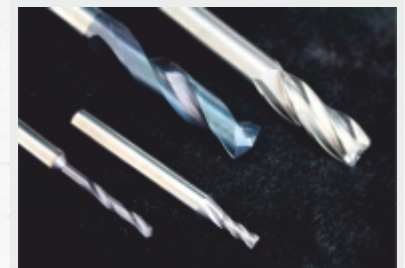
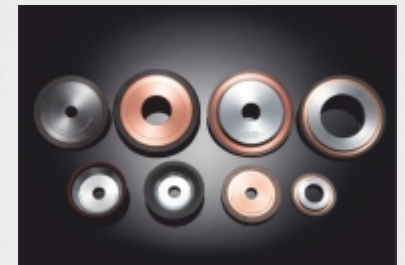
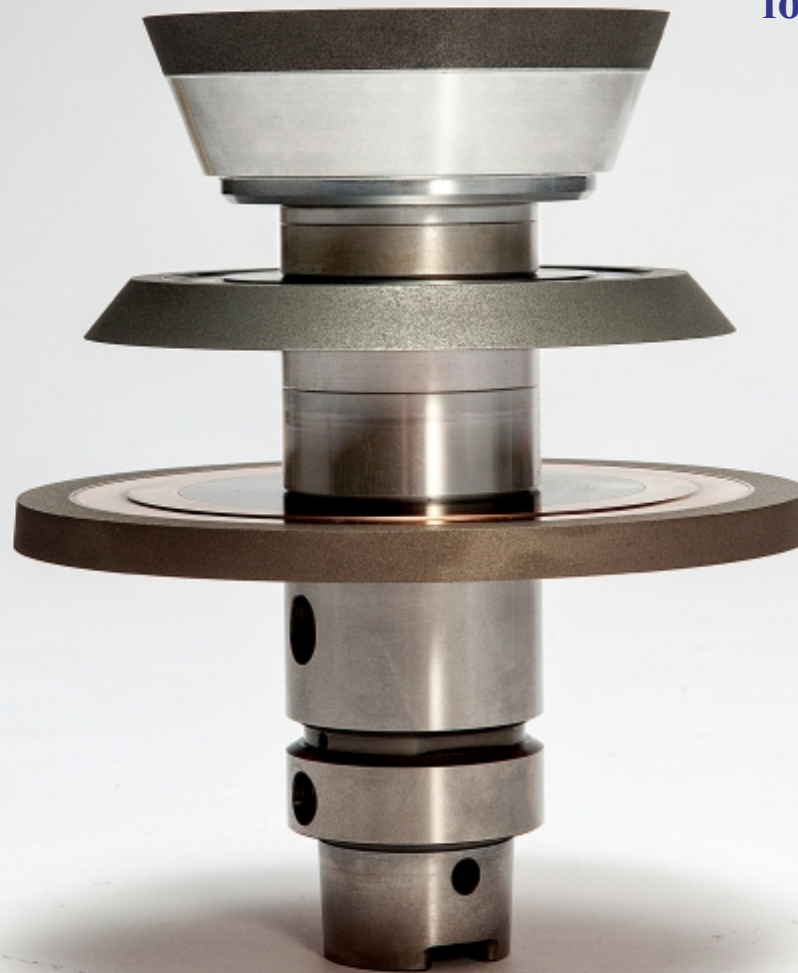
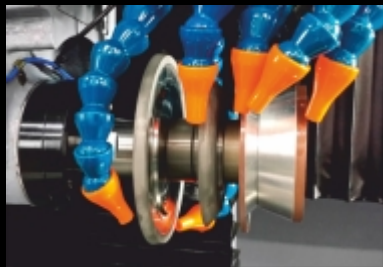


GRINDING WHEELS for CUTTING TOOLS



Diamond & CBN Wheels for machining cutting tools

ISHAM is a young and rapidly growing company specializing in metalworking solutions with the use of superhard materials such as PCD and CBN. Headquarters and R&D are located in Israel, grinding wheels production facility is in the Republic of Korea.



ISHAM's Diamond & CBN Grinding wheels offer the optimized solution for improvement of quality and productivity to produce cutting tools which is needed various material and shapes. Based on our diverse & abundant engineering experiences in tool grinding application, ISHAM has created an innovative bond systems to enhance the productivity and quality level.

- Shorter machining time through better traverse feeds.
- Longer wheel dressing interval and balanced grinding ability are able to sustain cutting tool's geometric stability.
- Optimizing tool manufacturing process through much experience in grinding cutting tool.
- Providing perfect wheel quality by way of developed bond systems and grit qualities.

Contents

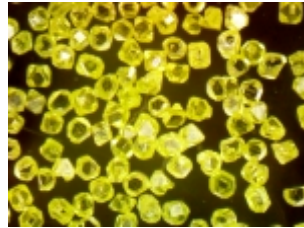
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Basic information of Diamond & CBN Wheels

Diamond grinding wheel : For grinding non-ferrous material

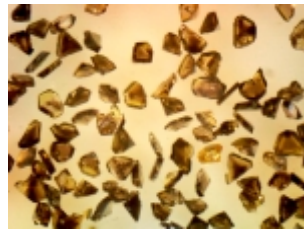
Diamond grinding wheel is consist of diamond which is most hardest material in the earth. Usually diamond grinding wheel is used for non-ferrous material such as carbide, ceramics and cermet, etc.



Diamond abrasive

CBN grinding wheel : For grinding ferrous material (mainly steel)

CBN grinding wheel is consist of CBN (Cubic Boron Nitride) which is the second hardest material in the earth. Usually CBN grinding wheel is used for steel (ferrous material) grinding.



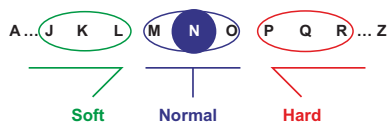
CBN abrasive

Abrasive Grit Size

Abrasive grit that takes role of cutting edge while grinding process is most important factor to grind effectively for the precision tool and a suitable grit size bring excellent grinding result.

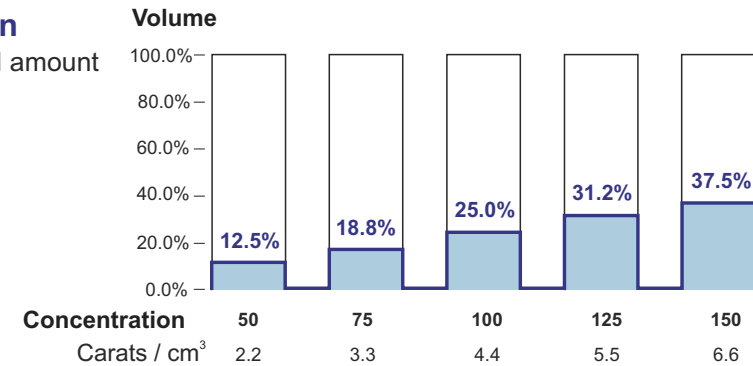
ISHAM Ltd. Grit Size		FEPA Designation		ANSI Grit Size	US Grit Number	JIS Size
Mesh	Size (µm)	DIA	CBN			
#60	251	D251	B251	60/80	60	
#80	181	D181	B181	80/100	100	80
#100	151	D151	B151	100/120	120	100
#120	126	D126	B126	120/140	150	120
#140	107	D107	B107	140/170	180	140
#170	91	D91	B91	170/200	220	170
#200	76	D76	B76	200/230	240	200
#230	64	D64	B64	230/270	280	230
#270	54	D54	B54	270/325	320	270
#325	46	D46	B46	325/400	400	325
#400	40					
#500	35					
#600	30					
#800	20					
#1000	15					
#1500	10					

Bond Hardness (Grade)



Concentration

Diamond or CBN amount in unit volume



Bond type of cutting tool grinding

Resin

Phenolic resin bond is one of the most representative bond type of Super-abrasive grinding wheel. In General, it shows an excellent result to achieve fine roughness and minimal chipping. It's mainly used for Carbide, HSS, ceramic cutting tool grinding applications. (ISHAM **GB** series)

