

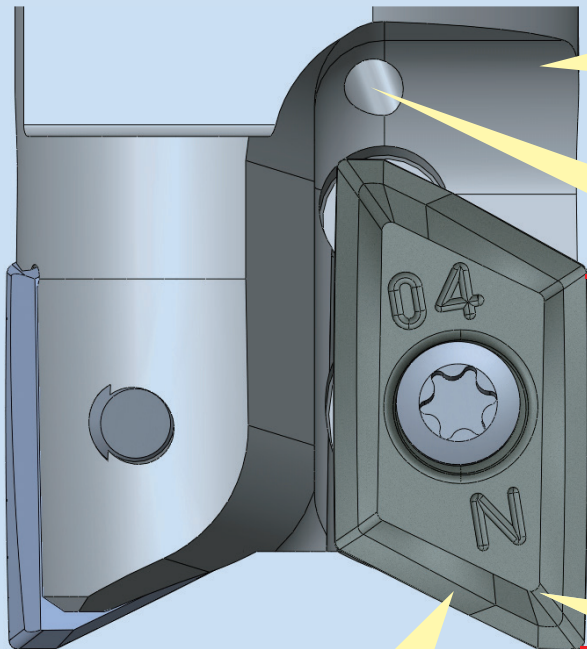
AERO CHIPPER

ALX/MAL Type

High Precision & High Efficient Machining on Aerospace tooling

G-Body

Aerospace Tooling



G-Body

Through coolant hole

High Precision

Combination of high accuracy body and ground insert gives excellent side wall finish.

High Efficiency

Sharp & Unique 3D geometry insert enables high efficiency and low cutting resistance machining. Key in insert gives added security allowing high speed spindle machining.

Multi Function

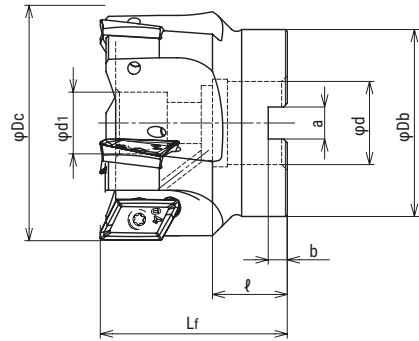
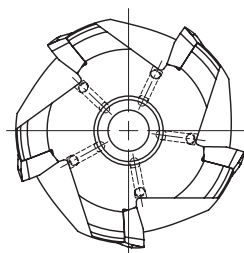
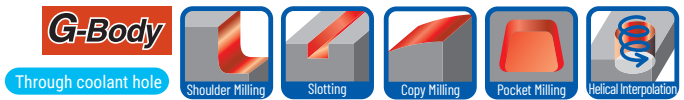
Capable of ramping & helical interpolation

G-Body

G-Body is a GN surface- hardening treatment on thermal resistant high strength steel giving a hardness over 65HRC and secures insert pocket and holder against thermal deformation improving body durability.

