

**Toolgal RM series** Flute Grinding wheels achieve these targets. Furthermore, the wheels maintain their profile throughout the grinding process, producing an excellent surface finish.  
 The RM Series, with its improved bond system and innovative abrasives, provides a wide range of benefits:
 

- high material removal rates
- low wheel wear
- low cutting forces
- low machine power consumption

- low frictional heat in the contact zone
- excellent surface finish and edge quality

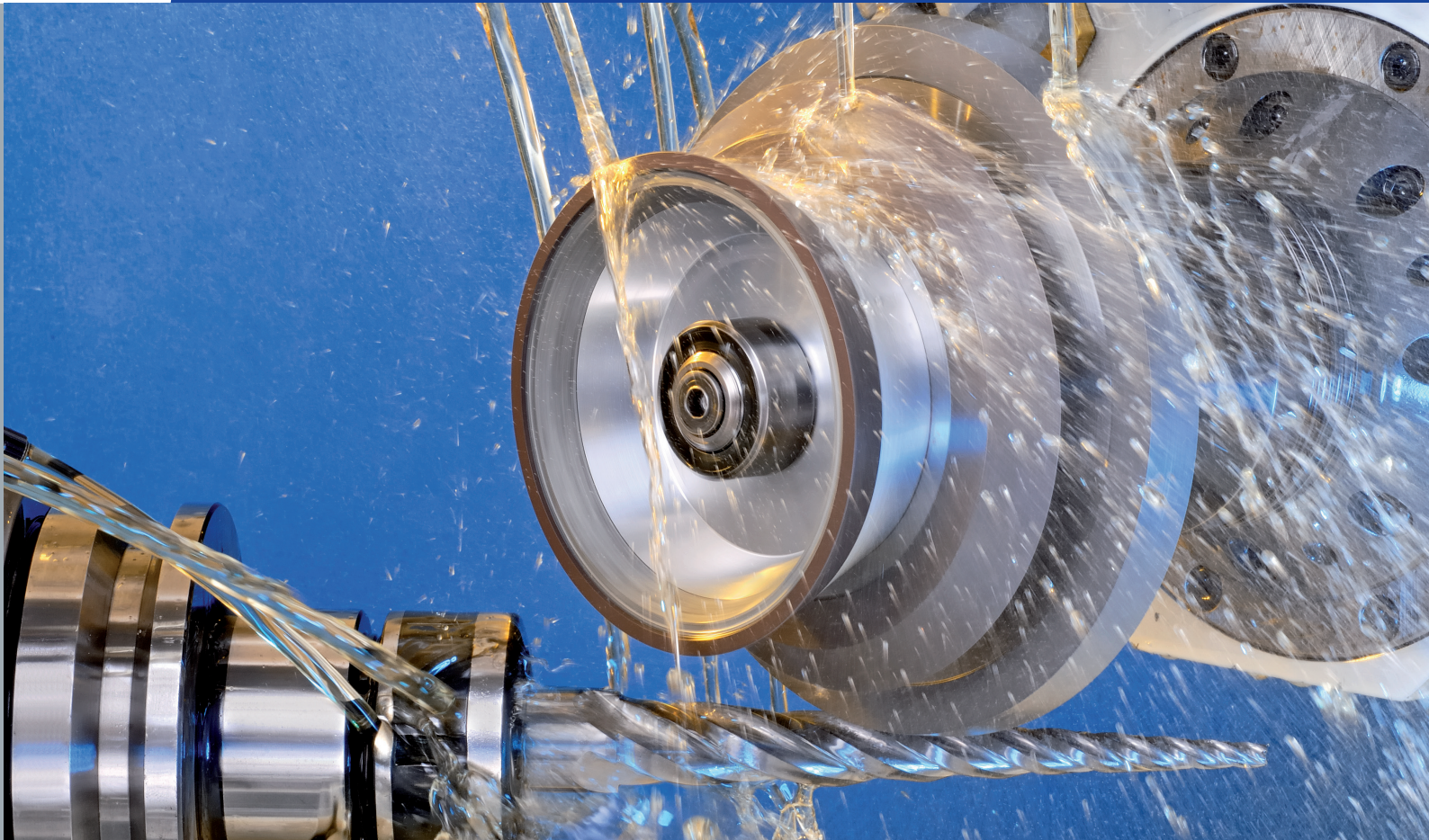
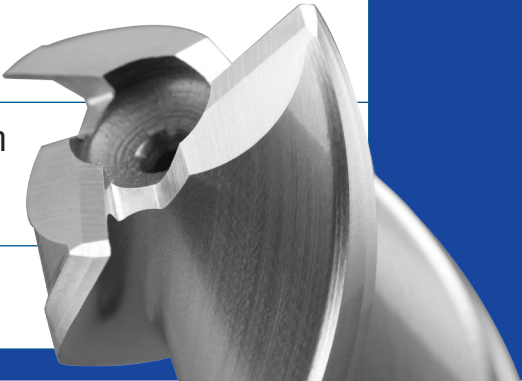
**Shapes available:**  
 1A1 14A1 3A1 1V1 14V1 3V1