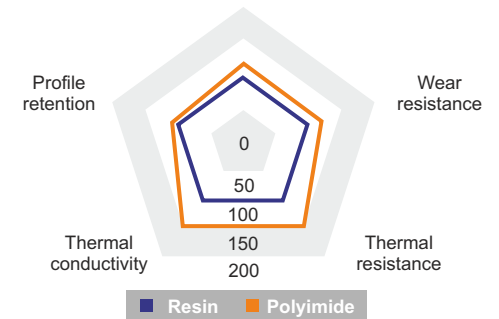
Polyimide

Polyimide resin bond has distinguished feature at heat and wear resistance. It's superior mechanical property in high temperature makes excellent result at creep feed grinding. (ISHAM **GP** series)

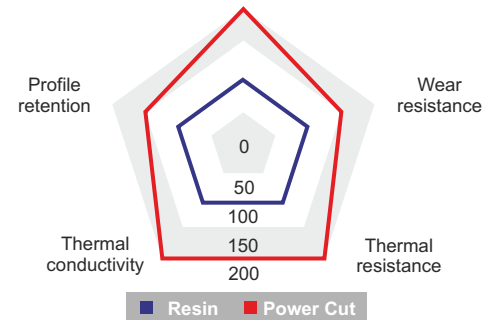
Power Cut

Power Cut is combined with metal and resin bond. This mixture has excellent grinding abilities : Heat & wear resistance (ISHAM **GMT** series)

Cutting ability



Cutting ability



Product Line-up for machining cutting tools

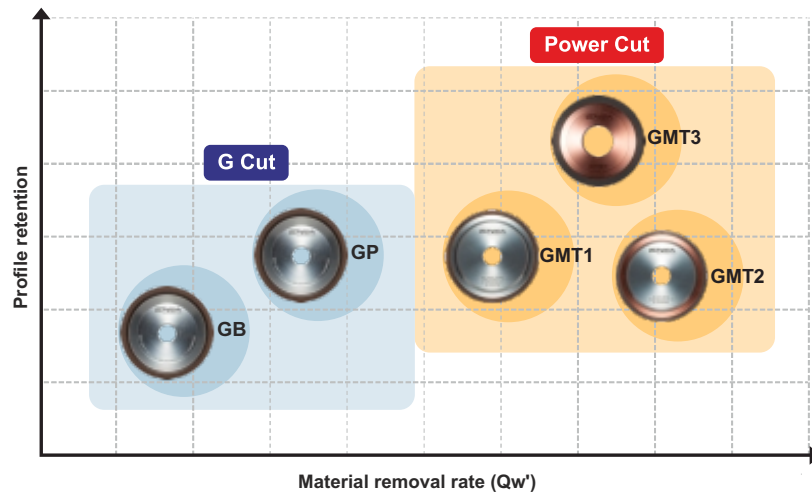
Case Study

Power Cut

- **ISHAM Power Cut** is the most suitable product for enhancing high stock removal rate in flute and gash operation which is need much lead time in diverse type of cutting tools.
- **ISHAM Power Cut** is applicable for all of carbide and HSS tools.
Power Cut Diamond Wheel: For carbide tools
Power Cut CBN Wheel: For HSS tools

Advantages

- Actual grinding time is reduced in half.
- Dressing interval time is doubled.
- Better wear resistance, High profile retention.
- Good surface roughness.



G Cut

- **G cut** is a standard products especially for cutting tools manufacturing process such as endmills, drills and reamers.
- **G cut** is basically combined with phenolic resin or polyimide bond. Well optimized by numerous test results we have conducted with our customers.

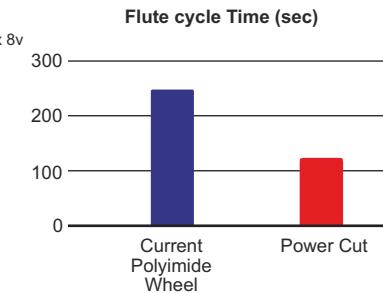
Case Study 1 – Fluting for carbide endmill

Grinding Wheel **Power Cut** D54 GMT2K, 3V1 Ø150 x 12t x 8v
Machine **REX-5B** (5-axis CNC grinder, 18.5kw)
Coolant Oil

Working Condition
Work piece Carbide endmill 4FL-Ø16
Grinding process Flute
Feed rate 140mm/min
Cutting speed 18m/s
Depth of cut 3.4mm
Material removal rate (Qw') 7.9mm3/mms

Advantages

- **Power Cut** flute wheel reduced cycle time by 50%
- Online self dressing capability
- Lower spindle load



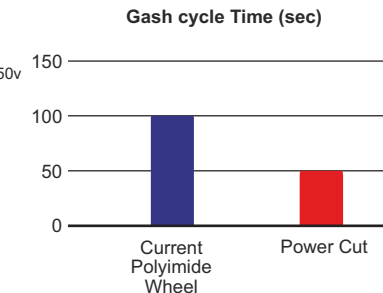
Case Study 2 – Gashing for carbide

Grinding Parameter **Power Cut** D54 GMT1, 3V1 Ø125 x 10t x 50v
Grinding process **REX-5B** (5-axis CNC grinder, 18.5kw)
Feed rate Oil
Cutting speed Carbide endmill 4FL-Ø16

Grinding Parameter
Grinding process Gash
Feed rate 60mm/min (Gash walk)
Cutting speed 20m/s

Advantages

- **Power Cut** Gash wheel reduced cycle time by 50%



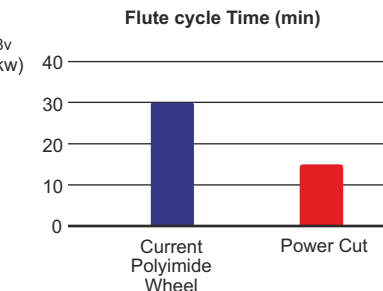
Case Study 3 – Fluting for HSS endmill

Grinding Wheel **Power Cut** B76 GMT3, 3V1 Ø150 x 10t x 8v
Machine **Walter Basic** (5-axis CNC grinder, 15kw)
Coolant Oil
Work piece PM HSS endmill 4FL-Ø5/8"

Grinding Parameter
Grinding Process Flute
Feed rate 100mm/min
Cutting speed 18m/s
Depth of cut 3.175mm

Advantages

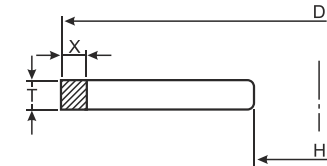
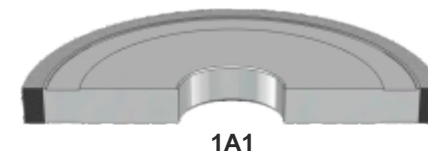
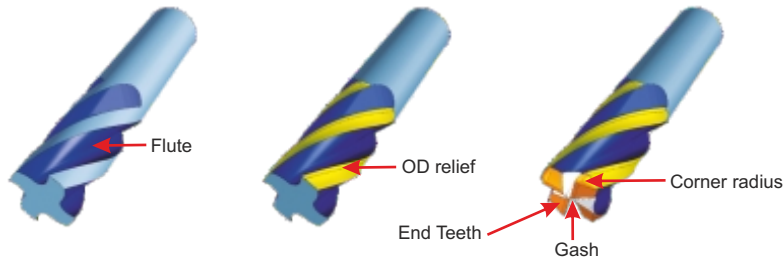
- **Power Cut** CBN Flute Wheel reduced cycle time by 50%
- Lower spindle load