AERO CHIPPER **ALX/MAL Type**

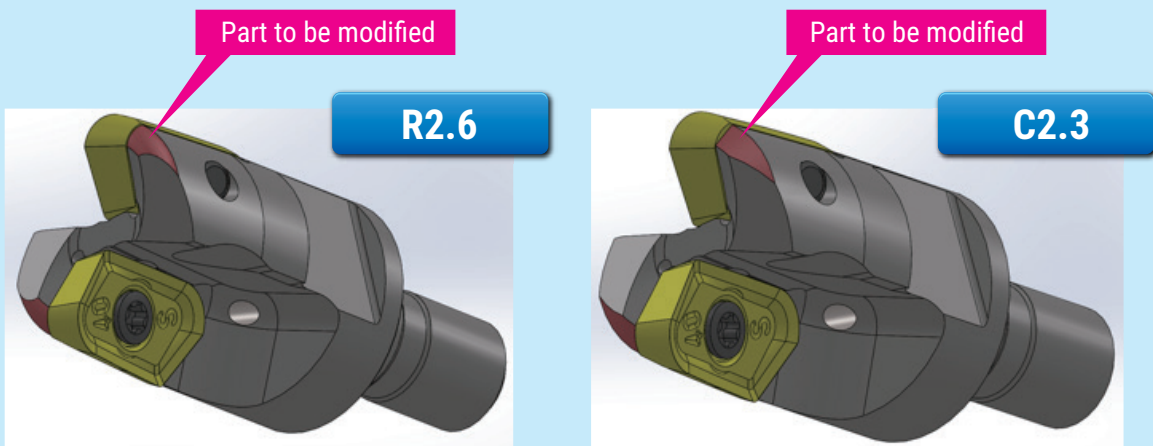
■ **Facemill Type**



Cat.No.	Stock	No. of inserts	Dimensions(mm)								Max. spindle speed	Weight (kg)	Inserts
			φDc	Lf	φDb	φd	φd1	a	b	ℓ			
ALX4050R-22	●	4	50	50	45	22	16.5	10.4	6.3	20	24,000	0.4	XOGT1605**PD*R
ALX5063R-22	●	5	63		50						21,000	0.6	

Screw	Torque(N.m)	Wrench
DSW-4085	3.6	A-15T

■ **Note: Use of XOGT160540PDFR insert**



When using inserts with corner radius RE 4 (XOGT160540PDFR), Standard cutter body has to be modified with R2.6 or C2.3

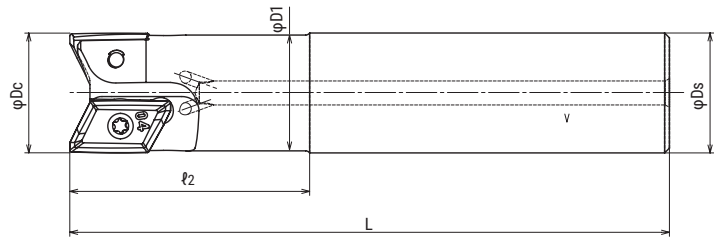
AERO CHIPPER

ALX/MAL Type

Endmill Shank Type

G-Body

Through coolant hole



Cat.No.	Stock	No. of inserts	Dimensions(mm)						Max. spindle speed	Parts		Inserts
			φD_c	ℓ	ℓ_2	L	φD_1	φD_s		Screw	Wrench	
ALXM1020S20	●	1	20	75	35	110	19.18	20	15,000	DSW-4075H	A-15	XOGT1605**PD*R
ALXM2025S25	●	2	25		50	125	24	25	40,000	DSW-4085		
ALXM2028S25	●		28	26.87		36,000						
ALXM2032S32	●		32	150	30.5	33,000						
ALXM2035S32	●		35		33.32	31,000						
ALXM3040S32	●	3	40	90	80	170	37.96	32	28,000			

Screw	Torque(N.m)
DSW-4075H	3.6
DSW-4085	3.6

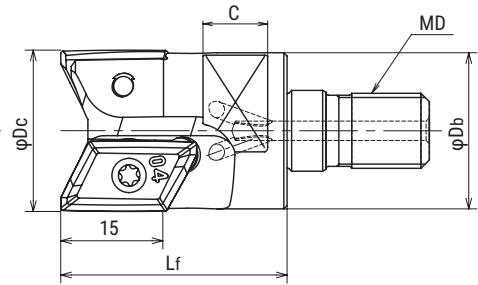
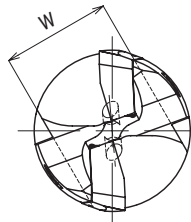
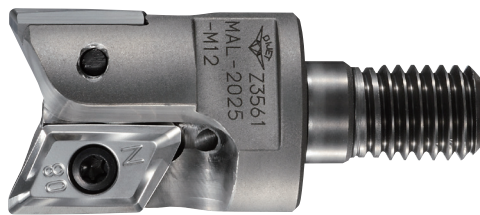
AERO CHIPPER