## FLUTE GRINDING

### Case study – Flute grinding of Ø16 carbide end-mill by Toolgal RM7

Parameter	
Workpiece	Tungsten carbide end-mill Ø16
Machine	ANCA TX7+ 37KW
Coolant	Grinding oil
Grinding Wheel	1V1 100X10X6 10 D54 C100 RM7
Workpiece	Tungsten carbide end-mill Ø16
Grinding parameters	
Cutting speed	Vc = 18 m/s
Feed rate	Vf = 120 mm/min
Depth of cut	ae = 4 mm
Material removal rate	Qw' = 8 mm³/mm/s
Num of pieces	40
Benefits	
Feed rate	50% higher fluting feed rate in comparison to the ompetitor's wheel
Total cycle time	Significant reduction in production time per tool
Wheel life	Much higher wheel life and form stability in comparison to the competitor's wheel
End-user conclusion	Recommend to swap from competitor wheel to Toolgal



Flute grinding is demanding and time-consuming, due to high stock removal: a cutting depth of 7-8 mm is not unusual. The large contact area hinders the access of coolant to the grinding zone: excessive heat is generated, damaging the work surface and reducing the grinding performance of the heat sensitive diamond grits.

To be competitive, tools must consistently produce high quality results at the lowest possible cost. Flute grinding is one of the most expensive manufacturing steps for mill, drill and cutter manufacturers; hence the continual search for more cost-effective solutions.

#### Features

Toolgal focuses on two main parameters in engineering its RM Series Flute Grinding wheels

- High stock removal rate
- Smooth surface finish



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Qw' Table

$$Qw' = \frac{ae \cdot F}{60}$$

Qw' - specific material removal rate [mm<sup>3</sup>/mm/s]

F - feed rate [mm/min]

ae - depth of cut [mm]

Toolgal's Wheel can generate the highest Qw' possible.

To maximize the Qw' please follow the recommendation below.

ae (mm)	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
40						2.7	3.0	3.3	3.7	4.0	4.3
50					2.9	3.3	3.8	4.2	4.6	5.0	5.4
60				3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.0
80			3.3	4.0	4.7	5.3	6.0	6.7	7.3	8.0	8.7
90		3.0	3.8	4.5	5.3	6.0	6.8	7.5	8.3	9.0	9.8
100	2.5	3.3	4.2	5.0	5.8	6.7	7.5	8.3	9.2	10.0	10.8
120	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	NR	NR
140	3.5	4.7	5.8	7.0	8.2	9.3	10.5	11.7	NR	NR	
160	4.0	5.3	6.7	8.0	9.3	10.7	12.0	NR	NR		
180	4.5	6.0	7.5	9.0	10.5	12.0	NR	NR			
200	5.0	6.7	8.3	10.0	11.7	NR	NR				
F (mm/min)											

Non Economic

Small Tools

Standard Stock Removal

High Stock Removal

Not Recommended

General machine operating instructions

Adjust the spindle RPM within the recommended range to the point of optimal spindle load.

Incorrect spindle RPM:

- Cutting speed lower than recommended might result in high wear of the wheel and poor hold of the form.
- Cutting speed higher than recommended might result in over heating, burning and clogging of the wheel.

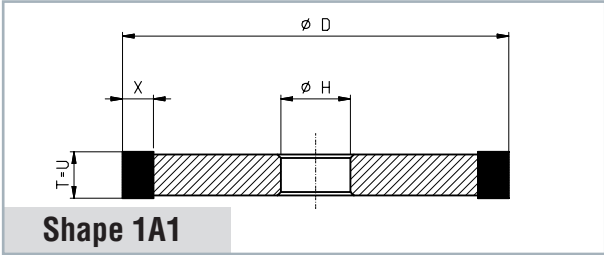
Recommended peripheral speed (Vc) For Diamond Grinding Wheels by Application

Application: Flute grinding					
Bond type: RM5, RM6, RM7   Grit Size: D46-D91					
		Wheel diameter [mm]			
Machine	kW	75	100	125	150
		Vc [m/s]			
Low-medium power	<10	13-18		15-18	
High power	>10	10-18		15-18	

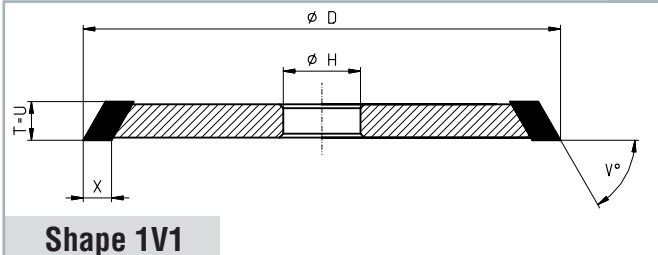
Spindle RPM Recommendation Table

Vc [m/s]	22	20	18	15	13	10
100	4200	3820	3440	2870	2480	1910
125	3360	3060	2750	2290	1990	NR
150	2800	2550	2290	1910	NR	
175	2400	2180	1970	NR		
200	2100	1910	NR			
Wheel Diameter [mm]						