Information of cutting tool grinding process

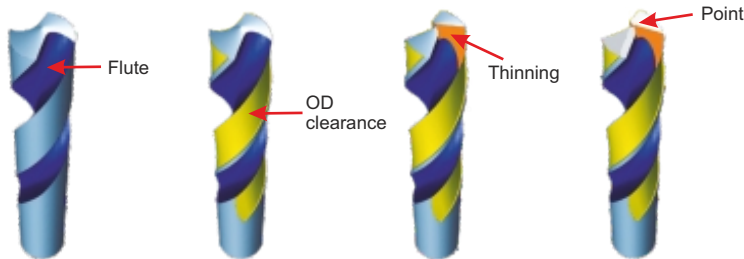
Wheels for CNC machining cutting tools
Flute grinding for endmills

Endmill



	Flute	OD relief	End Teeth
Wheel Shape	1A1, 1V1, 3A1, 3V1 etc.	11A2, 11V4, 11V5, 3V1 etc.	Gash : 1V1, 3V1 (High angle), 1Y1, etc. End teeth : 11A2, 11V4, 3V1, etc. Corner radius : 11V5, 3V1
Wheel Grit Size	Carbide : D91~ D46 HSS : B107~ B64	Carbide : D46~ D20 HSS : B91~ B46	Carbide : D76~ D30 HSS : B107~ B76

Drill



	Flute	OD clearance	Thinning	Point
Wheel Shape	1V1, 3V1 etc. Formed wheel	3V1 (Slight angle)	1V1, 3V1 etc.	11A2, 6A2 (Cup)
Wheel Grit Size	Carbide : D91~ D46 HSS : B107~ B64	Carbide : D76~ D46 HSS : B107~ B76	Carbide : D91~ D46 HSS : B107~ B64	Carbide : D64 ~ D30 HSS : B91~ B46

Metric

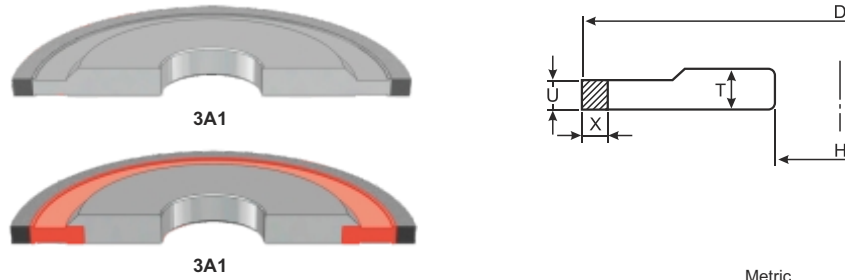
Shape	D	T	X	H	Carbide		HSS		Body	Machine Type		Stock Program
					Grit Size	Bond	Grit Size	Bond		A	B	
1A1	125	6	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	6	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	8	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	8	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	10	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	10	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	12	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	12	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	15	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	125	15	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	150	6	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	150	6	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	150	8	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	●
1A1	150	8	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	●
1A1	150	10	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	150	10	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	150	12	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	150	12	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	150	15	6	Per request	D54	GMT2	B76	GMT31	CS	A	B	
1A1	150	15	10	Per request	D54	GMT2	B76	GMT31	CS	A	B	

A H (Bore) = $\varnothing 20 / W$
 B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.

Body material
 CS : Carbon Steel

Power Cut

Wheels for CNC machining cutting tools Flute grinding for endmills



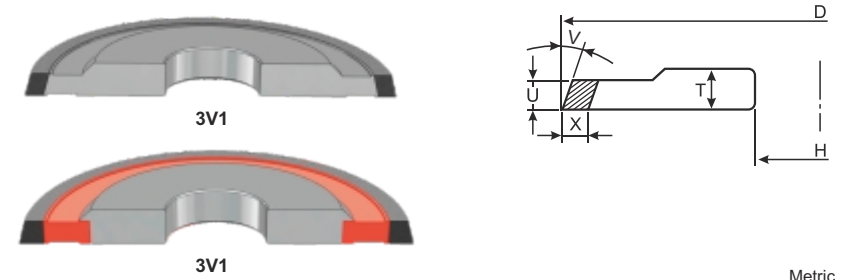
Metric

Shape	D	T	U	X	H	Carbide		HSS		Body	Machine Type	Stock Program
						Grit Size	Bond	Grit Size	Bond			
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3A1	125	8	3	6	Per request	D46	GMT3	B64	GMT31	SC	A B	
3A1	125	8	4	6	Per request	D54	GMT2	B76	GMT31	SC	A B	
3A1	125	8	5	6	Per request	D54	GMT2	B76	GMT31	SC	A B	
3A1	125	10	6	6	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	125	10	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	125	10	8	6	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	125	10	8	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	125	12	10	6	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	125	12	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	125	14	12	6	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	125	14	12	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	150	10	2	6	Per request	D46	GMT3	B64	GMT31	SC	A B C	
3A1	150	10	3	6	Per request	D46	GMT3	B64	GMT31	SC	A B C	
3A1	150	10	4	6	Per request	D54	GMT2	B76	GMT31	SC	A B C	
3A1	150	10	5	6	Per request	D54	GMT2	B76	GMT31	SC	A B C	
3A1	150	10	6	6	Per request	D54	GMT2	B76	GMT31	CS	A B C	
3A1	150	10	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B C	
3A1	150	10	8	6	Per request	D54	GMT2	B76	GMT31	CS	A B C	●
3A1	150	10	8	10	Per request	D54	GMT2	B76	GMT31	CS	A B C	●
3A1	150	12	10	6	Per request	D54	GMT2	B76	GMT31	CS	A B C	●
3A1	150	12	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B C	
3A1	150	14	12	6	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	150	14	12	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	150	18	15	6	Per request	D54	GMT2	B76	GMT31	CS	A B	
3A1	150	18	15	10	Per request	D54	GMT2	B76	GMT31	CS	A B	

- A H (Bore) = Ø20 / W
- B H (Bore) = Ø31.75 / A, H, M etc.
- C H (Bore) = Ø50 / R

Body material
 CS : Carbon Steel
 SC : Sintered Copper

Wheels for CNC machining cutting tools Flute grinding for endmills



Metric

Shape	D	T	U	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
3V1	125	8	2	6	10	Per request	D46	GMT3	B64	GMT31	SC	A B	
3V1	125	8	3	6	10	Per request	D46	GMT3	B64	GMT31	SC	A B	
3V1	125	8	4	6	10	Per request	D54	GMT2	B76	GMT31	SC	A B	
3V1	125	8	5	6	10	Per request	D54	GMT2	B76	GMT31	SC	A B	
3V1	125	10	6	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3V1	125	10	6	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3V1	125	10	8	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B	●
3V1	125	10	8	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B	●
3V1	125	12	10	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B	●
3V1	125	12	10	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3V1	125	14	12	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3V1	125	14	12	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3V1	150	10	2	6	10	Per request	D46	GMT3	B64	GMT31	SC	A B C	
3V1	150	10	3	6	10	Per request	D46	GMT3	B64	GMT31	SC	A B C	
3V1	150	10	4	6	10	Per request	D54	GMT2	B76	GMT31	SC	A B C	
3V1	150	10	5	6	10	Per request	D54	GMT2	B76	GMT31	SC	A B C	
3V1	150	10	6	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B C	
3V1	150	10	6	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B C	
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3V1	150	10	8	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B C	●
3V1	150	12	10	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B C	●
3V1	150	12	10	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B C	
3V1	150	14	12	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3V1	150	14	12	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3V1	150	18	15	6	10	Per request	D54	GMT2	B76	GMT31	CS	A B	
3V1	150	18	15	10	10	Per request	D54	GMT2	B76	GMT31	CS	A B	

- A H (Bore) = Ø20 / W
- B H (Bore) = Ø31.75 / A, H, M etc.
- C H (Bore) = Ø50 / R

Body material
 CS : Carbon Steel
 SC : Sintered Copper

Wheels for CNC machining cutting tools Gash grinding for endmills

Wheels for CNC machining cutting tools OD relief & end teeth grinding for endmills