ALX/MAL Type

■ Modular Head Type

G-Body

Through coolant hole

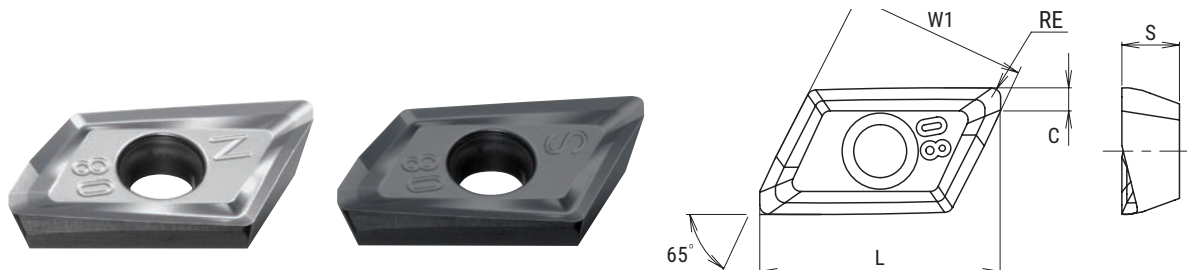


Cat.No.	Stock	No. of inserts	Dimensions(mm)						Max. spindle speed	Inserts
			φDc	Lf	φDb	MD	C	W		
MAL-1020-M10	●	1	20	35	19.5	M10	9	14	15,000	XOGT1605**PD*R
MAL-2025-M12	●	2	25		24	M12	10	19	40,000	
MAL-2028-M12	●		28						36,000	
MAL-2030-M16	●	2	30	43	28	M16	12	22	34,000	
MAL-2032-M16	●		32		33,000					
MAL-2035-M16	●		35		31,000					
MAL-3040-M16	●	3	40		32	M16	14	26	28,000	

Screw	Torque(N.m)	Wrench
DSW-4085	3.6	A-15

AERO CHIPPER **ALX/MAL Type**

■ **Insert**

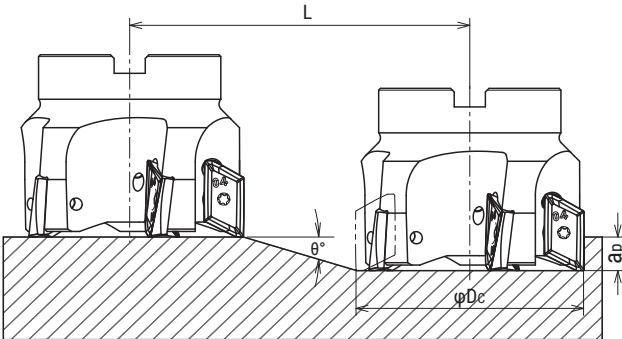


Cat.No.	Tolerance	PVD Coating	Uncoated	Dimensions (mm)						
		JC5118	FZ05	RE	L	W1	S	C		
XOGT160502PDFR	G		●	0.2	20.8	16.35	5	2.5		
XOGT160504PDFR			●	0.4	21			2.4		
XOGT160508PDFR			●	0.8				2.5		
XOGT160512PDFR			●	1.2	20.9			2.6		
XOGT160516PDFR			●	1.6	20.7			2.8		
XOGT160520PDFR			●	2	20.6			3		
XOGT160525PDFR			●	2.5	20.3			3.3		
XOGT160530PDFR			●	3	20.1			3.5		
XOGT160532PDFR			●	3.2	19.9			4.3		
XOGT160540PDFR			●	4	19.2			2.5		
XOGT160502PDER			●		0.2			20.8	21	2.4
XOGT160504PDER			●		0.4			20.9		2.5
XOGT160508PDER			●		0.8				20.7	2.6
XOGT160512PDER			●		1.2			20.6	2.8	
XOGT160516PDER			●		1.6			20.1	3.3	
XOGT160520PDER			●		2			19.9	3.5	
XOGT160530PDER			●		3					
XOGT160532PDER			●		3.2					

AERO CHIPPER ALX/MAL Type

Recommended Data for Profile Milling

Ramping

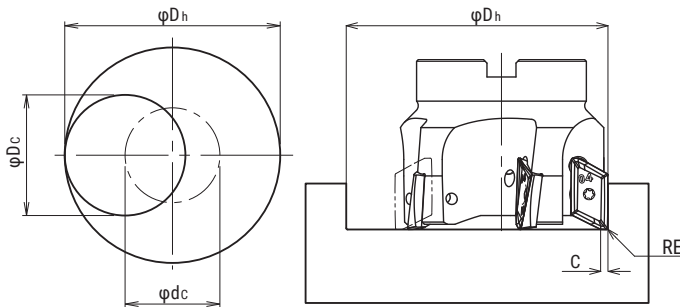


Tool dia. (mm)	Aluminium		Stainless steel		Titanium alloy		Max. Depth of cut (mm)
	Max. ramping angle (°)	Cutting length (mm)	Max. ramping angle (°)	Cutting length (mm)	Max. ramping angle (°)	Cutting length (mm)	
φDc	θ°	L	θ°	L	θ°	L	ap
20	16	28	10	45	10	45	8
25	11	41	9	51	9	51	8
28	9	51	7	65	7	65	8
30	8	57	6	76	6	76	8
32	7	65	6	76	6	76	8
35	6	76	6	76	6	76	8
40	5	91	5	91	5	91	8
50	4	114	4	114	4	114	8
63	3	153	3	153	3	153	8

Note

1. In case of ramping, apply 70% or less feed (Vf) from standard cutting condition table.
2. When cutting Titanium/Stainless steel, apply 0.005mm or less (fz) from standard cutting condition table.
3. Wet cutting is recommended.

