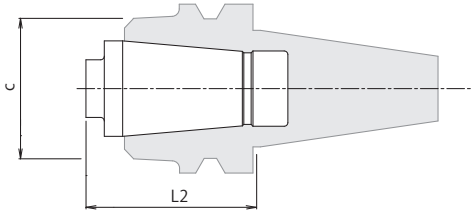


- PXMC collet for PHOENIX PXM series.
- With coolant hole
- Reducing overhang length allows high rigidity

EDP	Designation	DCONWS	BD	LF	l2	HEAD + l2		Cs	Type	Price
						PXAL DC				
						Ø 12,16, 20, 25	Ø 14, 18, 22 Reduced Shank Type			
7834001	PXMC-C1205	11,7	26	10,5	5	23	25	C12	Extra Short	
7834002	PXMC-C1605	15,7	26	10,5	5	28,5	30,5	C16	Extra Short	
7834003	PXMC-C2005	19,6	26	10,5	5	32,5	34,5	C20	Extra Short	
7834004	PXMC-C2505	24,0	26	10,5	5	40	-	C25	Extra Short	
7834011	PXMC-C1230	11,7	26	35,5	30	48	50	C12	Short	
7834012	PXMC-C1630	15,7	26	35,5	30	53,5	55,5	C16	Short	
7834013	PXMC-C2030	19,6	26	35,5	30	57,5	59,5	C20	Short	
7834014	PXMC-C2530	24,0	26	35,5	30	65	-	C25	Short	

HY-PRO HOLDER

Milling | Holders



- HY-PRO holder for PXMC collet

EDP	Designation	C	L2		Price
			Extra short	Short	
8910000	BT30-SLK12-35 P30T-1(MAS1)	38	45,5	70,5	
8910001	BT30-SLK12-35 P30T-2(MAS2)	38	45,5	70,5	
8910002	BT40-SLK12-45	38	55,5	80,5	
8910003	BT40-SLK12-75	38	85,5	110,5	
8910005	A63-SLK12-75	38	85,5	110,5	
8910006	A63-SLK12-135	38	145,5	170,5	

CUTTING CONDITIONS

PXAL + PXMC

Side milling Extra Short Type

Aluminum Alloy Expanding Material A5052 • A7075		
Ø	S (min^{-1})	F (mm/min)
12	10.000	3.000
14	10.000	3.000
16	10.000	3.000
18	8.900	3.210
20	8.000	2.880
22	7.300	3.510
25	6.400	3.080

Depth of cut

ap	ae
0,7 D	0,2 D

PXAL + PXMC

Slot milling Extra Short Type

Aluminum Alloy Expanding Material A5052 • A7075		
Ø	S (min^{-1})	F (mm/min)
12	10.000	3.000
14	10.000	3.000
16	10.000	3.000
18	8.900	2.670
20	8.000	2.400
22	7.300	2.190
25	6.400	1.920

Depth of cut

ap
0,5 D

1. Please adjust speed and feed when the depth of cut is large or machines with low rigidity are used.
2. When milling copper and copper alloys, lower the rotational speed by 20 to 40%, feed rate by 50 to 80%, and cutting depth by ap 50 to 80% in accordance with the table above.
3. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

CUTTING CONDITIONS

PXAL + PXMC

Side milling Short Type

Aluminum Alloy Expanding Material A5052 • A7075		
Ø	S (min^{-1})	F (mm/min)
12	10.000	2.700
14	10.000	2.700
16	10.000	2.700
18	8.900	2.890
20	8.000	2.600
22	7.300	3.160
25	6.400	2.770

Depth of cut

ap	ae
0,7 D	0,2 D

PXAL + PXMC

Slot milling Short Type

Aluminum Alloy Expanding Material A5052 • A7075		
Ø	S (min^{-1})	F (mm/min)
12	10.000	2.700
14	10.000	2.700
16	10.000	2.700
18	8.900	2.410
20	8.000	2.160
22	7.300	1.980
25	6.400	1.730

Depth of cut

ap
0,5 D

1. Please adjust speed and feed when the depth of cut is large or machines with low rigidity are used.
2. When milling copper and copper alloys, lower the rotational speed by 20 to 40%, feed rate by 50 to 80%, and cutting depth by ap 50 to 80% in accordance with the table above.
3. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

MOUNTING PROCEDURE

1. Initial Tightening (BT30)

Make sure the fastening portion of the collet is clean then insert it into the holder. Turn the pull stud to tighten.

*For models other than BT30 please refer to the instructions below.

2. Final Tightening

Tighten with a spanner wrench

3. Cleaning

Remove dirt and chips from the connecting thread and collet

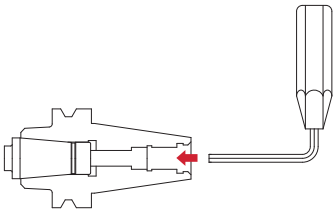
4. Mounting the Head

After screwing the head in by hand, use the PXM spanner wrench to tighten.