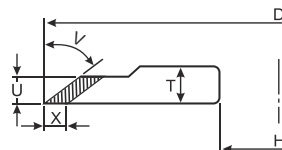
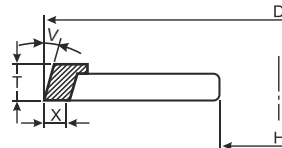
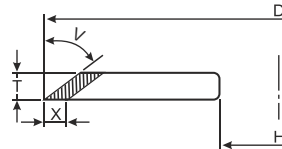
1V1



1Y1



3V1

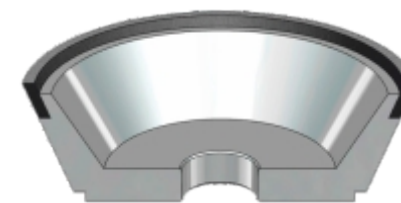


Metric

Shape	D	T	U	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
1V1	125	10	-	6	20	Per request	D54	GMT1	B91	GMT1	CS	A B	
1V1	125	10	-	6	30	Per request	D54	GMT1	B91	GMT1	CS	A B	
1V1	125	10	-	6	50	Per request	D54	GMT1	B91	GMT1	CS	A B	•
1V1	125	12	-	6	20	Per request	D54	GMT1	B91	GMT1	CS	A B	
1V1	125	12	-	6	30	Per request	D54	GMT1	B91	GMT1	CS	A B	
1V1	125	12	-	6	50	Per request	D54	GMT1	B91	GMT1	CS	A B	
1Y1	125	10	-	6	15	Per request	D54	GMT1	B91	GMT1	CS	A B	
1Y1	125	10	-	6	20	Per request	D54	GMT1	B91	GMT1	CS	A B	
1Y1	125	12	-	6	15	Per request	D54	GMT1	B91	GMT1	CS	A B	
1Y1	125	12	-	6	20	Per request	D54	GMT1	B91	GMT1	CS	A B	
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1V1	150	10	-	6	30	Per request	D54	GMT1	B91	GMT1	CS	A B	
1V1	150	10	-	6	50	Per request	D54	GMT1	B91	GMT1	CS	A B	
1V1	150	12	-	6	20	Per request	D54	GMT1	B91	GMT1	CS	A B	
1V1	150	12	-	6	30	Per request	D54	GMT1	B91	GMT1	CS	A B	
1V1	150	12	-	6	50	Per request	D54	GMT1	B91	GMT1	CS	A B	
3V1	100	8	6	6	20	Per request	D54	GMT3	B76	GMT3	SC	C	
3V1	100	8	6	6	30	Per request	D54	GMT3	B76	GMT3	SC	C	
3V1	100	8	6	6	50	Per request	D54	GMT3	B76	GMT3	SC	C	

- A H (Bore) = $\varnothing 20 / W$
- B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.
- C H (Bore) = $\varnothing 50 / R$

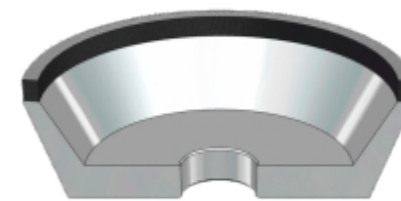
Body material
CS : Carbon Steel
SC : Sintered Copper



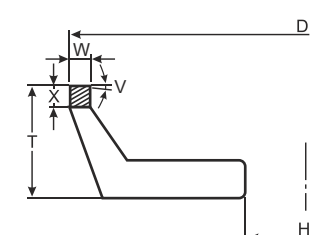
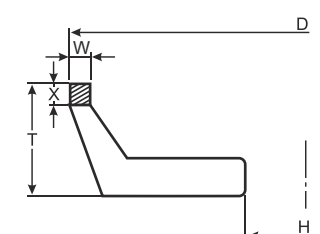
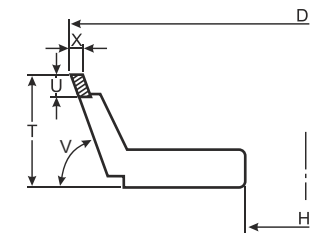
11V9



11A2



11V4



Metric

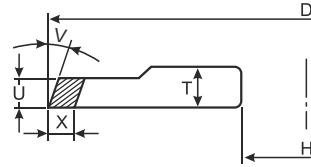
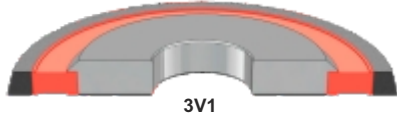
Shape	D	T	U (W)	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
11V9	100	35	10	3	70	Per request	D46	GMT1	B64	GMT3	A	A B	•
11A2	100	35	4	6	-	Per request	D46	GMT1	B64	GMT3	A	A B	
11A2	100	35	6	6	-	Per request	D46	GMT1	B64	GMT3	A	A B	
11V4	100	35	4	6	-5	Per request	D46	GMT1	B64	GMT3	A	A B	•
11V4	100	35	6	6	-5	Per request	D46	GMT1	B64	GMT3	A	A B	

- A H (Bore) = $\varnothing 20 / W$
- B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.

Body material
A : Aluminum

Wheels for CNC machining cutting tools Flute grinding for carbide drills

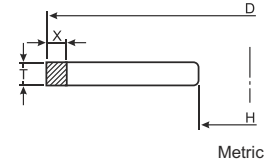
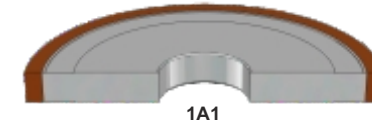
Wheels for CNC machining cutting tools Flute grinding for endmills



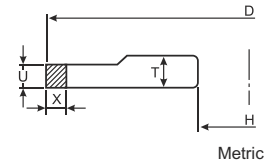
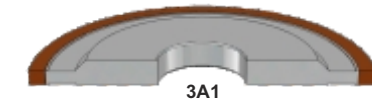
Shape	D	T	U	X	V	H	Grit Size	Bond	Body	Machine Type	Stock Program	Metric	
3V1	125	8	3	6	15	Per request	D54	GMT1	SC	A B			
3V1	125	8	4	6	15	Per request	D54	GMT1	SC	A B			
3V1	125	8	5	6	15	Per request	D54	GMT1	SC	A B			
3V1	125	8	6	6	15	Per request	D64	GMT1	CS	A B			
3V1	125	10	7	6	15	Per request	D64	GMT1	CS	A B			
3V1	125	10	8	6	15	Per request	D64	GMT1	CS	A B		●	
3V1	125	12	9	6	15	Per request	D91	GMT1	CS	A B			
3V1	125	12	10	6	15	Per request	D91	GMT1	CS	A B			
3V1	125	12	10	10	15	Per request	D91	GMT1	CS	A B			
3V1	125	14	12	6	15	Per request	D91	GMT1	CS	A B			
3V1	125	14	12	10	15	Per request	D91	GMT1	CS	A B			
3V1	150	10	3	6	15	Per request	D54	GMT1	SC	A B C			
3V1	150	10	4	6	15	Per request	D54	GMT1	SC	A B C			
3V1	150	10	5	6	15	Per request	D54	GMT1	SC	A B C			
3V1	150	10	6	6	15	Per request	D64	GMT1	CS	A B C			
3V1	150	10	7	6	15	Per request	D64	GMT1	CS	A B C			
3V1	150	10	8	6	15	Per request	D64	GMT1	CS	A B C		●	
3V1	150	12	9	6	15	Per request	D91	GMT1	CS	A B C			
3V1	150	12	10	6	15	Per request	D91	GMT1	CS	A B C			
3V1	150	12	10	10	15	Per request	D91	GMT1	CS	A B C			
1V1	150	13	-	6	15	Per request	D91	GMT1	CS	A B			
1V1	150	13	-	10	15	Per request	D91	GMT1	CS	A B			
1V1	150	15	-	6	15	Per request	D91	GMT1	CS	A B			
1V1	150	15	-	10	15	Per request	D91	GMT1	CS	A B			