Helical interpolation



- Calculation of tool pass dia.

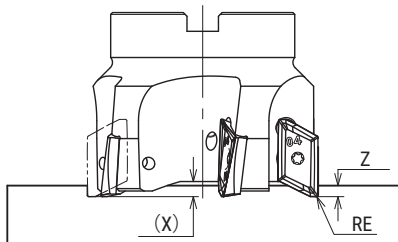
$$\phi_{dc} = \phi_{Dh} - \phi_{Dc}$$
Tool pass dia. Bore dia. Tool dia.
- Depth of cut per one circuit should not exceed max. depth of cut Ap
- Down cutting is recommended, tool pass rotation should be counterclockwise

Tool dia. (mm)	Min. bore dia. (mm)	Max. Bore dia. (mm)	Max. Depth of cut (mm)		
			Aluminium	Stainless steel	Titanium alloy
φDc	φDh min.	φDh max.			
20	35.8	38.6	15	9	9
25	45.8	48.6	13	11	11
28	51.8	54.6	12	10	10
30	55.8	58.6	11	10	10
32	59.8	62.6	11	10	10
35	65.8	68.6	11	11	11
40	75.8	78.6	10	10	10
50	96.8	98.6	10	10	10
63	122.8	124.6	10	10	10

Note

1. In case of helical interpolation, apply 70% or less feed (Vf) from standard cutting condition table.
2. When cutting Titanium/Stainless steel, apply 0.005mm or less (fz) from standard cutting condition table.
3. Wet cutting is recommended.

Drilling



Coner radius R (mm)	Max. depth of cut: Z (mm)
RE	Z
R2.5 or below	3
R3 / R3.2	2
R4	1.5

Note

1. Do not combine drilling and ramping together.
2. In case of drilling, apply 50% or less feed (Vf) from standard cutting condition table.
3. Long chips may come out in case of drilling, confirm safe operating conditions.

AERO CHIPPER

ALX/MAL Type

■ Recommended cutting conditions

● Facemill types

Material	Grade	Tool dia.(mm)									
		50					63				
		ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)
Aluminium alloy below 50-110HB	FZ05	100	8	35	6,300	5,040	100	8	45	5,000	5,000
		150	4	35	6,300	3,020	150	4	45	5,000	3,000
		200	3	35	6,300	1,760	200	3	45	5,000	1,750
Stainless steel below 250HB	JC5118	100	3	35	950	380	100	2	45	760	380
		150	2	35	950	190	150	2	45	760	190
Titanium alloy 35-43HRC	JC5118	100	8	35	380	122	100	8	45	300	120
		150	4	35	380	106	150	4	45	300	105
		200	2	35	380	91	200	2	45	300	90

Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or Vf.
3. In case of slot milling, apply 70% or less feed (Vf) and (n) from standard cutting condition table and apply ap=8mm or below.

● Endmill type

Material	Grade	Application	Tool dia.(mm)											
			20				25				28			
			ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)
Aluminium alloy below 50-110HB	FZ05	Shoulder milling	12	4	14,000	2,800	12	5	12,000	4,800	12	5.6	11,000	4,400
			8	14	14,000	2,520	8	18	12,000	4,320	8	20	11,000	3,960
		Slot milling	6	20	12,000	2,400	6	25	10,000	4,000	8	28	9,200	3,680
Stainless steel below 250HB	JC5118	Shoulder milling	5	4	2,400	240	5	5	1,900	380	5	6	1,700	340
			2	14	2,400	240	2	8	1,900	380	2	20	1,700	340
		Slot milling	2	20	2,000	100	2	25	1,600	160	2	28	1,400	140
Titanium alloy 35-43HRC	JC5118	Shoulder milling	12	4	950	95	12	5	764	153	12	5.6	685	137
			8	14	950	76	8	18	764	122	8	20	685	110
		Slot milling	6	20	800	64	6	25	640	102	8	28	570	91