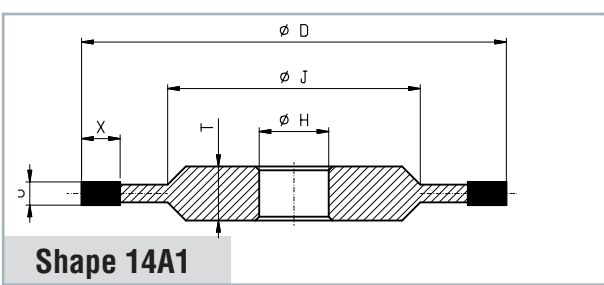
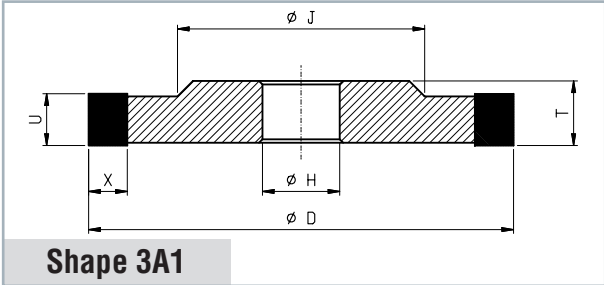
Toolgal Standard program for flute grinding



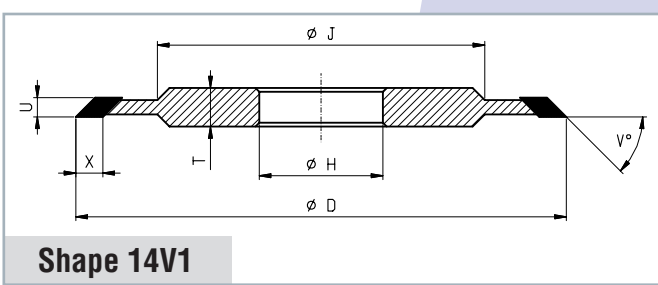
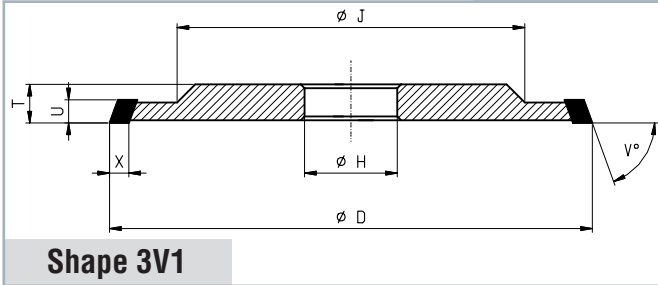
D Ø	T	X	X	Diamond	CBN
50	6,8,10	6	10	RM5	RM9
75	6,8,10,12,15	6	10	RM5	RM9
100	6,8,10,12,15	6	10	RM5	RM9
125	6,8,10,12,15	6	10	RM5	RM9
150	6,8,10,12,15	6	10	RM5	RM9
175	6,8,10,12,15	6	10	RM5	RM9



D Ø	T	X	X	Diamond	CBN
50	6,8,10	6	10	RM5	RM6/7
75	6,8,10,12,15	6	10	RM5	RM6/7
100	6,8,10,12,15	6	10	RM5	RM6/7
125	6,8,10,12,15	6	10	RM5	RM7/6
150	6,8,10,12,15	6	10	RM5	RM7/6
Special 175	6,8,10,12,15	6	10	RM5	RM7/6
Special 200	6,8,10,12,15	6	10	RM5	RM7/6



D	U	X=6mm	X=10mm	Diamond	CBN
50	2,4,5	6		RM5	RM9
	6,8,10	6	10	RM5	RM6/7
75	2,3,4,5	6		RM5	RM9
	6,8,10,12,15	6	10	RM5	RM6/7
100	2,3,4,5	6		RM5	RM9
	6,8,10,12,15	6	10	RM5	RM7/6
125	2,3,4,5	6		RM5	RM9
	6,8,10,12,15	6	10	RM5	RM7/6
150	2,3,4,5	6		RM5	RM9
	6,8,10,12,15	6	10	RM5	RM7/6
175	6,8,10,12,15	6	10	RM5	RM7/6



D	U	X=6mm	X=10mm	Diamond	CBN
50	2,4,5	6		RM5	RM9
	6,8,10	6	10	RM5	RM6/7
75	2,3,4,5	6		RM5	RM9
	6,8,10,12,15	6	10	RM5	RM6/7
100	2,3,4,5	6		RM5	RM9
	6,8,10,12,15	6	10	RM5	RM7/6
125	2,3,4,5	6		RM5	RM9
	6,8,10,12,15	6	10	RM5	RM7/6
150	2,3,4,5	6		RM5	RM9
	6,8,10,12,15	6	10	RM5	RM7/6
175	6,8,10,12,15	6	10	RM5	RM7/6

Other dimensions available on request - Please indicate required U and X "H" central holes available: Ø20mm Ø31.75mm H6