- A H (Bore) = $\varnothing 20 / W$
- B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.
- C H (Bore) = $\varnothing 50 / R$

Body material
CS : Carbon Steel
SC : Sintered Copper



Shape	D	T	X	H	Carbide		HSS		Body	Machine Type	Stock Program
					Grit Size	Bond	Grit Size	Bond			
1A1	125	6	6	Per request	D64	GB72	B91	GBS72	A	A B	
1A1	125	8	6	Per request	D64	GB72	B91	GBS72	A	A B	
1A1	125	10	6	Per request	D64	GB72	B91	GBS72	A	A B	
1A1	125	12	6	Per request	D64	GB72	B91	GBS72	A	A B	
1A1	125	15	6	Per request	D64	GB72	B91	GBS72	A	A B	
1A1	150	6	6	Per request	D64	GB72	B91	GBS72	A	A B	
1A1	150	8	6	Per request	D64	GB72	B91	GBS72	A	A B	
1A1	150	10	6	Per request	D91	GB72	B107	GBS72	A	A B	●
1A1	150	12	6	Per request	D91	GB72	B107	GBS72	A	A B	
1A1	150	15	6	Per request	D91	GB72	B107	GBS72	A	A B	



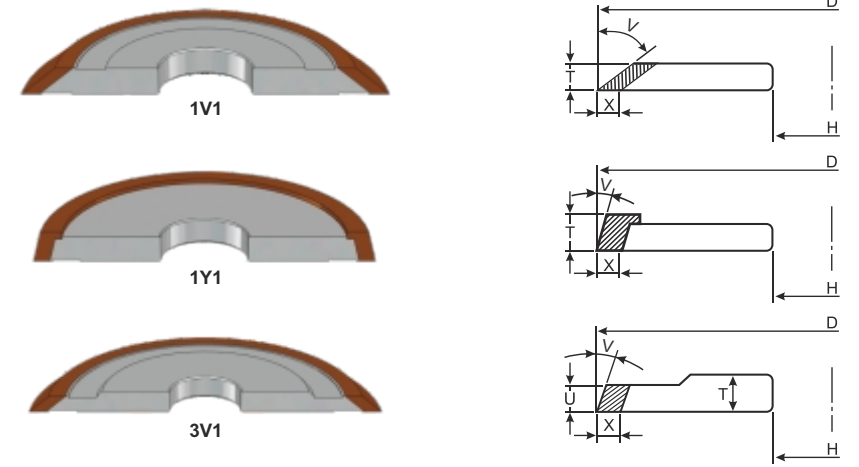
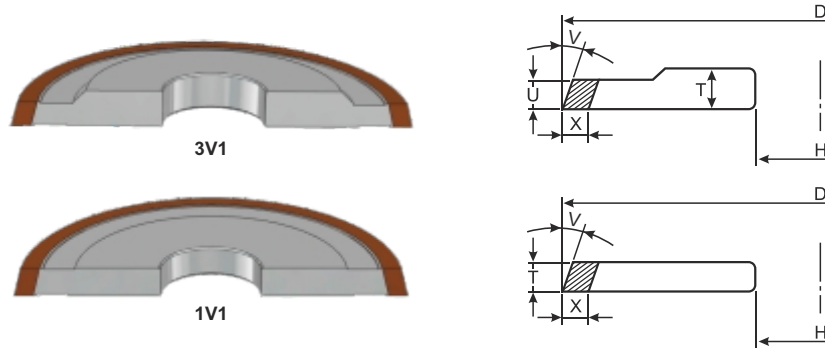
Shape	D	T	U	X	H	Carbide		HSS		Body	Machine Type	Stock Program
						Grit Size	Bond	Grit Size	Bond			
3A1	125	8	1	6	Per request	D46	GP33	B64	GPS32	CS	A B C	
3A1	125	8	2	6	Per request	D46	GP33	B64	GPS32	CS	A B C	
3A1	125	8	3	6	Per request	D46	GP33	B64	GPS32	A	A B C	
3A1	125	8	4	6	Per request	D64	GB72	B91	GBS72	A	A B C	
3A1	125	8	5	6	Per request	D64	GB72	B91	GBS72	A	A B C	
3A1	125	10	6	6	Per request	D64	GB72	B91	GBS72	A	A B C	
3A1	125	10	8	6	Per request	D64	GB72	B91	GBS72	A	A B C	
3A1	125	12	10	6	Per request	D91	GB72	B107	GBS72	A	A B C	
3A1	125	14	12	6	Per request	D91	GB72	B107	GBS72	A	A B C	
3A1	150	10	1	6	Per request	D46	GP33	B64	GPS32	CS	A B C	
3A1	150	10	2	6	Per request	D46	GP33	B64	GPS32	CS	A B C	
3A1	150	10	3	6	Per request	D46	GP33	B64	GPS32	A	A B C	
3A1	150	10	4	6	Per request	D64	GB72	B91	GBS72	A	A B C	
3A1	150	10	5	6	Per request	D64	GB72	B91	GBS72	A	A B C	
3A1	150	10	6	6	Per request	D64	GB72	B91	GBS72	A	A B C	
3A1	150	10	8	6	Per request	D64	GB72	B91	GBS72	A	A B C	
3A1	150	12	10	6	Per request	D91	GB72	B107	GBS72	A	A B C	●
3A1	150	14	12	6	Per request	D91	GB72	B107	GBS72	A	A B C	
3A1	150	18	15	6	Per request	D91	GB72	B107	GBS72	A	A B C	

- A H (Bore) = $\varnothing 20 / W$
- B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.
- C H (Bore) = $\varnothing 50 / R$

Body material
CS : Carbon Steel
A : Aluminum

Wheels for CNC machining cutting tools Flute grinding for endmills

Wheels for CNC machining cutting tools Flute grinding for endmills



Metric

Shape	D	T	U	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
3V1	125	8	1	6	10	Per request	D46	GP33	B64	GPS32	CS	A B	
3V1	125	8	2	6	10	Per request	D46	GP33	B64	GPS32	CS	A B	
3V1	125	8	3	6	10	Per request	D64	GB73	B64	GPS32	A	A B	
3V1	125	8	4	6	10	Per request	D64	GB73	B91	GBS72	A	A B	
3V1	125	8	5	6	10	Per request	D64	GB73	B91	GBS72	A	A B	
3V1	125	10	6	6	10	Per request	D64	GB73	B91	GBS72	A	A B	
3V1	125	10	8	6	10	Per request	D64	GB73	B91	GBS72	A	A B	
1V1	125	10	-	6	10	Per request	D91	GB73	B107	GBS72	A	A B	
1V1	125	12	-	6	10	Per request	D91	GB73	B107	GBS72	A	A B	
3V1	150	10	1	6	10	Per request	D46	GP33	B64	GPS32	CS	A B C	
3V1	150	10	2	6	10	Per request	D46	GP33	B64	GPS32	CS	A B C	
3V1	150	10	3	6	10	Per request	D64	GB73	B64	GPS32	A	A B C	
3V1	150	10	4	6	10	Per request	D64	GB73	B91	GBS72	A	A B C	
3V1	150	10	5	6	10	Per request	D64	GB73	B91	GBS72	A	A B C	
3V1	150	10	6	6	10	Per request	D64	GB73	B91	GBS72	A	A B C	
3V1	150	10	8	6	10	Per request	D64	GB73	B91	GBS72	A	A B C	
1V1	150	10	-	6	10	Per request	D91	GB73	B107	GBS72	A	A B C	●
1V1	150	12	-	6	10	Per request	D91	GB73	B107	GBS72	A	A B	
1V1	150	15	-	6	10	Per request	D91	GB73	B107	GBS72	A	A B	

- A H (Bore) = Ø20 / W
- B H (Bore) = Ø31.75 / A, H, M etc.
- C H (Bore) = Ø50 / R