Material	Grade	Application	Tool dia.(mm)											
			32				35				40			
			ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)
Aluminium alloy below 50-110HB	FZ05	Shoulder milling	12	6.4	9,500	3,800	12	7	9,000	3,600	12	8	7,800	4,680
			8	22	9,500	3,420	8	25	9,000	3,240	8	28	7,800	4,210
		Slot milling	8	32	8,000	3,200	8	35	7,200	2,880	8	40	6,400	3,840
Stainless steel below 250HB	JC5118	Shoulder milling	8	6	1,500	300	8	7	1,355	271	3	8	1,200	360
			3	22	1,500	300	3	25	1,355	271	2	28	1,200	360
		Slot milling	2	32	1,200	120	2	35	1,100	110	1	40	1,000	150
Titanium alloy 35-43HRC	JC5118	Shoulder milling	12	6.4	600	120	12	7	545	109	12	8	480	144
			8	22	600	96	8	25	545	87	8	28	480	115
		Slot milling	8	32	500	80	8	35	450	72	8	40	400	96

Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or Vf.

AERO CHIPPER**ALX/MAL Type**

■ Recommended cutting conditions

Modular head MAL type + MSN shank**SHOULDER MILLING**

Material	Grade	Tool dia.(mm)														
		20					25					28				
		ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)
Aluminium alloy below 50-110HB	FZ05	75	10	4	14,000	840	90	15	5	12,000	4,800	90	12	5.6	11,000	2,640
		125	3	4	14,000	700	140	8	5	12,000	2,400	140	6	5.6	11,000	1,320
		175	1	4	10,000	500	190	3	5	9,000	1,200	190	3	5.6	9,000	900
Stainless steel below 250HB	JC5118	60	4	4	2,400	240	60	7	5	1,900	380	90	4	5.6	1,700	340
		90	2	4	1,900	95	90	4	5	1,540	154	110	3	5.6	1,350	135
Titanium alloy 35-43HRC	JC5118	60	10	4	950	57	60	15	5	764	153	90	10	5.6	685	110
		90	5	4	950	38	90	8	5	764	92	110	6	5.6	685	69

Material	Grade	Tool dia.(mm)														
		30					32					35				
		ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)
Aluminium alloy below 50-110HB	FZ05	100	10	6	10,100	3,030	100	10	6.4	9,500	2,850	100	10	7	9,000	4,500
		150	6	6	10,100	1,620	150	6	6.4	9,500	1,520	150	5	7	9,000	2,700
		200	4	6	8,500	850	200	4	6.4	8,000	800	200	4	7	7,200	1,152
Stainless steel below 250HB	JC5118	90	5	6	1,600	320	90	5	6.4	1,500	300	100	4	7	1,355	270
		120	3	6	1,300	130	120	3	6.4	1,200	120	150	3	7	1,100	110
Titanium alloy 35-43HRC	JC5118	90	10	6	640	130	90	10	6.4	600	120	100	10	7	545	109
		120	6	6	640	100	120	6	6.4	600	96	150	6	7	545	76

Material	Grade	Tool dia.(mm)														
		40														
		ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)										
Aluminium alloy below 50-110HB	FZ05	100	12	8	7,800	5,850										
		150	8	8	7,800	3,510										
		200	5	8	6,400	1,920										
Stainless steel below 250HB	JC5118	100	4	8	1,200	360										
		150	2	8	950	143										
Titanium alloy 35-43HRC	JC5118	100	12	8	480	144										
		150	6	8	480	101										

Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or Vf.

AERO CHIPPER

ALX/MAL Type

Recommended cutting conditions
Modular head MAL type + MSN shank

SHOULDER MILLING

Material	Grade	Tool dia.(mm)														
		20					25					28				
		ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)
Aluminium alloy below 50-110HB	FZ05	75	4	14	14,000	1,120	90	8	18	12,000	4,800	90	7	20	11,000	2,640
		125	2	14	14,000	700	140	5	18	12,000	2,400	140	4	20	11,000	1,540
		175	0.5	14	10,000	500	190	2	18	9,000	1,200	190	2	20	9,000	900
Stainless steel below 250HB	JC5118	60	2	14	2,400	240	60	3	18	1,900	380	90	2	20	1,700	272
		90	1	14	1,900	95	90	2	18	1,540	154	110	1	20	1,350	108
Titanium alloy 35-43HRC	JC5118	60	6	14	950	76	60	10	18	764	122	90	7	20	685	110
		90	3	14	950	48	90	6	18	764	76	110	3	20	685	69

