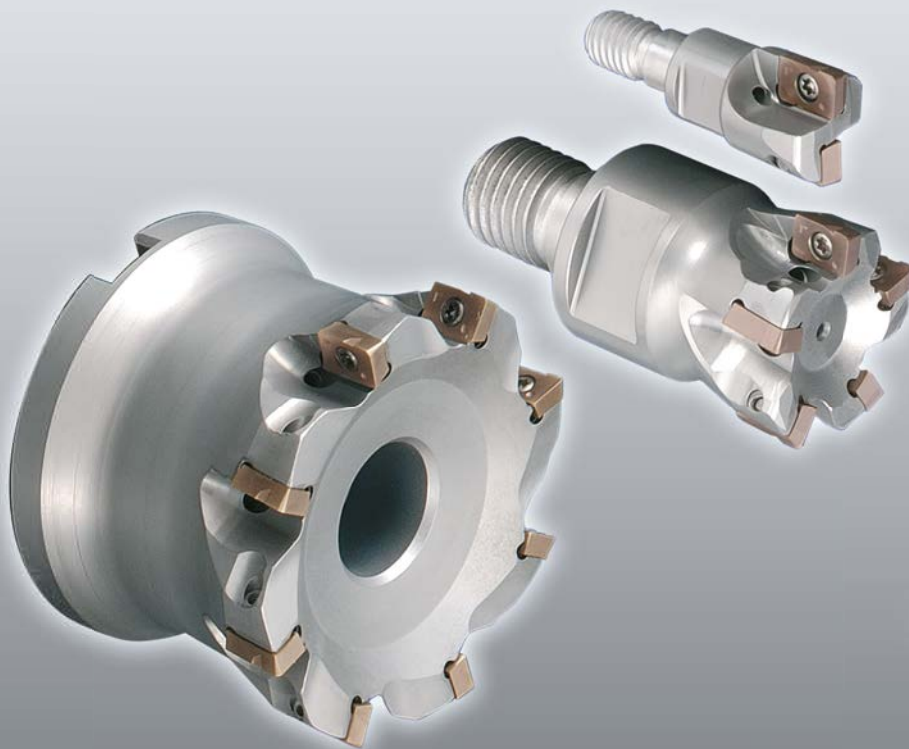


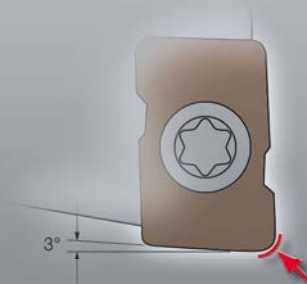
ASPV Polish Mill Vertical Type

Multi Function High Speed End Mill
for bottom & vertical wall finishing of high quality surfaces



D16mm ~ D66mm

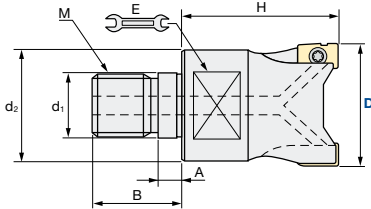
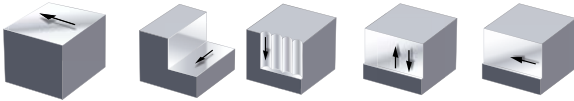
- Modular & Bore Types
- Insert **CR: 0.4 | 0.8 | 2.0**




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ASPVM | Polish Mill V-Type / Modular

Jet Air Hole	 Roughing	 Finishing	HRC 62	No. of Teeth 2~6	
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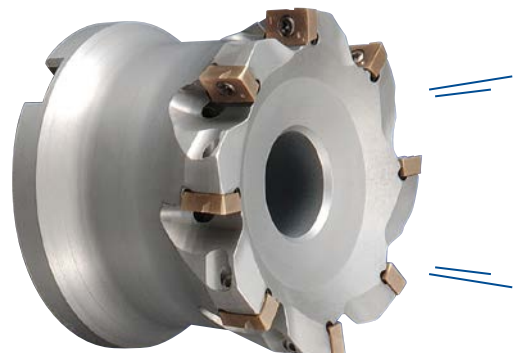
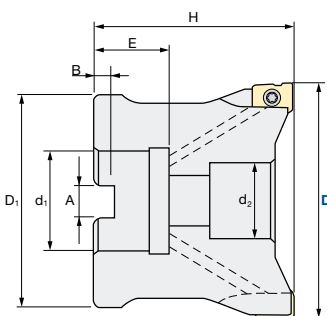
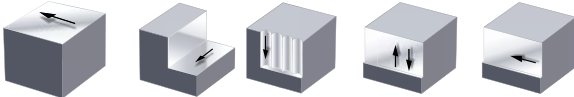


Diameter Holder only [mm]	Fastening Torque [Nm]
-0.03/-0.1 mm	1.1 Nm


Modular Type												
ID Code	Item Code	Flutes	D	H	d ₁	M	d ₂	A	B	C	E	Inserts
FH161	ASPVM-2016R-2-M8	2	16	25	8.5	M8	12.8	5.5	17	8	10	MPHW06.... 
FH162	ASPVM-2020R-3-M10	3	20	30	10.5	M10	17.8		19	10	15	
FH163	ASPVM-2025R-4-M12	4	25	35	12.5	M12	20.8		22		17	
FH164	ASPVM-2032R-5-M16	5	32	40	17	M16	28.8	6	23	12	22	
FH165	ASPVM-2035R-5-M16		35									
FH166	ASPVM-2042R-6-M16	6	42									

ASPVB | Polish Mill V-Type / Bore Type

Jet Air Hole	 Roughing	 Finishing	HRC 62	No. of Teeth 6~8	
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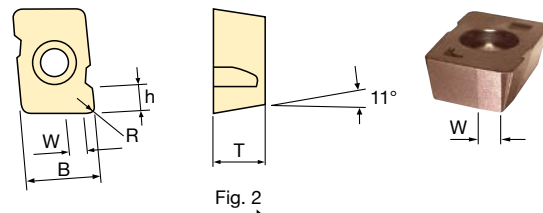
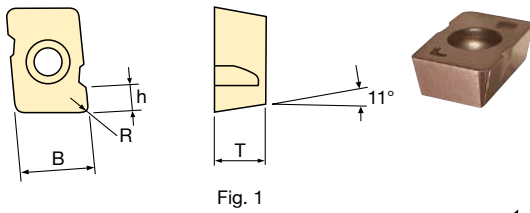
Diameter Holder only [mm]	Fastening Torque [Nm]
-0.03/-0.1 mm	1.1 Nm

Bore Type												
ID Code	Item Code	Flutes	D	H	d ₁	d ₂	M	D ₁	A	B	E	Inserts
FH157	ASPVB-2042RM-6-16	6	42	40	16	13.5	M8	35	8.4	5.6	18	MPHW06... 
FH215	ASPVB-2050RM-7	7	50	50	22	17	M10	47	10.4	6.3	20	
FH158	ASPVB-2052RM-7-22		52		27	20	M12	45			22	
FH159	ASPVB-2052RM-7-27				27	20	M12	45			22	
FH216	ASPVB-2063RM-8	8	63	60	22	17	M10	60	10.4	6.3	20	
FH160	ASPVB-2066RM-8-27		66		27	20	M12		12.4	7	22	

Note: Arbor screw is not included.



INSERTS ASPV | Polish Mill V-Type






MPHW0603..ZEL/ZFL



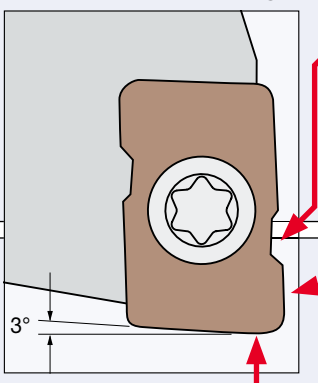
		SoftTarget Hardness of WorkpieceHard													
Inserts		Tolerance Class	Grade				Size (mm)								
Item Code			SD5010	JX1045	JX1020	ATH08M	B	W	T	h	R	Shape			
ID Code															
R 0.4	MPHW060304ZEL ATH08M	H				WF188	6.35	-	3.18	3	0.4	Fig-1			
	MPHW060304ZEL-0.5 ATH08M					WF189		0.5				Fig-2			
	MPHW060304ZFL SD5010		WF190					-				Fig-1			
R 0.8	MPHW060308ZEL ATH08M					WF191		1.5			-	3.18	3	0.8	Fig-1
	MPHW060308ZEL JX1020				WF192										
	MPHW060308ZEL JX1045			WF193											
	MPHW060308ZEL-1.5 ATH08M					WF194									Fig-2
	MPHW060308ZEL-1.5 JX1020				WF195										
	MPHW060308ZEL-1.5 JX1045			WF196											
	MPHW060308ZFL SD5010		WF197												-
R 2	MPHW060320ZEL ATH08M				WF198	-			2	Fig-1					

SD5010	PVD · For Aluminium
JX1045	PVD · General grade for 30 – 40 HRC Recommended for dry cutting
JX1020	PVD · For pre-hardened steels 40 – 55 HRC
ATH08M	PVD · General grade from soft to hard