Mounting procedure for holders other than BT30

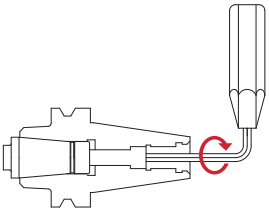
①

Insert the hexagon socket wrench into the pull screw hexagonal section.
*For pull studs with holes (φ6 or above), it is operational with the stud being attached.



②

To prevent the collet from rotating, support the tip of the collet by hand, tighten with the wrench by turning to the right, then fastening to the required torque.
*Recommended tightening torque: 18N·m



Cautions during use

- Only use the spanner wrenches that are designed specifically for the PXM (p.24) for attaching PXM heads . Please do not use alternative spanner wrenches sold on the market as a replacement.
- Please refer to p.24 for tightening torque.
- Please tighten until the head and the collet faces meet. Confirm that there is no gap.
- Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
- Please make sure that the spanner wrench is inserted properly and turn it slowly during use.

Abundant exchangeable milling heads! Exchangeable head end mill PXM

The PXM is an exchangeable head end mill series with the same high performance of a solid tool and the cost efficiency of an indexable tool. A single exchangeable head body is able to accommodate a wide range of exchangeable heads to meet various application needs.

Available shapes

- Square Type
- Roughing Type
- Corner Radius Type
- Ball Type

Please see OSG PHOENIX Catalog for details.

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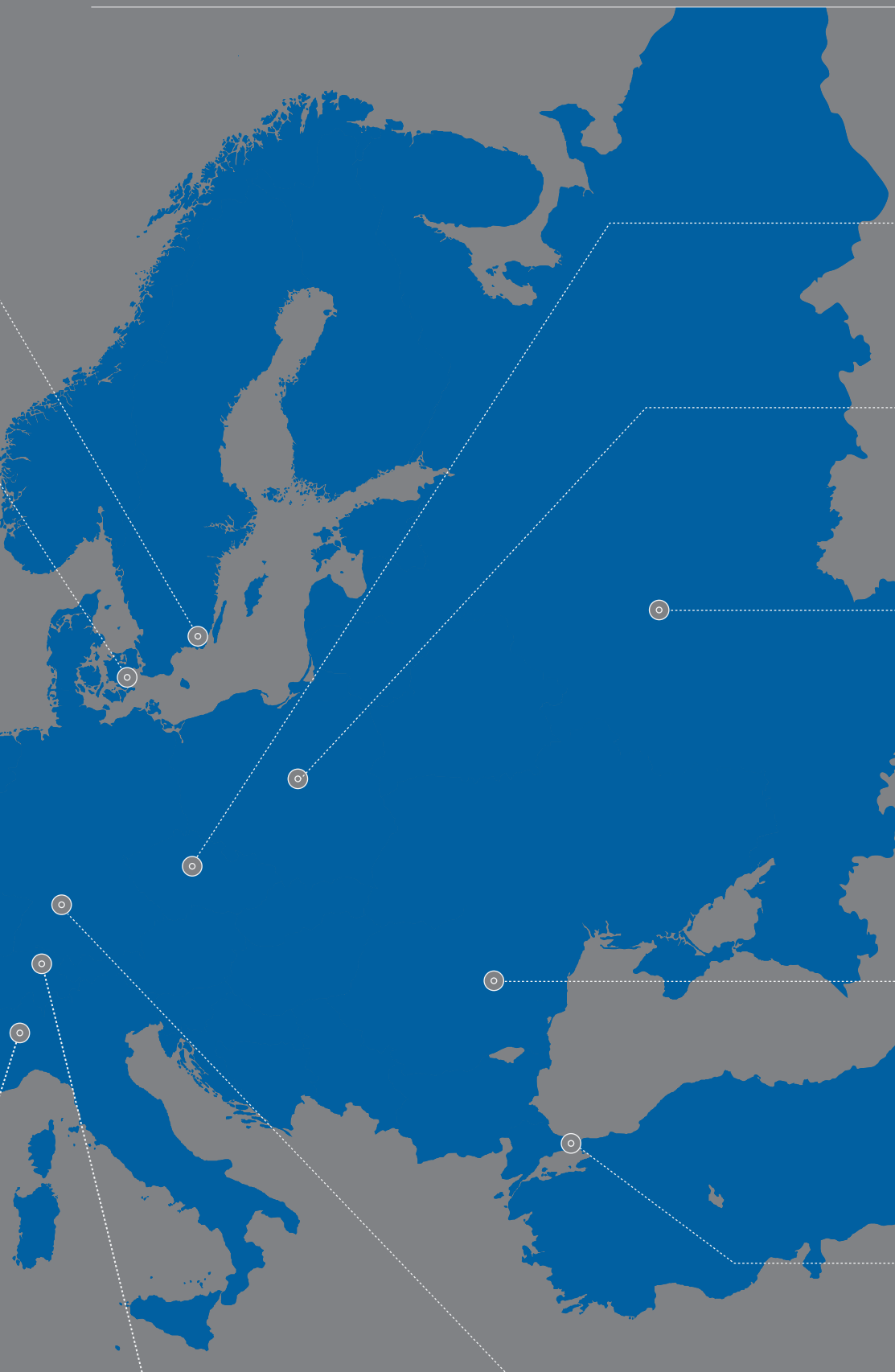

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