Body material
CS : Carbon Steel
A : Aluminum

Metric

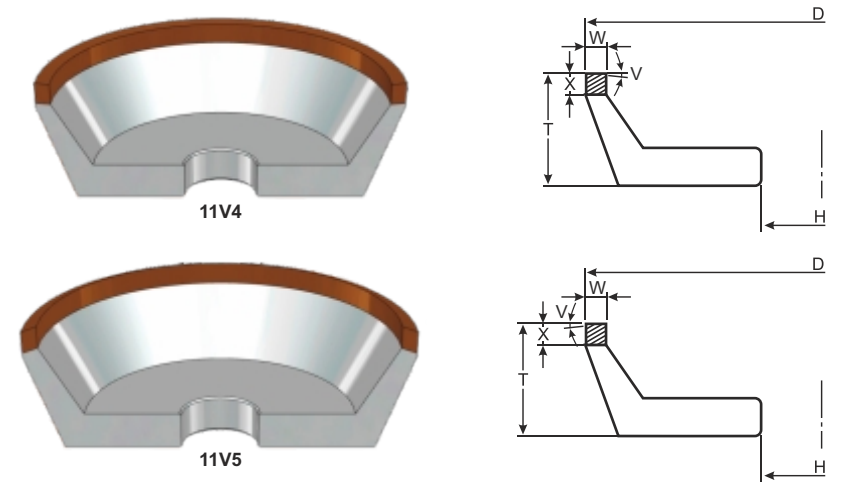
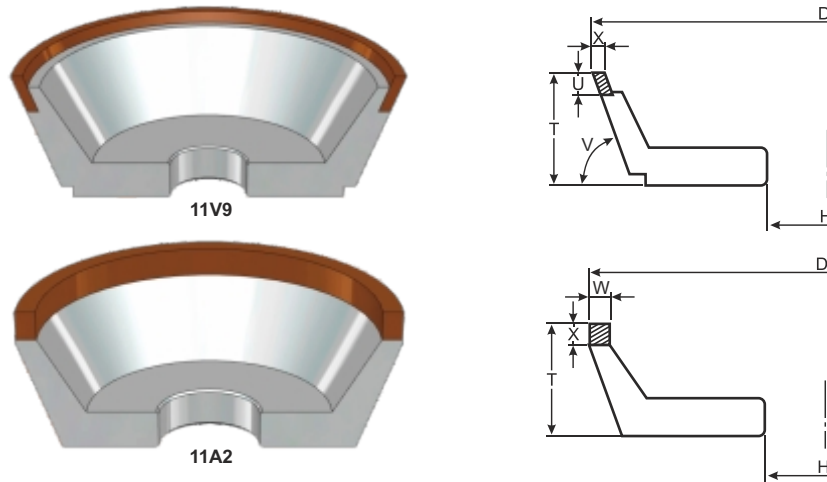
Shape	D	T	U	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
1V1	125	10	-	6	20	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	125	10	-	6	30	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	125	10	-	6	50	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	125	12	-	6	20	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	125	12	-	6	30	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	125	12	-	6	50	Per request	D64	GP32	B91	GPS33	A	A B	●
1Y1	125	10	-	6	15	Per request	D64	GP32	B91	GPS33	A	A B	
1Y1	125	10	-	6	20	Per request	D64	GP32	B91	GPS33	A	A B	
1Y1	125	12	-	6	15	Per request	D64	GP32	B91	GPS33	A	A B	
1Y1	125	12	-	6	20	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	150	10	-	6	20	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	150	10	-	6	30	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	150	10	-	6	50	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	150	12	-	6	20	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	150	12	-	6	30	Per request	D64	GP32	B91	GPS33	A	A B	
1V1	150	12	-	6	50	Per request	D64	GP32	B91	GPS33	A	A B	
3V1	100	8	6	6	20	Per request	D54	GP32	B91	GPS33	A		C
3V1	100	8	6	6	30	Per request	D54	GP32	B91	GPS33	A		C
3V1	100	8	6	6	50	Per request	D54	GP32	B91	GPS33	A		C

- A H (Bore) = Ø20 / W
- B H (Bore) = Ø31.75 / A, H, M etc.
- C H (Bore) = Ø50 / R

Body material
A : Aluminum

Wheels for CNC machining cutting tools OD relief & end teeth grinding for endmills

Wheels for CNC machining cutting tools OD relief & end teeth grinding for endmills



G Cut

G Cut

Metric

Shape	D	T	U (W)	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
11V9	100	35	10	3	70	Per request	D46	GB73	B91	GB32	A	A B	●
11V9	125	40	10	3	70	Per request	D46	GB73	B91	GB32	A	A B	
11A2	100	35	4	6	-	Per request	D46	GB73	B91	GB32	A	A B	
11A2	100	35	6	6	-	Per request	D46	GB73	B91	GB32	A	A B	

A H (Bore) = $\varnothing 20 / W$
B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.

Body material
 A : Aluminum

Metric

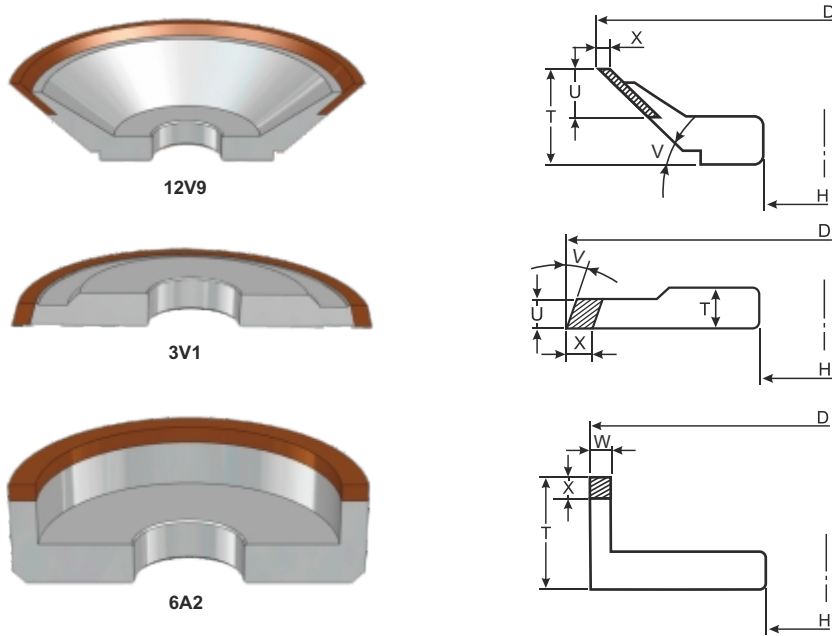
Shape	D	T	W	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
11V4	100	35	4	6	-5	Per request	D46	GB73	B64	GB73	A	A B	●
11V5	100	35	4	6	20	Per request	D46	GP33	B64	GB73	A	A B	
11V5	100	35	4	6	20	Per request	D30	GP33	B46	GB73	A	A B	●
11V5	100	35	6	6	20	Per request	D46	GP33	B64	GB73	A	A B	
11V5	100	35	6	6	20	Per request	D30	GP33	B46	GB73	A	A B	

A H (Bore) = $\varnothing 20 / W$
B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.