Parts Shape	Clamp Screw		Screw Driver	
				
Cutter body	ID Code	Item Code	ID Code	Item Code
ASPVM20..R-	ET175	250-141	ET13	104-T8

Cutting Conditions Schnittwerte Condizioni di taglio Condiciones de Corte Conditions de coupe Valores de corte:				
Bottom finishing		Page 6 – 7:	Modular D16 – D42 Page 8: Bore Types D42 – D66	
Wall finishing Z constant		Page 9 – 10:	Modular D16 – D42 Page 11: Bore Types D42 – D66	
Vertical wall roughing		Page 12:	Modular D16 – D42, Bore Types D42 – D66	
Vertical wall finishing		Page 13:	Modular D16 – D42, Bore Types D42 – D66	
Contouring Z constant		Page 14 – 15:	Modular D16 – D42, Bore Types D42 – D66	

Flute tip has 3 cutting edges:

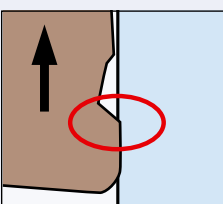


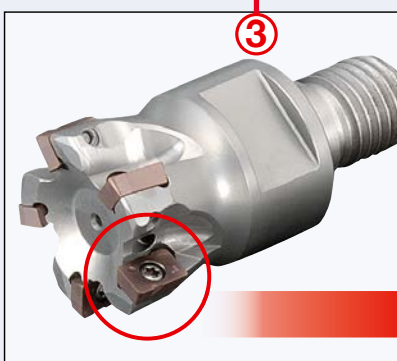
① **Cutting edge for reciprocating machining**
Used as the cutting edge when performing reciprocating finishing vertical machining.

② **Peripheral cutting edge**
Used as the peripheral cutting edge when performing side machining.

③ **Face cutting edge:** Used when bottom finishing. Used as the reciprocating cutting edge when performing vertical machining.

Feed direction:






4. Insert with supplementary cutting edge:
For increased feed rates

MPHW0603..ZEL 0.5
MPHW0603..ZEL 1.5

5. Insert without supplementary cutting edge:
For bottom machining, suitable for long overhang (L/Dc = 5 or more) machining or for handling low rigidity in main axis direction.
For vertical machining, inserts without supplementary cutting edge are recommended.



MPHW0603..ZEL

Fräser mit 3 Schneidkanten | Vorschubrchtung:

- Schneidkante für oszillierende Bearbeitung:** Für vertikale Schlichtoperationen mit wechselnder Richtung.
- Äußere Schneidkante:** Für die Seitenbearbeitung.
- Stirnschneidkante:** Zum Schlichten der Bodenflächen. Schneidkante für vertikales Schlichten mit wechselnder Richtung.
- Schneidplatte mit zusätzlicher Schneidkante:**
Für erhöhte Vorschubraten
- Schneidplatte ohne zusätzliche Schneidkante:** Für die Bearbeitung der Bodenflächen, geeignet für große Auskraglängen (L/Dc = 5 und mehr) oder bei geringer Stabilität in der Hauptachse. Für Vertikalbearbeitung sind diese Schneidplatten besonders geeignet.

La punta dell'inserto ha 3 parti taglienti | Direzione avanzamento:

- Tagliente per lavorazioni di finitura alternata.**
Utilizzo del bordo tagliente per lavorazioni di finitura assiale con direzione alternata.
- Tagliente periferico**
Utilizzato come tagliente periferico durante lavorazioni di contornatura.
- Inserto per lavorazione dei piani**
Utilizzato per finitura di piani. Utilizzato come tagliente alternato per finitura verticale.
- Inserto con affilatura supplementare:**
Per aumentare l'avanzamento
- Inserto senza affilatura supplementare:**
Per lavorazioni di piani, adatto per lavorazioni con lunghe sporgenze (L/D = 5 volte o superiore) o in situazioni di bassa rigidità nella direzione dell'asse principale. Per le lavorazioni di finitura in verticale sono raccomandati gli inserti senza affilatura supplementare.

Placas con 3 filos de corte | Sentido del avance:

- Filo de corte para mecanizado bidireccional.**
Para las operaciones de acabado verticales con procesos ascendentes y descendentes.
- Filo de corte periférico**
Para el mecanizado lateral en procesos de contorneado.

Filo de corte frontal

Se utiliza en acabado de fondo. Se utiliza como filo de corte cuando se realiza un mecanizado vertical descendente

- Plaqueta con un filo de corte suplementario:**
Permite aumentar el avance

Plaqueta sin filo de corte suplementario:

Para el mecanizado de fondos. Ideal para mecanizados con grandes voladizos (L / Dc = 5 o más) y para maquinas poco rígidas. Para el mecanizado vertical, se recomienda plaquetas sin filo de corte suplementario




La plaquette a 3 arrêtes de coupe | Sens de l'avance:

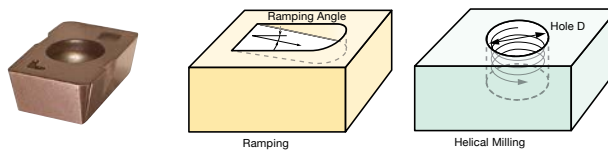
- Arrête de coupe pour Usinage en tirant**
Utilisée en alternance comme arête de coupe lors d'usinage de finition vertical en bidirectionnel (en montant)
- Arrête de coupe périphérique**
Utilisée lors d'opérations de contournage.
- Arrête de coupe inférieure**
Utilisée en surfacage. Utilisée en alternance comme arête de coupe lors d'usinage de finition vertical en bidirectionnel (en descendant)
- Plaquette avec Wiper:** Pour des avances supérieures
- Plaquette sans Wiper:** En surfacage, adaptée aux usinages avec de longs portes à faux (L/Dc = 5 ou plus) ou pour pallier à un manque de rigidité dans l'axe de broche. Pour l'usinage vertical, nous recommandons les plaquettes sans Wiper

A zona corte tem 3 arestas: | Direção Maquinação:




- Chanfre para maquinação vertical:**
Usado para realizar maquinação de acabamento vertical. (Plunging)
- Zona periférica**
Usado para realizar maquinação acabamento lateral.
- Chanfre inferior:**
Usado no acabamento de topo e usado também na maquinação vertical.
- Plaquete com chanfre inferior corte suplementar:**
Para o aumento dos avanços.
- Plaquete sem chanfre inferior de corte suplementar:**
Para maquinação de topos e adequado para zonas Altas (> = 5 vezes D) de maquinação ou para resolução da rigidez na direção do eixo principal. Para maquinação vertical, plaquetes sem chanfre suplementar de corte são recomendadas.




ASPV | Polish Mill V-Type | Recommended Cutting Conditions

-  **Ramping / Helical Milling**
-  **Rampen-/Helikalfräsen**
-  **Rampa / Fresatura elicoidale**
-  **Rampas / fresado helicoidal**
-  **Rampe / Fraisage Hélicoïdal**
-  **Rampa / Fresagem Helicoidal**

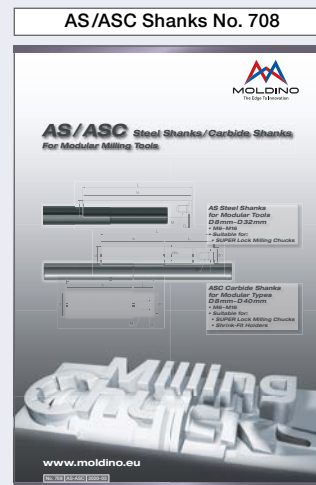


Inserts	MPHW0603..ZEL/ZFL							
Tool diameter D (mm)	D16	D20	D25	D32	D35	D42	D52	D66
Maximum ramp angle °	2.5°	2.5°	2.1°	1.6°	1.4°	1.2°	1°	0.5°
Helical Milling / Hole Dia. (mm)	22~30	30~38	40~48	54~62	60~68	74~82	94~102	122~130


















-  1. The ramp angle should be set within the ranges listed above. Use at ramp angles of 0.5° is recommended.
- 2. For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.
-  1. Der Rampenfräswinkel sollte innerhalb der oben aufgelisteten Bereiche sein. Empfohlen wird ein Winkel von 0,5°.
- 2. Für Bohrungen mit einem größeren Durchmesser als oben aufgeführt sollte vor dem Helikalfräsen eine Startbohrung durchgeführt werden.
-  1. L'angolo di rampa dovrebbe essere compreso tra i valori sopra esposti. E' comunque raccomandabile l'utilizzo di un angolo di 0.5°.
- 2. Per i fori di diametro non compreso tra i valori sopra riportati è necessaria una pre-foratura da effettuare prima della fresatura elicoidale.