Material	Grade	Tool dia.(mm)														
		30					32					35				
		ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)
Aluminium alloy below 50-110HB	FZ05	100	7	21	10,100	3,030	100	7	22	9,500	2,850	100	8	25	9,000	3,600
		150	4	21	10,100	1,620	150	4	22	9,500	1,520	150	5	25	9,000	1,800
		200	2	21	8,530	850	200	2	22	8,000	800	200	3	25	7,200	1,000
Stainless steel below 250HB	JC5118	90	3	21	1,600	260	90	3	22	1,500	240	100	2	25	1,355	217
		120	1	21	1,280	130	120	1	22	1,200	120	150	1	25	1,100	110
Titanium alloy 35-43HRC	JC5118	90	7	21	640	100	90	7	22	600	96	100	8	25	545	87
		120	3	21	640	64	120	3	22	600	60	150	4	25	545	55

Material	Grade	Tool dia.(mm)														
		40														
		ℓ (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)										
Aluminium alloy below 50-110HB	FZ05	100	8	28	7,800	5,850										
		150	6	28	7,800	2,800										
		200	4	28	6,400	1,500										
Stainless steel below 250HB	JC5118	100	2	28	1,200	288										
		150	1	28	950	114										
Titanium alloy 35-43HRC	JC5118	100	8	28	480	115										
		150	3	28	480	72										

Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or Vf.

AERO CHIPPER**ALX/MAL Type**

■ Recommended cutting conditions

Modular head MAL type + MSN shank**SLOT MILLING**

Material	Grade	Tool dia.(mm)											
		20				25				28			
		ℓ (mm)	a _p (mm)	n (min ⁻¹)	V _f (mm/min)	ℓ (mm)	a _p (mm)	n (min ⁻¹)	V _f (mm/min)	ℓ (mm)	a _p (mm)	n (min ⁻¹)	V _f (mm/min)
Aluminium alloy below 50-110HB	FZ05	75	2.5	14,000	2,100	90	8	12,000	4,800	90	6	11,000	4,400
		125	1	14,000	980	140	6	12,000	2,400	140	3	11,000	2,200
		175	0.5	10,000	500	190	2	9,000	1,200	190	2	9,000	900
Stainless steel below 250HB	JC5118	60	2	2,400	240	60	2	1,900	380	90	2	1,700	272
		90	1	1,900	95	90	1	1,540	154	110	1	1,350	108
Titanium alloy 35-43HRC	JC5118	60	6	800	64	60	8	640	102	90	6	570	91
		90	3	800	40	90	4	640	77	120	3	570	68

Material	Grade	Tool dia.(mm)											
		30				32				35			
		ℓ (mm)	a _p (mm)	n (min ⁻¹)	V _f (mm/min)	ℓ (mm)	a _p (mm)	n (min ⁻¹)	V _f (mm/min)	ℓ (mm)	a _p (mm)	n (min ⁻¹)	V _f (mm/min)
Aluminium alloy below 50-110HB	FZ05	100	6	10,100	4,040	100	6	9,500	3,800	100	6	9,000	3,600
		150	3	10,100	2,020	150	3	9,500	1,900	150	4	9,000	1,800
		200	2	8,500	1,360	200	2	8,000	1,280	200	2	7,200	1,150
Stainless steel below 250HB	JC5118	90	2	1,600	260	90	2	1,500	240	100	2	1,355	217
		120	1	1,280	130	120	1	1,200	120	120	1	1,100	110
Titanium alloy 35-43HRC	JC5118	90	8	530	85	90	8	500	80	100	8	450	72
		120	4	530	64	120	4	500	60	120	4	450	54

Material	Grade	Tool dia.(mm)											
		40											
		ℓ (mm)	a _p (mm)	n (min ⁻¹)	V _f (mm/min)								
Aluminium alloy below 50-110HB	FZ05	100	8	7,800	4,680								
		150	5	7,800	3,510								
		200	3	6,400	1,920								
Stainless steel below 250HB	JC5118	100	2	1,200	288								
		150	1	950	114								
Titanium alloy 35-43HRC	JC5118	100	8	400	96								
		150	4	400	72								

Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce a_p or V_f.