Body material
 A : Aluminum

Wheels for CNC machining cutting tools OD relief & end teeth grinding for endmills

Wheels for CNC machining cutting tools OD relief & end teeth grinding for endmills



Shape	D	T	U (W)	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
12V9	100	25	10	3	45	Per request	D46	GB73	B64	GBS73	A	A B	
12V9	125	30	10	3	45	Per request	D46	GB73	B64	GBS73	A	A B	
3V1	100	8	6	6	15	Per request	D30	GP32	B46	GPS32	A	A B	●
3V1	125	10	6	6	15	Per request	D30	GP32	B46	GPS32	A	A B	
3V1	150	10	6	6	15	Per request	D30	GP32	B46	GPS32	A	A B	
6A2	80	10	6	4	-	Per request	D30	GP32	B46	GPS32	A	A B	●

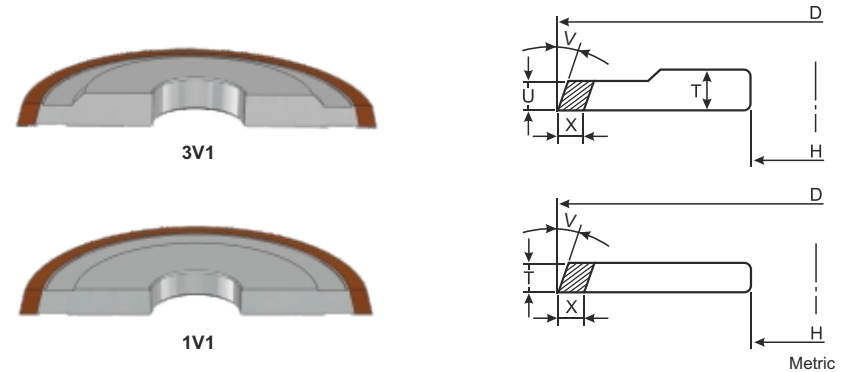
A H (Bore) = $\varnothing 20 / W$
B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.
C H (Bore) = $\varnothing 50 / R$

Body material
 A : Aluminum



Shape	D	T	U	X	V	H	Grit Size	Bond	Body	Machine Type	Stock Program
3V1	125	10	2	6	15	Per request	D64	GB73	CS	A B	
3V1	125	10	3	6	15	Per request	D64	GB73	A	A B	
3V1	125	8	4	6	15	Per request	D64	GB73	A	A B	
3V1	125	8	5	6	15	Per request	D64	GB73	A	A B	
3V1	125	8	6	6	15	Per request	D64	GB73	A	A B	●
3V1	150	10	2	6	15	Per request	D64	GB73	CS	A B C	
3V1	150	10	3	6	15	Per request	D64	GB73	A	A B C	
3V1	150	10	4	6	15	Per request	D64	GB73	A	A B C	
3V1	150	10	5	6	15	Per request	D64	GB73	A	A B C	
3V1	150	10	6	6	15	Per request	D64	GB73	A	A B C	

Grinding for thinning of carbide drills

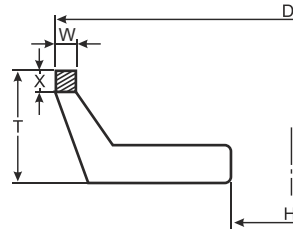
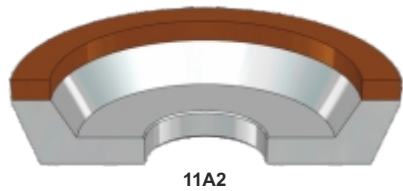


Shape	D	T	U	X	V	H	Grit Size	Bond	Body	Machine Type	Stock Program
3V1	125	10	6	6	15	Per request	D64	GP32	A	A B	
1V1	125	10	-	6	15	Per request	D64	GP32	A	A B	●

A H (Bore) = $\varnothing 20 / W$
B H (Bore) = $\varnothing 31.75 / A, H, M$ etc.
C H (Bore) = $\varnothing 50 / R$

Body material
 CS : Carbon Steel
 A : Aluminum

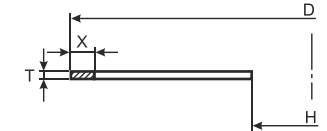
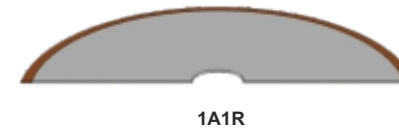
Wheels for CNC machining cutting tools Point grinding for carbide drills



Metric

Shape	D	T	W	X	H	Grit Size	Bond	Body	Machine Type	Stock Program
11A2	100	25	10	6	Per request	D40	GP32	A	A B	
11A2	100	25	15	6	Per request	D40	GP32	A	A B	●

Wheels for machining cutting tools Cut off

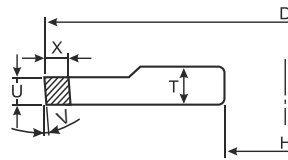
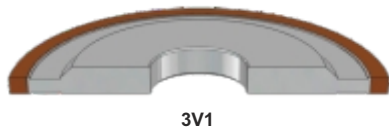


Metric

Shape	D	T	X	H	Carbide		HSS		Body	Stock Program
					Grit Size	Bond	Grit Size	Bond		
1A1R	150	0.8	6	20 31.75 32	D126	GB921	B126	GB321	Steel	
1A1R	150	1	6		D126	GB921	B126	GB321	Steel	●
1A1R	200	1	6		D126	GB921	B126	GB321	Steel	
1A1R	200	1.2	6		D126	GB921	B126	GB321	Steel	

G Cut

OD clearance grinding for carbide drills



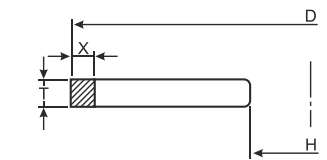
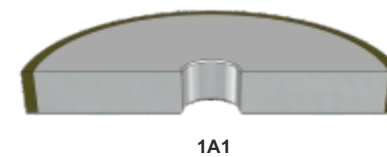
Metric

Shape	D	T	U	X	V	H	Grit Size	Bond	Body	Machine Type	Stock Program
3V1	85	10	3	6	3	Per request	D40	GP32	A	A B	
3V1	85	10	4	6	3	Per request	D40	GP32	A	A B	
3V1	85	10	6	6	3	Per request	D64	GP32	A	A B	
3V1	125	12	6	6	3	Per request	D64	GP32	A	A B	●
3V1	125	12	8	6	3	Per request	D64	GP32	A	A B	
3V1	125	12	10	6	3	Per request	D64	GP32	A	A B	

A H (Bore) = Ø20 / W
B H (Bore) = Ø31.75 / A, H, M etc.

Body material
A : Aluminum

Chamfer grinding

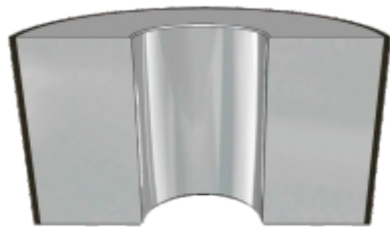


Metric

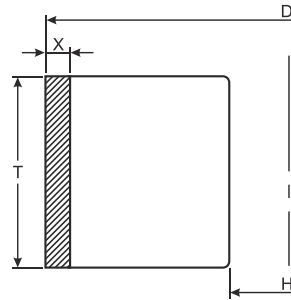
Shape	D	T	X	H	Grit Size	Bond	Body	Machine Type	Stock Program
1A1	150	10	6	20 31.75 32	D252 D126 D64	GP35	Aluminum	Tool & cutter grinder / Dry	
1A1	150	13	6				Aluminum	Tool & cutter grinder / Dry	●
1A1	175	10	6				Aluminum	Tool & cutter grinder / Dry	
1A1	175	13	6				Aluminum	Tool & cutter grinder / Dry	
1A1	200	15	6				Aluminum	Tool & cutter grinder / Dry	
1A1	200	25	6				Aluminum	Tool & cutter grinder / Dry	

Wheels for machining cutting tools Centerless grinding

Wheels for machining cutting tools Resharpener for cutting tools by tool and cutter grinder



1A1

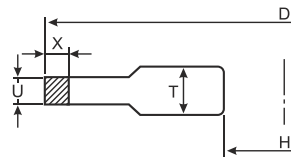


Metric

Shape	D	T	X	H	Grit Size	Bond	Body	Machine Type	Stock Program
1A1	300	50	6	127	D252	GB11	Aluminum	Dedtru	
1A1	300	75	6				Aluminum		
1A1	300	100	6				Aluminum		
1A1	300	100	6	152.4 203.2	D30 D12	GB10	Aluminum	Through Feed	
1A1	350	150	6				Aluminum		
1A1	350	205	6				Aluminum		
1A1	400	205	6				Aluminum		