-  1. El ángulo de rampa debe establecerse dentro de los rangos indicados en el cuadro. Es recomendable utilizar ángulos de rampa de 0,5°.
- 2. Para agujeros distintos a los rangos indicados en el cuadro, es necesario realizar un orificio previo antes del fresado.
-  1. L'angle de rampe utilise doit-être tel que précisé dans la liste ci-dessous. L'utilisation d'un angle de rampe de 0.5° est recommandée.
- 2. Pour la réalisation de perçage par fraisage, voir la liste ci-dessous. Un avant trou doit-être réalisé au préalable.
-  1. O ângulo da rampa deve ser definido dentro dos intervalos listados acima. Use em ângulos de rampa de 0,5° é recomendado.
- 2. Para diâmetros de furos fora dos intervalos listados acima, um furo piloto deve ser perfurado antes de maquinação.

➔ For more information about Modular Tools and available Shanks please check our brochures:



ASPV | Polish Mill V-Type | Recommended Cutting Conditions

			Bottom finishing			D16 Modular (Z2)							D20 Modular (Z3)					D25 Modular (Z4)																		
			 Finishing																																	
																																				
Material	Grade*	Overhang ratio	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D														
Mild Steels (200HB or less)	ATH08M JX1020 JX1045	<i>n</i> min ⁻¹	2,980	5,970	3,980	2,980	2,590	2,390	4,770	3,180	2,390	2,070	1,910	3,820	2,550	1,910	1,660																			
		<i>V_c</i> m/min	150	300	200	150	130	150	300	200	150	130	150	300	200	150	130	130																		
		<i>V_f</i> mm/min	600	1,790	1,190	720	520	720	2,150	1,430	860	620	760	2,290	1,530	920	660																			
		<i>f_z</i> mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1																		
		<i>a_p</i> mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2																		
		<i>a_e</i> mm	8-16	8-16	8-16	8-16	8	10-20	10-20	10-20	10-20	10	12-25	12-25	12-25	12-25	12	12-25																		
Carbon Steels Alloy Steels (30HRC or less)	ATH08M JX1020 JX1045	<i>n</i> min ⁻¹	2,980	4,970	3,580	2,590	1,990	2,390	3,980	2,860	2,070	1,590	1,910	3,180	2,290	1,660	1,270																			
		<i>V_c</i> m/min	150	250	180	130	100	150	250	180	130	100	150	250	180	130	100	100																		
		<i>V_f</i> mm/min	600	1,490	1,070	620	400	720	1,790	1,290	740	480	760	1,910	1,380	790	510																			
		<i>f_z</i> mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1																		
		<i>a_p</i> mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2																		
		<i>a_e</i> mm	8-16	8-16	8-16	8-16	8	10-20	10-20	10-20	10-20	10	12-25	12-25	12-25	12-25	12	12-25																		
Carbon Steels Alloy Steels (30~45HRC)	ATH08M JX1020 JX1045	<i>n</i> min ⁻¹	2,590	3,980	3,180	2,590	1,790	2,070	3,180	2,550	2,070	1,430	1,660	2,550	2,040	1,660	1,150																			
		<i>V_c</i> m/min	130	200	160	130	90	130	200	160	130	90	130	200	160	130	90	90																		
		<i>V_f</i> mm/min	520	950	760	520	360	620	1,150	920	620	430	660	1,220	980	660	460																			
		<i>f_z</i> mm/t	0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1	0.1																		
		<i>a_p</i> mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2																		
		<i>a_e</i> mm	8-16	8-16	8-16	8-16	8	10-20	10-20	10-20	10-20	10	12-25	12-25	12-25	12-25	12	12-25																		
SUS Stainless Steels	JX1020 ATH08M	<i>n</i> min ⁻¹	2,980	4,970	3,580	2,590	1,990	2,390	3,980	2,860	2,070	1,590	1910	3,180	2,290	1,660	1,270																			
		<i>V_c</i> m/min	150	250	180	130	100	150	250	180	130	100	150	250	180	130	100	100																		
		<i>V_f</i> mm/min	600	1,490	1,070	620	400	720	1,790	1,290	740	480	760	1,910	1,380	790	510																			
		<i>f_z</i> mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1																		
		<i>a_p</i> mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2																		
		<i>a_e</i> mm	8-16	8-16	8-16	8-16	8	10-20	10-20	10-20	10-20	10	12-25	12-25	12-25	12-25	12	12-25																		
FC FCD Cast Iron	ATH08M JX1020 JX1045	<i>n</i> min ⁻¹	2,980	4,970	3,980	2,980	2,590	2,390	3,980	3,180	2,390	2,070	1,910	3,180	2,550	1,910	1,660																			
		<i>V_c</i> m/min	150	250	200	150	130	150	250	200	150	130	150	250	200	150	130	130																		
		<i>V_f</i> mm/min	600	1,990	1,590	900	520	720	2,390	1,910	1,070	620	760	2,550	2,040	1,150	660																			
		<i>f_z</i> mm/t	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1	0.1																		
		<i>a_p</i> mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2																		
		<i>a_e</i> mm	8-16	8-16	8-16	8-16	8	10-20	10-20	10-20	10-20	10	12-25	12-25	12-25	12-25	12	12-25																		
Hardened Steels (45~55HRC)	ATH08M JX1020	<i>n</i> min ⁻¹	1,590	2,390	1,990	1,590	1,590	1,270	1,910	1,590	1,270	1,270	1,020	1,530	1,270	1,020	1,020																			
		<i>V_c</i> m/min	80	120	100	80	80	80	120	100	80	80	80	120	100	80	80	80																		
		<i>V_f</i> mm/min	320	480	400	320	320	380	570	480	380	380	410	610	510	410	410																			
		<i>f_z</i> mm/t	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																		
		<i>a_p</i> mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2																		
		<i>a_e</i> mm	8-16	8-16	8-16	8-16	8	10-20	10-20	10-20	10-20	10	12-25	12-25	12-25	12-25	12	12-25																		
Hardened Steels (55~62HRC)	ATH08M JX1020	<i>n</i> min ⁻¹	990	1,990	1,390	990	990	800	1,590	1,110	800	800	640	1,270	890	640	640																			
		<i>V_c</i> m/min	50	100	70	50	50	50	100	70	50	50	50	100	70	50	50	50																		
		<i>V_f</i> mm/min	100	280	190	100	100	120	330	230	120	120	130	360	250	130	130																			
		<i>f_z</i> mm/t	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05	0.05																		
		<i>a_p</i> mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2																		
		<i>a_e</i> mm	8-16	8-16	8-16	8-16	8	10-20	10-20	10-20	10-20	10	12-25	12-25	12-25	12-25	12	12-25																		
Titanium Alloy Ti-6Al-4V (wet condition)	ATH08M JX1020	<i>n</i> min ⁻¹	600	1,190	990	600	600	480	950	800	480	480	380	760	640	380	380																			
		<i>V_c</i> m/min	30	60	50	30	30	30	60	50	30	30	30	60	50	30	30	30																		
		<i>V_f</i> mm/min	120	360	300	120	120	140	430	360	140	140	150	460	380	150	150																			

ASPV | Polish Mill V-Type | Recommended Cutting Conditions

D32 Modular (Z5)					D35 Modular (Z5)					D42 Modular (Z6)				
General		High Speed			General		High Speed			General		High Speed		
3D-5D	5D-7D	>7D	3D-5D	5D-7D	>7D	3D-5D	5D-7D	>7D	3D-5D	5D-7D	>7D	3D-5D	5D-7D	>7D
1,490	2,980	1,990	1,490	1,290	1,360	2,730	1,820	1,360	1,180	1,140	2,270	1,520	1,140	990
150	300	200	150	130	150	300	200	150	130	150	300	200	150	130
750	2,240	1,490	900	650	680	2,050	1,360	820	590	680	2,050	1,360	820	590
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21
1,490	2,490	1,790	1,290	990	1,360	2,270	1,640	1,180	910	1,140	1,890	1,360	990	760
150	250	180	130	100	150	250	180	130	100	150	250	180	130	100
750	1,870	1,340	780	500	680	1,710	1,230	710	450	680	1,710	1,230	710	450
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21
1,290	1,990	1,590	1,290	900	1,180	1,820	1,460	1,180	820	990	1,520	1,210	990	680
130	200	160	130	90	130	200	160	130	90	130	200	160	130	90
650	1,190	950	650	450	590	1,090	870	590	410	590	1,090	870	590	410
0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21
1,490	2,490	1,790	1,290	990	1,360	2,270	1,640	1,180	910	1,140	1,890	1,360	990	760
150	250	180	130	100	150	250	180	130	100	150	250	180	130	100
750	1,870	1,340	780	500	680	1,710	1,230	710	450	680	1,710	1,230	710	450
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21
1,490	2,490	1,990	1,490	1,290	1,360	2,270	1,820	1,360	1,180	1,140	1,890	1,520	1,140	990
150	250	200	150	130	150	250	200	150	130	150	250	200	150	130
750	2,490	1,990	1,120	650	680	2,270	1,820	1,020	590	680	2,270	1,820	1,020	590
0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21
800	1,190	990	800	800	730	1,090	910	730	730	610	910	760	610	610
80	120	100	80	80	80	120	100	80	80	80	120	100	80	80
400	600	500	400	400	360	550	450	360	360	360	550	450	360	360
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21
500	990	700	500	500	450	910	640	450	450	380	760	530	380	380
50	100	70	50	50	50	100	70	50	50	50	100	70	50	50
120	350	240	120	120	110	320	220	110	110	110	320	220	110	110
0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21
300	600	500	300	300	270	550	450	270	270	230	450	380	230	230
30	60	50	30	30	30	60	50	30	30	30	60	50	30	30
150	450	370	150	150	140	410	340	140	140	140	410	340	140	140
0.1	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.1	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21
5,970	11,940	7,960	5,970	5,970	5,460	10,910	7,280	5,460	5,460	4,550	9,090	6,060	4,550	4,550
600	1,200	800	600	600	600	1,200	800	600	600	600	1,200	800	600	600
2,980	8,950	5,970	3,580	2,980	2,730	8,190	5,460	3,270	2,730	2,730	8,190	5,460	3,270	2,730
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
16-32	16-32	16-32	16-32	16	17.5-35	17.5-35	17.5-35	17.5-35	17.5	21-42	21-42	21-42	21-42	21

* Red indicates primary recommended material types





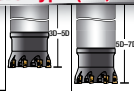

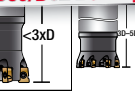
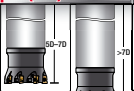

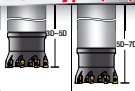


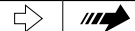
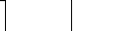
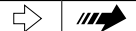

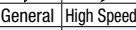

Bore Types D42 – D66: Page 8




Bottom finishing




ASPV | Polish Mill V-Type | Recommended Cutting Conditions

		Bottom finishing   Finishing		D42 Bore Type (Z6)						D50/D52 Bore Type (Z7)						D63/D66 Bore Type (Z8)							
																							
																							
Material	Grade	Overhang ratio	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D						
Mild Steels (200HB or less)	ATH08M JX1020 JX1045	n min ⁻¹	1,140	2,270	1,520	1,140	990	920	1,530	1,220	920	800	720	1,210	960	720	630						
		V_c m/min	150	300	200	150	130	150	250	200	150	130	150	250	200	150	130						
		V_f mm/min	680	2,050	1,360	820	590	640	1,610	1,290	770	560	580	1,450	1,160	690	500						
		f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
Carbon Steels Alloy Steels (30HRC or less)	ATH08M JX1020 JX1045	n min ⁻¹	1,140	1,890	1,360	990	760	920	1,410	1,100	800	610	720	1,110	870	630	480						
		V_c m/min	150	250	180	130	100	150	230	180	130	100	150	230	180	130	100						
		V_f mm/min	680	1,710	1,230	710	450	640	1,480	1,160	670	430	580	1,330	1,040	600	390						
		f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
Carbon Steels Alloy Steels (30~45HRC)	ATH08M JX1020 JX1045	n min ⁻¹	990	1,520	1,210	990	680	800	1,100	920	800	550	630	870	720	630	430						
		V_c m/min	130	200	160	130	90	130	180	150	130	90	130	180	150	130	90						
		V_f mm/min	590	1,090	870	590	410	560	930	770	560	390	500	830	690	500	350						
		f_z mm/t	0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
SUS Stainless Steels	JX1020 ATH08M	n min ⁻¹	1,140	1,890	1,360	990	760	920	1,410	1,100	800	610	720	1,110	870	630	480						
		V_c m/min	150	250	180	130	100	150	230	180	130	100	150	230	180	130	100						
		V_f mm/min	680	1,710	1,230	710	450	640	1,480	1,160	670	430	580	1,330	1,040	600	390						
		f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
FC FCD Cast Iron	ATH08M JX1020 JX1045	n min ⁻¹	1,140	1,890	1,520	1,140	990	920	1,530	1,220	920	800	720	1,210	960	720	630						
		V_c m/min	150	250	200	150	130	150	250	200	150	130	150	250	200	150	130						
		V_f mm/min	680	2,270	1,820	1,020	590	640	2,140	1,710	960	560	580	1,930	1,540	870	500						
		f_z mm/t	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
Hardened Steels (45~55HRC)	ATH08M JX1020	n min ⁻¹	610	910	760	610	610	370	610	490	370	370	290	480	390	290	290						
		V_c m/min	80	120	100	80	80	60	100	80	60	60	60	100	80	60	60						
		V_f mm/min	360	550	450	360	360	260	430	340	260	260	230	390	310	230	230						
		f_z mm/t	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
Hardened Steels (55~62HRC)	ATH08M JX1020	n min ⁻¹	380	760	530	380	380	310	490	370	310	310	240	390	290	240	240						
		V_c m/min	50	100	70	50	50	50	80	60	50	50	50	80	60	50	50						
		V_f mm/min	110	320	220	110	110	110	240	180	110	110	100	220	160	100	100						
		f_z mm/t	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
Titanium Alloy Ti-6Al-4V (wet condition)	ATH08M JX1020	n min ⁻¹	230	450	380	230	230	180	370	310	180	180	140	290	240	140	140						
		V_c m/min	30	60	50	30	30	30	60	50	30	30	30	60	50	30	30						
		V_f mm/min	140	410	340	140	140	130	390	320	150	130	120	350	290	140	120						
		f_z mm/t	0.1	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
Aluminium Alloy	SD5010	n min ⁻¹	4,550	9,090	6,060	4,550	4,550	3,670	9,180	6,120	3,670	3,670	2,890	7,230	4,820	2,890	2,890						
		V_c m/min	600	1,200	800	600	600	600	1,500	1,000	600	600	600	1,500	1,000	600	600						
		V_f mm/min	2,730	8,190	5,460	3,270	2,730	2,570	9,640	6,430	3,090	3,090	2,310	8,680	5,790	2,780	2,780						
		f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.12	0.1	0.15	0.15	0.12	0.12						
		a_p mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						
		a_e mm	21-42	21-42	21-42	21-42	21	26-52	26-52	26-52	26-52	26	33-66	33-66	33-66	33-66	33						
Maximum f _z (mm/t)			<0.35					<0.35					<0.35										
Maximum a _p (mm)			<2.8					<2.8					<2.8										


Modular Types D16 - D42: Page 6-7



Bottom finishing




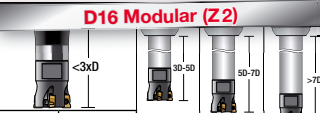
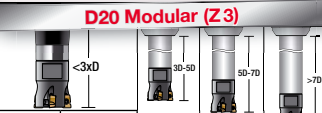
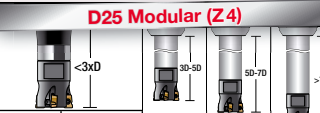