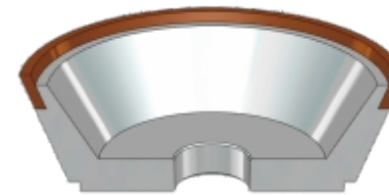


14A1

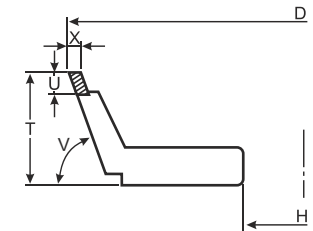


Metric

Shape	D	U	X	H	Grit Size	Bond	Body	Machine Type	Stock Program
14A1	300	12	6	127 152.4	D252 D126 D30 D12	GB351	Aluminum	Cylindrical grinder	
14A1	300	15	6				Aluminum		
14A1	300	20	6				Aluminum		
14A1	350	12	6				Aluminum		
14A1	350	15	6				Aluminum		
14A1	350	20	6				Aluminum		
14A1	400	15	6				Aluminum		
14A1	400	20	6				Aluminum		
14A1	400	25	6				Aluminum		

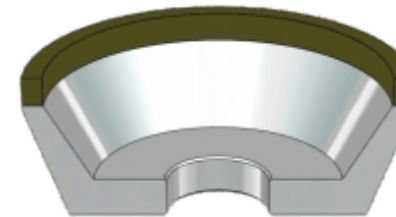


11V9

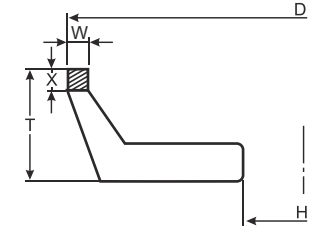


Metric

Shape	D	T	U	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
11V9	75	30	10	2	70	20	D126	GB521	B126	GB321	Aluminum	Tool and cutter grinder	
11V9	100	35	10	3	70	31.75	D126	GB521	B126	GB321	Aluminum		●
11V9	125	40	10	3	70	32	D126	GB521	B126	GB321	Aluminum		
11V9	75	30	10	2	70	20	D64	GB521	B91	GB321	Aluminum		
11V9	100	35	10	3	70	31.75	D64	GB521	B91	GB321	Aluminum		
11V9	125	40	10	3	70	32	D64	GB521	B91	GB321	Aluminum		



11A2



Metric

Shape	D	T	W	X	H	Carbide		HSS		Body	Machine Type	Stock Program
						Grit Size	Bond	Grit Size	Bond			
11A2	75	34	3	5	20	D126	GB751	B126	GB321	Aluminum	Tool and cutter grinder	
11A2	75	34	3	5	31.75	D76	GB751	B91	GB321	Aluminum		
11A2	75	34	3	5	32	D46	GB751	B54	GB321	Aluminum		
11A2	100	35	5	5	20	D126	GB751	B126	GB321	Aluminum		●
11A2	100	35	5	5	31.75	D76	GB751	B91	GB321	Aluminum		
11A2	100	35	5	5	32	D46	GB751	B54	GB321	Aluminum		

Wheels for machining cutting tools
Resharpening for cutting tools by tool and cutter grinder

Wheels for machining cutting tools
Resharpening for cutting tools by tool and cutter grinder



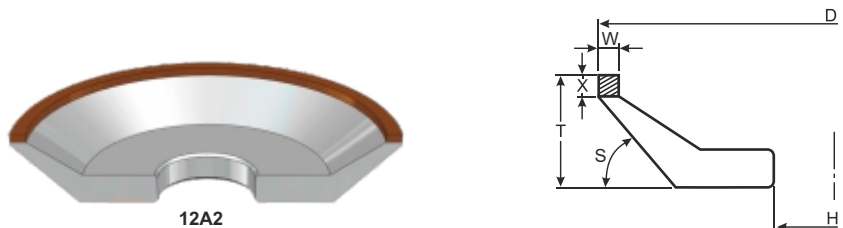
12V9

Shape	D	T	U	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
							Metric						
12V9	100	25	10	3	45	20	D126	GB521	B126	GB321	Aluminum	Tool and cutter grinder	●
12V9	125	30	10	3	45	31.75	D126	GB521	B126	GB321	Aluminum		
12V9	100	25	10	3	45	32	D64	GB521	B91	GB321	Aluminum		
12V9	100	25	10	3	45		D64	GB521	B91	GB321	Aluminum		
12V9	125	30	10	3	45		D64	GB521	B91	GB321	Aluminum		



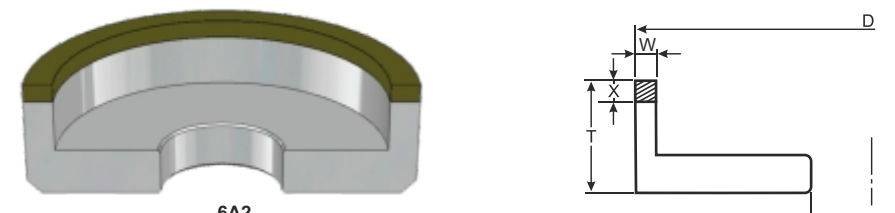
1A1

Shape	D	T	X	H	Carbide		HSS		Body	Machine Type	Stock Program	
					Grit Size	Bond	Grit Size	Bond				
					Metric							
1A1	100	10	6	20	D126	GB75	B126	GB35	Aluminum	Tool and cutter grinder	●	
1A1	125	10	6		D126	GB75	B126	GB35	Aluminum			
1A1	150	10	6		D126	GB75	B126	GB35	Aluminum			
1A1	100	10	6		32	D64	GB75	B91	GB35			Aluminum
1A1	125	10	6		D64	GB75	B91	GB35	Aluminum			
1A1	150	10	6	D64	GB75	B91	GB35	Aluminum				



12A2

Shape	D	T	W	X	V	H	Carbide		HSS		Body	Machine Type	Stock Program
							Grit Size	Bond	Grit Size	Bond			
							Metric						
12A2	100	25	5	3	45	20	D126	GB521	B126	GB321	Aluminum	Tool and cutter grinder	●
12A2	100	25	8	3	45	31.75	D126	GB521	B126	GB321	Aluminum		
12A2	125	25	5	3	45	32	D126	GB521	B126	GB321	Aluminum		
12A2	125	25	8	3	45		D126	GB521	B126	GB321	Aluminum		
12A2	100	25	5	3	45		D64	GB521	B91	GB321	Aluminum		
12A2	100	25	8	3	45		D64	GB521	B91	GB321	Aluminum		
12A2	100	25	5	3	45		D64	GB521	B91	GB321	Aluminum		
12A2	125	25	5	3	45		D64	GB521	B91	GB321	Aluminum		
12A2	125	25	8	3	45		D64	GB521	B91	GB321	Aluminum		
12A2	125	25	8	3	45		D64	GB521	B91	GB321	Aluminum		



6A2

Shape	D	T	W	X	H	Carbide		HSS		Body	Machine Type	Stock Program	
						Grit Size	Bond	Grit Size	Bond				
						Metric							
6A2	100	25	5	5	20	D126	GB75	B126	GB35	Aluminum	Tool and cutter grinder	●	
6A2	125	25	6	5		D126	GB75	B126	GB35	Aluminum			
6A2	150	25	8	5		D126	GB75	B126	GB35	Aluminum			
6A2	100	25	5	5		32	D64	GB75	B91	GB35			Aluminum
6A2	125	25	6	5		D64	GB75	B91	GB35	Aluminum			
6A2	150	25	8	5		D64	GB75	B91	GB35	Aluminum			

G Cut

G Cut