Finishing



* Red indicates primary recommended material types




ASPV | Polish Mill V-Type | Recommended Cutting Conditions


<div><div>Wall finishing Z constant</div></div>			<div><div>D16 Modular (Z2)</div></div>					<div><div>D20 Modular (Z3)</div></div>					<div><div>D25 Modular (Z4)</div></div>						
Material	Grade	Overhang ratio	<div></div> General	<div></div> High Speed	<div></div> 3D-5D	<div></div> 5D-7D	<div></div> >7D	<div></div> General	<div></div> High Speed	<div></div> 3D-5D	<div></div> 5D-7D	<div></div> >7D	<div></div> General	<div></div> High Speed	<div></div> 3D-5D	<div></div> 5D-7D	<div></div> >7D		
Mild Steels (200HB or less)	ATH08M JX1020 JX1045	n min ⁻¹	7,960	15,920	11,940	7,960	7,960	6,370	12,730	9,550	6,370	6,370	5,090	10,190	7,640	5,090	5,090		
		V_c m/min	400	800	600	400	400	400	800	600	400	400	400	800	600	400	400		
		V_f mm/min	1,590	4,770	3,580	1,910	1,590	1,910	5,730	4,300	2,290	1,910	2,040	6,110	4,580	2,440	2,040		
		f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1		
		a_p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7		
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
		n min ⁻¹	5,970	11,940	7,960	7,960	5,970	4,770	9,550	6,370	6,370	4,770	3,820	7,640	5,090	5,090	3,820		
Carbon Steels Alloy Steels (30HRC or less)	ATH08M JX1020 JX1045	V_c m/min	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300		
		V_f mm/min	1,190	3,580	2,390	1,910	1,190	1,430	4,300	2,860	2,290	1,430	1,530	4,580	3,060	2,440	1,530		
		f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1		
		a_p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7		
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
		n min ⁻¹	3,980	9,950	6,960	5,970	5,970	3,180	7,960	5,570	4,770	4,770	2,550	6,370	4,460	3,820	3,820		
		V_c m/min	200	500	350	300	300	200	500	350	300	300	200	500	350	300	300		
Carbon Steels Alloy Steels (30~45HRC)	ATH08M JX1020 JX1045	V_f mm/min	800	2,390	1,670	1,190	950	950	2,860	2,010	1,430	1,150	1,020	3,060	2,140	1,530	1,220		
		f_z mm/t	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08		
		a_p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7		
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
		n min ⁻¹	5,970	11,940	7,960	7,960	5,970	4,770	9,550	6,370	6,370	4,770	3,820	7,640	5,090	5,090	3,820		
		V_c m/min	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300		
		V_f mm/min	1,190	3,580	2,390	1,910	1,190	1,430	4,300	2,860	2,290	1,430	1,530	4,580	3,060	2,440	1,530		
SUS Stainless Steels	JX1020 ATH08M	f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1		
		a_p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7		
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
		n min ⁻¹	5,970	11,940	9,950	7,960	7,960	4,770	9,550	7,960	6,370	6,370	3,820	7,640	6,370	5,090	5,090		
		V_c m/min	300	600	500	400	400	300	600	500	400	400	300	600	500	400	400		
		V_f mm/min	1,190	3,580	2,980	1,910	1,590	1,430	4,300	3,580	2,290	1,910	1,530	4,580	3,820	2,440	2,040		
		f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1		
FC FCD Cast Iron	ATH08M JX1020 JX1045	a_p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7		
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
		n min ⁻¹	2,980	4,970	3,580	2,980	2,980	2,390	3,980	2,860	2,390	2,390	1,910	3,180	2,290	1,910	1,910		
		V_c m/min	150	250	180	150	150	150	250	180	150	150	150	250	180	150	150		
		V_f mm/min	600	990	720	480	480	720	1,190	860	570	570	760	1,270	920	610	610		
		f_z mm/t	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08		
		a_p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7		
Hardened Steels (45~55HRC)	ATH08M JX1020	a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
		n min ⁻¹	2,590	3,980	3,180	2,590	2,590	2,070	3,180	2,550	2,070	2,070	1,660	2,550	2,040	1,660	1,660		
		V_c m/min	130	200	160	130	130	130	200	160	130	130	130	200	160	130	130		
		V_f mm/min	520	800	640	410	260	620	950	760	500	310	660	1,020	810	530	330		
		f_z mm/t	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05		
		a_p mm	1.5	1.5	1	0.7	0.5	1.5	1.5	1	0.7	0.5	1.5	1.5	1	0.7	0.5		
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Titanium Alloy Ti-6Al-4V (wet condition)	ATH08M JX1020	n min ⁻¹	1,190	1,790	1,590	1,190	1,190	950	1,430	1,270	950	950	760	1,150	1,020	760	760		
		V_c m/min	60	90	80	60	60	60	90	80	60	60	60	90	80	60	60		
		V_f mm/min	240	430	380	240	190	290	520	460	290	230	310	550	490	310	240		
		f_z mm/t	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08		
		a_p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7		
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
		n min ⁻¹	11,940	23,870	15,920	11,940	11,940	9,550	19,100	12,730	9,550	9,550	7,640	15,280	10,190	7,640	7,640		
Aluminium Alloy	SD5010	V_c m/min	600	1,200	800	600	600	600	1,200	800	600	600	600	1,200	800	600	600		
		V_f mm/min	2,390	7,160	4,770	2,860	2,390	2,860	8,590	5,730	3,440	2,860	3,060	9,170	6,110	3,670	3,060		
		f_z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1		
		a_p mm	2	2	2	1.5	1	2	2	2	1.5	1	2	2	2	1.5	1		
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
		Maximum f _z (mm/t)			<0.35					<0.35					<0.35				
		Maximum a _e (mm)			<2.8					<2.8					<2.8				

* Red indicates primary recommended material types

Modular Types D32 – D42 / Bore Types D42 – D66: Page 10-11



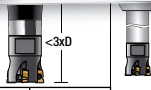
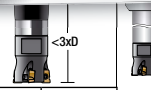
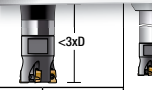

















Wall finishing
Z constant

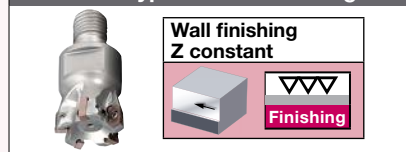


Finishing

ASPV | Polish Mill V-Type | Recommended Cutting Conditions

 <div>Wall finishing Z constant</div> <div><div>Finishing</div></div>			 <div>D32 Modular (Z5)</div>						 <div>D35 Modular (Z5)</div>						 <div>D42 Modular (Z6)</div>									
Material	Grade	Overhang ratio																						
			General	High Speed	3D-5D	5D-7D				>7D	General	High Speed	3D-5D				5D-7D	>7D	General	High Speed				3D-5D
Mild Steels (200HB or less)	ATH08M JX1020 JX1045	n min ⁻¹	3,980	7,960	5,970	3,980	3,980	3,640	7,280	5,460	3,640	3,640	3,030	6,060	4,550	3,030	3,030							
		V _c m/min	400	800	600	400	400	400	800	600	400	400	400	800	600	400	400							
		V _f mm/min	1,990	5,970	4,480	2,390	1,990	1,820	5,460	4,090	2,180	1,820	1,820	5,460	4,090	2,180	1,820							
		f _z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1							
		a _p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2						
		n min ⁻¹	2,980	5,970	3,980	3,980	2,980	2,730	5,460	3,640	3,640	2,730	2,270	4,550	3,030	3,030	2,270							
		V _c m/min	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300							
Carbon Steels Alloy Steels (30HRC or less)	ATH08M JX1020 JX1045	V _f mm/min	1,490	4,480	2,980	2,390	1,490	1,360	4,090	2,730	2,180	1,360	1,360	4,090	2,730	2,180	1,360							
		f _z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1							
		a _p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
		n min ⁻¹	1,990	4,970	3,480	2,980	2,980	1,820	4,550	3,180	2,730	2,730	1,520	3,790	2,650	2,270	2,270							
		V _c m/min	200	500	350	300	300	200	500	350	300	300	200	500	350	300	300							
		V _f mm/min	990	2,980	2,090	1,490	1,190	910	2,730	1,910	1,360	1,090	910	2,730	1,910	1,360	1,090							
		f _z mm/t	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08							
Carbon Steels Alloy Steels (30~45HRC)	ATH08M JX1020 JX1045	a _p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
		n min ⁻¹	2,980	5,970	3,980	3,980	2,980	2,730	5,460	3,640	3,640	2,730	2,270	4,550	3,030	3,030	2,270							
		V _c m/min	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300							
		V _f mm/min	1,490	4,480	2,980	2,390	1,490	1,360	4,090	2,730	2,180	1,360	1,360	4,090	2,730	2,180	1,360							
		f _z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1							
		a _p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
SUS Stainless Steels	JX1020 ATH08M	n min ⁻¹	2,980	5,970	3,980	3,980	2,980	2,730	5,460	3,640	3,640	2,730	2,270	4,550	3,030	3,030	2,270							
		V _c m/min	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300							
		V _f mm/min	1,490	4,480	2,980	2,390	1,490	1,360	4,090	2,730	2,180	1,360	1,360	4,090	2,730	2,180	1,360							
		f _z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1							
		a _p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
		n min ⁻¹	2,980	5,970	4,970	3,980	3,980	2,730	5,460	4,550	3,640	3,640	2,270	4,550	3,790	3,030	3,030							
		V _c m/min	300	600	500	400	400	300	600	500	400	400	300	600	500	400	400							
FC FCD Cast Iron	ATH08M JX1020 JX1045	V _f mm/min	1,490	4,480	3,730	2,390	1,990	1,360	4,090	3,410	2,180	1,820	1,360	4,090	3,410	2,180	1,820							
		f _z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1							
		a _p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
		n min ⁻¹	1,490	2,490	1,790	1,490	1,490	1,360	2,270	1,640	1,360	1,360	1,140	1,890	1,360	1,140	1,140							
		V _c m/min	150	250	180	150	150	150	250	180	150	150	150	250	180	150	150							
		V _f mm/min	750	1,240	900	600	600	680	1,140	820	550	550	680	1,140	820	550	550							
		f _z mm/t	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08							
Hardened Steels (45~55HRC)	ATH08M JX1020	a _p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
		n min ⁻¹	1,290	1,990	1,590	1,290	1,290	1,180	1,820	1,460	1,180	1,180	990	1,520	1,210	990	990							
		V _c m/min	130	200	160	130	130	130	200	160	130	130	130	200	160	130	130							
		V _f mm/min	650	990	800	520	320	590	910	730	470	300	590	910	730	470	300							
		f _z mm/t	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05							
		a _p mm	1.5	1.5	1	0.7	0.5	1.5	1.5	1	0.7	0.5	1.5	1.5	1	0.7	0.5							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
Titanium Alloy Ti-6Al-4V (wet condition)	ATH08M JX1020	n min ⁻¹	600	900	800	600	600	550	820	730	550	550	450	680	610	450	450							
		V _c m/min	60	90	80	60	60	60	90	80	60	60	60	90	80	60	60							
		V _f mm/min	300	540	480	300	240	270	490	440	270	220	270	490	440	270	220							
		f _z mm/t	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08							
		a _p mm	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
		n min ⁻¹	5,970	11,940	7,960	5,970	5,970	5,460	10,910	7,280	5,460	5,460	4,550	9,090	6,060	4,550	4,550							
		V _c m/min	600	1200	800	600	600	600	1,200	800	600	600	600	1,200	800	600	600							
Aluminium Alloy	SD5010	V _f mm/min	2,980	8,950	5,970	3,580	2,980	2,730	8,190	5,460	3,270	2,730	2,730	8,190	5,460	3,270	2,730							
		f _z mm/t	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1							
		a _p mm	2	2	2	1.5	1	2	2	2	1.5	1	2	2	2	1.5	1							
		a _e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2							
		Maximum f _z (mm/t)			<0.35					<0.35					<0.35									
		Maximum a _e (mm)			<2.8					<2.8					<2.8									

Modular Types D16 – D25: Page 9























* Red indicates primary recommended material types






















ASPV | Polish Mill V-Type | Recommended Cutting Conditions



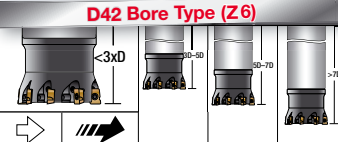
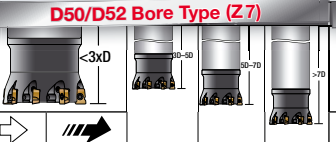
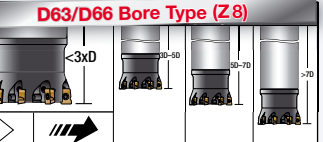


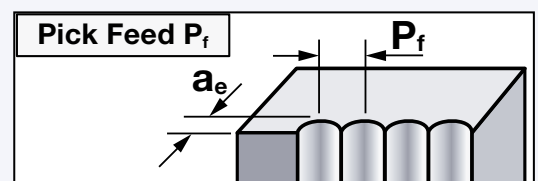
D42 Bore Type (Z6)					D50/D52 Bore Type (Z7)					D63/D66 Bore Type (Z8)				
General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D
3,030	6,060	4,550	3,030	3,030	2,450	4,900	3,670	2,450	2,450	1,930	3,860	2,890	1,930	1,930
400	800	600	400	400	400	800	600	400	400	400	800	600	400	400
1,820	5,460	4,090	2,180	1,820	1,710	5,140	3,860	2,060	1,710	1,540	4,630	3,470	1,850	1,540
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,270	4,550	3,030	3,030	2,270	1,840	3,670	2,450	2,450	1,840	1,450	2,890	1,930	1,930	1,450
300	600	400	400	300	300	600	400	400	300	300	600	400	400	300
1,360	4,090	2,730	2,180	1,360	1,290	3,860	2,570	2,060	1,290	1,160	3,470	2,310	1,850	1,160
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,520	3,790	2,650	2,270	2,270	1,220	3,060	2,140	1,840	1,840	960	2,410	1,690	1,450	1,450
200	500	350	300	300	200	500	350	300	300	200	500	350	300	300
910	2,730	1,910	1,360	1,090	860	2,570	1,800	1,290	1,030	770	2,310	1,620	1,160	930
0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08
2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,270	4,550	3,030	3,030	2,270	1,840	3,670	2,450	2,450	1,840	1,450	2,890	1,930	1,930	1,450
300	600	400	400	300	300	600	400	400	300	300	600	400	400	300
1,360	4,090	2,730	2,180	1,360	1,290	3,860	2,570	2,060	1,290	1,160	3,470	2,310	1,850	1,160
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,270	4,550	3,790	3,030	3,030	1,840	3,670	3,060	2,450	2,450	1,450	2,890	2,410	1,930	1,930
300	600	500	400	400	300	600	500	400	400	300	600	500	400	400
1,360	4,090	3,410	2,180	1,820	1,290	3,860	3,210	2,060	1,710	1,160	3,470	2,890	1,850	1,540
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,140	1,890	1,360	1,140	1,140	920	1,530	1,100	920	920	720	1,210	870	720	720
150	250	180	150	150	150	250	180	150	150	150	250	180	150	150
680	1,140	820	550	550	640	1,070	770	510	510	580	960	690	460	460
0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08
2	2	1.5	1	0.7	2	2	1.5	1.2	1	2	2	1.5	1.2	1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
990	1,520	1,210	990	990	800	1,220	980	800	800	630	960	770	630	630
130	200	160	130	130	130	200	160	130	130	130	200	160	130	130
590	910	730	470	300	560	860	690	450	280	500	770	620	400	250
0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05
1.5	1.5	1	0.7	0.5	1.5	1.5	1.5	1	0.7	1.5	1.5	1.5	1.2	1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
450	680	610	450	450	370	550	490	370	370	290	430	390	290	290
60	90	80	60	60	60	90	80	60	60	60	90	80	60	60
270	490	440	270	220	260	460	410	260	210	230	420	370	230	190
0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08
2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
4,550	9,090	6,060	4,550	4,550	3,670	9,180	6,120	3,670	3,670	2,890	7,230	4,820	2,890	2,890
600	1,200	800	600	600	600	1,500	1,000	600	600	600	1,500	1,000	600	600
2,730	8,190	5,460	3,270	2,730	2,570	9,640	6,430	3,090	2,570	2,310	8,680	5,790	2,780	2,310
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
2	2	2	1.5	1	2	2	2	2	1.5	2	2	2	2	1.5
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.35 <2.8					<0.35 <2.8					<0.35 <2.8				

ASPV | Polish Mill V-Type | Recommended Cutting Conditions

	Vertical wall roughing  Roughing		D16 Modular (Z2)    					D20 Modular (Z3)    					D25 Modular (Z4)    				
Material	Grade*	Overhang ratio															
Carbon Steels Alloy Steels (30HRC or less)	JX1020 JX1045 JX1060	<i>n</i> min ⁻¹	2,980	3,980	2,980	2,980	2,390	2,390	3,180	2,390	2,390	1,910	1,910	2,550	1,910	1,910	1,530
		<i>V_e</i> m/min	150	200	150	150	120	150	200	150	150	120	150	200	150	150	120
		<i>V_f</i> mm/min	900	1,190	720	600	330	1,070	1,430	860	720	400	1,150	1,530	920	760	430
		<i>f_z</i> mm/t	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07
		<i>P_r</i> mm	3.6	3.6	3.6	3.6	3	4	4	4	4	4	4.5	4.5	4.5	4.5	4.5
		<i>a_e</i> mm	<4	<4	<3	<2	<2	<4	<4	<3	<2	<2	<4	<4	<3	<2	<2
FC FCD Cast Iron	ATH08M JX1020 JX1045	<i>n</i> min ⁻¹	2,980	4,970	3,980	3,980	2,980	2,390	3,980	3,180	3,180	2,390	1,910	3,180	2,550	2,550	1,910
		<i>V_e</i> m/min	150	250	200	200	150	150	250	200	200	150	150	250	200	200	150
		<i>V_f</i> mm/min	1,190	1,990	1,190	1,030	600	1,430	2,390	1,430	1,240	720	1,530	2,550	1,530	1,320	760
		<i>f_z</i> mm/t	0.2	0.2	0.15	0.13	0.1	0.2	0.2	0.15	0.13	0.1	0.2	0.2	0.15	0.13	0.1
		<i>P_r</i> mm	3.6	3.6	3.6	3.6	3	4	4	4	4	4	4.5	4.5	4.5	4.5	4.5
		<i>a_e</i> mm	<4	<4	<4	<4	<3	<4	<4	<4	<4	<3	<4	<4	<4	<4	<3
Maximum <i>f_z</i> (mm/t)			<0.25					<0.25					<0.25				
Maximum <i>a_e</i> (mm)			<5					<5					<5				

























	Vertical wall roughing  		D32 Modular (Z5)    					D35 Modular (Z5)    					D42 Modular (Z6)    				
																	
Material	Grade*	Overhang ratio	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D
Carbon Steels Alloy Steels (30HRC or less)	JX1020 JX1045 JX1060	n min ⁻¹	1,490	1,990	1,490	1,490	1,190	1,360	1,820	1,360	1,360	1,090	1,140	1,520	1,140	1,140	910
		V_e m/min	150	200	150	150	120	150	200	150	150	120	150	200	150	150	120
		V_f mm/min	1,120	1,490	900	750	420	1,020	1,360	820	680	380	1,020	1,360	820	680	380
		f_z mm/t	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07
		P_r mm	5.1	5.1	5.1	5.1	5.1	5.3	5.3	5.3	5.3	5.3	5.8	5.8	5.8	5.8	5.8
		a_e mm	<4	<4	<3	<2	<2	<4	<4	<3	<2	<2	<4	<4	<3	<2	<2
FC FCD Cast Iron	ATH08M JX1020 JX1045	n min ⁻¹	1,490	2,490	1,990	1,990	1,490	1,360	2,270	1,820	1,820	1,360	1,140	1,890	1,520	1,520	1,140
		V_e m/min	150	250	200	200	150	150	250	200	200	150	150	250	200	200	150
		V_f mm/min	1,490	3,110	1,990	1,990	1,120	1,360	2,840	1,820	1,820	1,020	1,360	2,840	1,820	1,820	1,020
		f_z mm/t	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15
		P_r mm	5.1	5.1	5.1	5.1	5.1	5.3	5.3	5.3	5.3	5.3	5.8	5.8	5.8	5.8	5.8
		a_e mm	<4	<4	<4	<4	<3	<4	<4	<4	<4	<3	<4	<4	<4	<4	<3
Maximum f _z (mm/t)			<0.25					<0.25					<0.25				
Maximum a _e (mm)			<5					<5					<5				



















 <div>Vertical wall roughing</div> <div><div>Roughing</div></div>			<div>D42 Bore Type (Z6)</div> <div></div>							<div>D50/D52 Bore Type (Z7)</div> <div></div>					<div>D63/D66 Bore Type (Z8)</div> <div></div>				
Material	Grade*	Overhang ratio	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D		
Carbon Steels Alloy Steels (30HRC or less)	JX1020 JX1045 JX1060	n min ⁻¹	1,140	1,520	1,140	1,140	910	920	1,220	920	920	730	720	960	720	720	580		
		V_e m/min	150	200	150	150	120	150	200	150	150	120	150	200	150	150	120		
		V_f mm/min	1,020	1,360	820	680	380	960	1,290	770	640	360	870	1,160	690	580	320		
		f_z mm/t	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07		
		P_f mm	5.8	5.8	5.8	5.8	5.8	6.4	6.4	6.4	6.4	6.4	7.3	7.3	7.3	7.3	7.3		
		a_e mm	<4	<4	<3	<2	<2	<4	<4	<3	<2	<2	<4	<4	<3	<2	<2		
FC FCD Cast Iron	ATH08M JX1020 JX1045	n min ⁻¹	1,140	1,890	1,520	1,520	1,140	920	1,530	1,220	1,220	920	720	1,210	960	960	720		
		V_e m/min	150	250	200	200	150	150	250	200	200	150	150	250	200	200	150		
		V_f mm/min	1,360	2,840	1,820	1,820	1,020	1,290	2,680	1,710	1,710	960	1,160	2,410	1,540	1,540	870		
		f_z mm/t	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15		
		P_f mm	5.8	5.8	5.8	5.8	5.8	6.4	6.4	6.4	6.4	6.4	7.3	7.3	7.3	7.3	7.3		
		a_e mm	<4	<4	<4	<4	<3	<4	<4	<4	<4	<3	<4	<4	<4	<4	<3		
Maximum f_z (mm/t)			<0.25					<0.25					<0.25						
Maximum a_e (mm)			<5					<5					<5						

















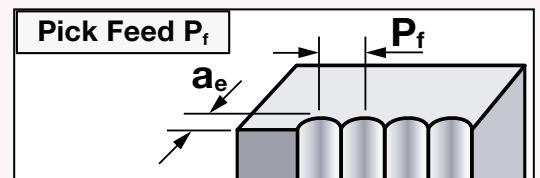
* Red indicates primary recommended material types

ASPV | Polish Mill V-Type | Recommended Cutting Conditions

	Vertical wall finishing		D16 Modular (Z2)					D20 Modular (Z3)					D25 Modular (Z4)				
																	
Material	Grade*	Overhang ratio															
Carbon Steels Alloy Steels (30HRC or less)	ATH08M JX1020 JX1045	n min ⁻¹	5,970	11,940	7,960	7,960	5,970	4,770	9,550	6,370	6,370	4,770	3,820	7,640	5,090	5,090	3,820
		V_c m/min	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300
		V_f mm/min	1,550	4,770	2,390	2,070	1,190	1,860	5,730	2,860	2,480	1,430	2,290	6,110	3,670	3,060	1,830
		f_z mm/t	0.13	0.2	0.15	0.13	0.1	0.13	0.2	0.15	0.13	0.1	0.15	0.2	0.18	0.15	0.12
		P_r mm	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
FC FCD Cast Iron	ATH08M JX1020 JX1045	n min ⁻¹	5,970	11,940	9,950	7,960	7,960	4,770	9,550	7,960	6,370	6,370	3,820	7,640	6,370	5,090	5,090
		V_c m/min	300	600	500	400	400	300	600	500	400	400	300	600	500	400	400
		V_f mm/min	1,790	4,770	3,980	3,180	2,390	2,150	5,730	4,770	3,820	2,860	3,060	7,640	5,090	4,070	3,060
		f_z mm/t	0.15	0.2	0.2	0.2	0.15	0.15	0.2	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15
		P_r mm	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Maximum f _z (mm/t)			<0.3					<0.3					<0.3				
Maximum a _e (mm)			<0.5					<0.5					<0.5				


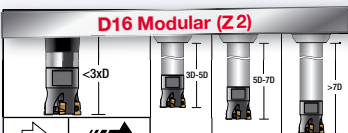
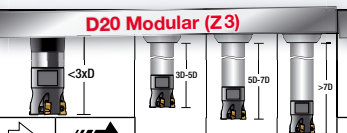
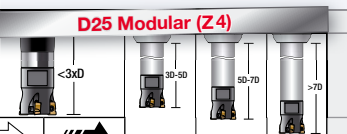






	Vertical wall finishing		D32 Modular (Z5)					D35 Modular (Z5)					D42 Modular (Z6)				
																	
Material	Grade*	Overhang ratio	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D
Carbon Steels Alloy Steels (30HRC or less)	ATH08M JX1020 JX1045	n min ⁻¹	2,980	5,970	3,980	3,980	2,980	2,730	5,460	3,640	3,640	2,730	2,270	4,550	3,030	3,030	2,270
		V_c m/min	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300
		V_f mm/min	2,240	5,970	3,580	2,980	1,790	2,050	5,460	3,270	2,730	1,640	2,050	5,460	3,270	2,730	1,640
		f_z mm/t	0.15	0.2	0.18	0.15	0.12	0.15	0.2	0.18	0.15	0.12	0.15	0.2	0.18	0.15	0.12
		P_r mm	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
FC FCD Cast Iron	ATH08M JX1020 JX1045	n min ⁻¹	2,980	5,970	4,970	3,980	3,980	2,730	5,460	4,550	3,640	3,640	2,270	4,550	3,790	3,030	3,030
		V_c m/min	300	600	500	400	400	300	600	500	400	400	300	600	500	400	400
		V_f mm/min	2,980	7,460	4,970	3,980	2,980	2,730	6,820	4,550	3,640	2,730	2,730	6,820	4,550	3,640	2,730
		f_z mm/t	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15
		P_r mm	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9
		a_e mm	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Maximum f_z (mm/t)			<0.3					<0.3					<0.3				
Maximum a_e (mm)			<0.5					<0.5					<0.5				


















			Vertical wall finishing																
																			
																			
																			
																			



* Red indicates primary recommended material types

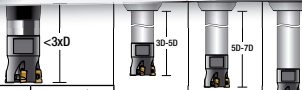
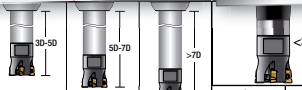
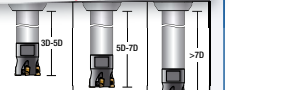
ASPV | Polish Mill V-Type | Recommended Cutting Conditions

 Contouring Z constant			 D16 Modular (Z2)					 D20 Modular (Z3)					 D25 Modular (Z4)												
Material	Grade*	Overhang ratio			General	High Speed	3D-5D	5D-7D	>7D			General	High Speed	3D-5D	5D-7D	>7D			General	High Speed	3D-5D	5D-7D	>7D		
Carbon Steels Alloy Steels (30HRC or less)	JX1020 JX1045 JX1060	n min ⁻¹			2,590	3,980	2,590	2,590	1,790	2,070	3,180	2,070	2,070	1,430	1,660	2,550	1,660	1,660	1,150			1,660	1,660	1,150	
		V_e m/min			130	200	130	130	90	130	200	130	130	90	130	200	130	130	90			130	130	90	
		V_f mm/min			2,590	3,980	2,590	2,590	1,790	3,100	4,770	3,100	3,100	2,150	3,310	5,090	3,310	3,310	2,290			3,310	3,310	2,290	
		f_z mm/t			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			0.5	0.5	0.5	
		a_p mm			0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25			0.4	0.3	0.25
		a_e mm			13	13	13	13	13	13	16	16	16	16	16	20	20	20	20	20			20	20	20
Carbon Steels Alloy Steels (30-45HRC)	JX1020 JX1045 JX1060	n min ⁻¹			1,790	3,580	2,590	2,590	1,790	1,430	2,860	2,070	2,070	1,430	1,150	2,290	1,660	1,660	1,150			1,660	1,660	1,150	
		V_e m/min			90	180	130	130	90	90	180	130	130	90	90	180	130	130	90			130	130	90	
		V_f mm/min			1,430	2,860	2,070	2,070	1,430	1,720	3,440	2,480	2,480	1,720	1,830	3,670	2,650	2,650	1,830			2,650	2,650	1,830	
		f_z mm/t			0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4			0.4	0.4	0.4	
		a_p mm			0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25			0.4	0.3	0.25
		a_e mm			13	13	13	13	13	13	16	16	16	16	16	20	20	20	20	20			20	20	20
SUS Stainless Steels	JX1045 JX1060	n min ⁻¹			2,590	3,980	2,590	2,590	1,790	2,070	3,180	2,070	2,070	1,430	1,660	2,550	1,660	1,660	1,150			1,660	1,660	1,150	
		V_e m/min			130	200	130	130	90	130	200	130	130	90	130	200	130	130	90			130	130	90	
		V_f mm/min			2,590	3,980	2,590	2,590	1,790	3,100	4,770	3,100	3,100	2,150	3,310	5,090	3,310	3,310	2,290			3,310	3,310	2,290	
		f_z mm/t			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			0.5	0.5	0.5	
		a_p mm			0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25			0.4	0.3	0.25
		a_e mm			13	13	13	13	13	13	16	16	16	16	16	20	20	20	20	20			20	20	20
FC FCD Cast Iron	JX1020 JX1045	n min ⁻¹			2,980	3,980	2,590	2,590	1,790	2,390	3,180	2,070	2,070	1,430	1,910	2,550	1,660	1,660	1,150			1,660	1,660	1,150	
		V_e m/min			150	200	130	130	90	150	200	130	130	90	150	200	130	130	90			130	130	90	
		V_f mm/min			4,180	5,570	3,620	3,620	2,510	5,010	6,680	4,340	4,340	3,010	5,350	7,130	4,630	4,630	3,210			4,630	4,630	3,210	
		f_z mm/t			0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7			0.7	0.7	0.7	
		a_p mm			0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.3			0.5	0.4	0.3
		a_e mm			13	13	13	13	13	13	16	16	16	16	16	20	20	20	20	20			20	20	20
Maximum f _z (mm/t)			<0.8					<0.8					<0.8												
Maximum a _p (mm)			<1.0					<1.0					<1.0												

 Contouring Z constant 			D42 Bore Type (Z6)					D50/D52 Bore Type (Z7)					D63/D66 Bore Type (Z8)					
			 		  		 		  		 		  					
Material	Grade*	Overhang ratio	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	General	High Speed	3D-5D	5D-7D	>7D	
Carbon Steels Alloy Steels (30HRC or less)	JX1020 JX1045 JX1060	n min ⁻¹	990	1,520	990	990	680	800	1,220	800	800	550	630	960	630	630	430	
		V_e m/min	130	200	130	130	90	130	200	130	130	90	130	200	130	130	90	
		V_f mm/min	2,960	4,550	2,960	2,960	2,050	2,790	4,280	2,790	2,790	1,930	2,510	3,860	2,510	2,510	1,740	
		f_z mm/t	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
		a_p mm	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25
		a_e mm	34	34	34	34	34	34	42	42	42	42	42	53	53	53	53	53
Carbon Steels Alloy Steels (30~45HRC)	JX1020 JX1045 JX1060	n min ⁻¹	680	1,360	990	990	680	800	1,220	800	800	550	430	870	630	630	430	
		V_e m/min	90	180	130	130	90	130	200	130	130	90	90	180	130	130	90	
		V_f mm/min	1,640	3,270	2,360	2,360	1,640	2,230	3,430	2,230	2,230	1,540	1,390	2,780	2,010	2,010	1,390	
		f_z mm/t	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
		a_p mm	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	
		a_e mm	34	34	34	34	34	34	42	42	42	42	42	53	53	53	53	53
SUS Stainless Steels	JX1045 JX1060	n min ⁻¹	990	1,520	990	990	680	920	1,410	1,100	800	610	630	960	630	630	430	
		V_e m/min	130	200	130	130	90	150	230	180	130	100	130	200	130	130	90	
		V_f mm/min	2,960	4,550	2,960	2,960	2,050	3,210	4,930	3,860	2,790	2,140	2,510	3,860	2,510	2,510	1,740	
		f_z mm/t	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
		a_p mm	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	
		a_e mm	34	34	34	34	34	34	42	42	42	42	42	53	53	53	53	53
FC FCD Cast Iron	JX1020 JX1045	n min ⁻¹	1,140	1,520	990	990	680	920	1,220	800	800	550	720	960	630	630	430	
		V_e m/min	150	200	130	130	90	150	200	130	130	90	150	200	130	130	90	
		V_f mm/min	4,770	6,370	4,140	4,140	2,860	4,500	6,000	3,900	3,900	2,700	4,050	5,400	3,510	3,510	2,430	
		f_z mm/t	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
		a_p mm	0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.3	
		a_e mm	34	34	34	34	34	34	42	42	42	42	42	53	53	53	53	53
Maximum f _z (mm/t)			<0.8					<0.8					<0.8					
Maximum a _p (mm)			<1.0					<1.0					<1.0					

* Red indicates primary recommended material types

ASPV | Polish Mill V-Type | Recommended Cutting Conditions

D32 Modular (Z5)						D35 Modular (Z5)						D42 Modular (Z6)					
																	
General	High Speed	3D-5D	5D-7D	>7D		General	High Speed	3D-5D	5D-7D	>7D		General	High Speed	3D-5D	5D-7D	>7D	
1,290	1,990	1,290	1,290	900		1,180	1,820	1,180	1,180	820		990	1,520	990	990	680	
130	200	130	130	90		130	200	130	130	90		130	200	130	130	90	
3,230	4,970	3,230	3,230	2,240		2,960	4,550	2,960	2,960	2,050		2,960	4,550	2,960	2,960	2,050	
0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	
0.5	0.5	0.4	0.3	0.25		0.5	0.5	0.4	0.3	0.25		0.5	0.5	0.4	0.3	0.25	
26	26	26	26	26		28	28	28	28	28		34	34	34	34	34	
900	1,790	1,290	1,290	900		820	1,640	1,180	1,180	820		680	1,360	990	990	680	
90	180	130	130	90		90	180	130	130	90		90	180	130	130	90	
1,790	3,580	2,590	2,590	1,790		1,640	3,270	2,360	2,360	1,640		1,640	3,270	2,360	2,360	1,640	
0.4	0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4	0.4	
0.5	0.5	0.4	0.3	0.25		0.5	0.5	0.4	0.3	0.25		0.5	0.5	0.4	0.3	0.25	
26	26	26	26	26		28	28	28	28	28		34	34	34	34	34	
1,290	1,990	1,290	1,290	900		1,180	1,820	1,180	1,180	820		990	1,520	990	990	680	
130	200	130	130	90		130	200	130	130	90		130	200	130	130	90	
3,230	4,970	3,230	3,230	2,240		2,960	4,550	2,960	2,960	2,050		2,960	4,550	2,960	2,960	2,050	
0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	
0.5	0.5	0.4	0.3	0.25		0.5	0.5	0.4	0.3	0.25		0.5	0.5	0.4	0.3	0.25	
26	26	26	26	26		28	28	28	28	28		34	34	34	34	34	
1,490	1,990	1,290	1,290	900		1,360	1,820	1,180	1,180	820		1,140	1,520	990	990	680	
150	200	130	130	90		150	200	130	130	90		150	200	130	130	90	
5,220	6,960	4,530	4,530	3,130		4,770	6,370	4,140	4,140	2,860		4,770	6,370	4,140	4,140	2,860	
0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7	
0.5	0.5	0.5	0.4	0.3		0.5	0.5	0.5	0.4	0.3		0.5	0.5	0.5	0.4	0.3	
26	26	26	26	26		28	28	28	28	28		34	34	34	34	34	
<0.8						<0.8						<0.8					
<1.0						<1.0						<1.0					

Always up to date: Please check our P50 QuickFinder



Attentions on Safety

1. Cautions regarding handling

- (1) When removing the tool from its case (packaging), be careful that the tool does not pop out or is dropped. Be particularly careful regarding contact with the tool flutes.
- (2) When handling tools with sharp cutting flutes, be careful not to touch the cutting flutes directly with your bare hands.

2. Cautions regarding mounting

- (1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
- (2) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
- (3) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

3. Cautions during use

- (1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
- (2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
- (3) Cutting tools are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be attached when work is performed and safety equipment such as safety goggles should be worn to create a safe environment for work.
- (4) There is a risk of fire or inflammation due to sparks, heat due to breakage, and cutting chips. Do not use where there is a risk of fire or explosion. Please caution of fire while using oil base coolant, fire prevention is necessary.
- (5) Do not use the tool for any purpose other than that for which it is intended.

4. Cautions regarding regrinding

- (1) If regrinding is not performed at the proper time, there is a risk of the tool breaking. Replace the tool with one in good condition, or perform regrinding.
- (2) Grinding dust will be created when regrinding a tool. When regrinding, be sure to attach a safety cover over the work area and wear safety clothes such as safety goggles, etc.
- (3) This product contains the specified chemical substance cobalt and its inorganic compounds. When performing regrinding or similar processing, be sure to handle the processing in accordance with the local laws and regulations regarding prevention of hazards due to specified chemical substances.

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Specifications for the products listed in this catalog are subject to change without notice due to replacement or modification.

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