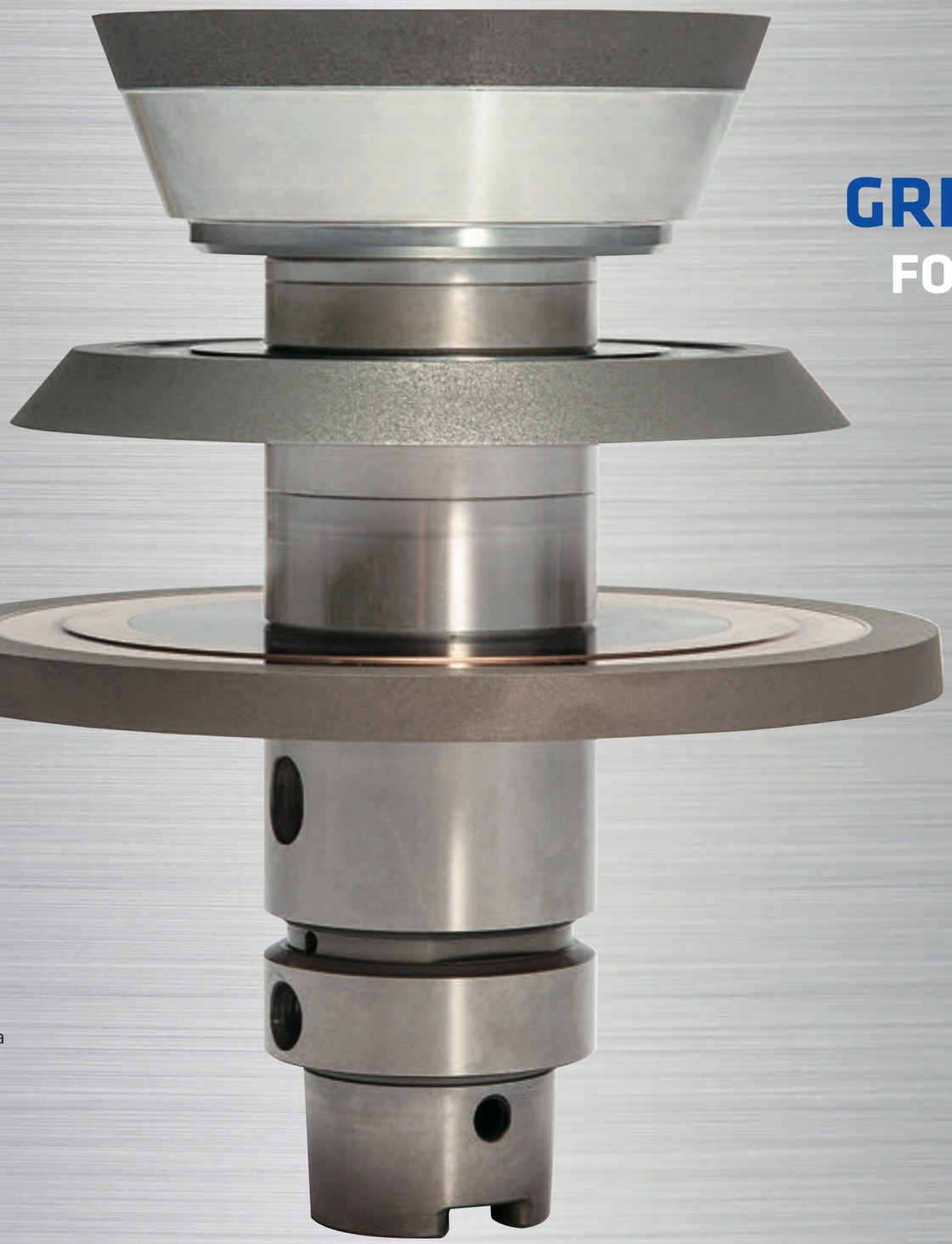


GRINDING WHEELS
FOR CUTTING TOOLS

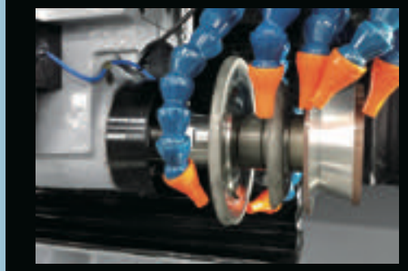
GENENTECH CO., LTD.

HEAD OFFICE · FACTORY
131B - 8L, 56, Neungheodae-ro 649beon-gil, Namdong-gu, Incheon, Korea
TEL. +82-32-812-1520
FAX. +82-32-812-1522
E-mail sales@genentech.kr
www.genentech-abrasives.com

GENENTECH Europe GmbH
Rudolf Diesel Str. 12b 65760 Eschborn Ts. Germany
TEL. +49-6173-9997460
E-mail info@gt-abrasives.com
www.genentech-abrasives.com

GENENTECH
DIAMOND & CBN WHEELS

Diamond & CBN Wheels
for machining cutting tools



WELCOME TO GENENTECH CO. LTD.

To accomplish goals together with our customers, this is our entitlement. Our company is fairly young, founded in 2009, but through cooperation with our customers challenges are mastered fast and competent. Sustained success means to be fit for the future. We offer superior quality, high precision and short delivery times for our customers.

Our core competence includes the development and production of Diamond and CBN wheels as well as the application technology for the grinding processes applied in the tooling industry. The innovated bond system offer the optimize of the process times in line with long dressing cycles enables high productivity in the production processes. Our products full fill these criterias and secure the success of our customers. Genentech is looking forward in working with you.

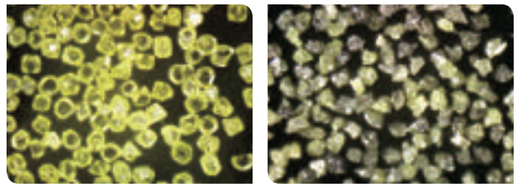
- Shorter machining time through better traverse feeds.
- Longer wheel dressing interval and balanced grinding ability are able to sustain cutting tool's geometric stability.
- Optimizing tool manufacturing process through much experience in grinding cutting tool.
- Providing perfect wheel quality by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

Contents

Basic information of Diamond & CBN Wheels

Diamond grinding wheel : For grinding non-ferrous material

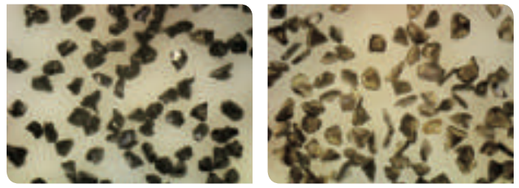
Genentech use good raw materials for produce best quality wheel.
Diamond wheel consists of diamond which is the most hardest material on earth.
Usually the diamond grinding wheel is used for non-ferrous material such as carbide, ceramics and cermet, etc.



Diamond abrasive

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

Fine raw material with our effort. we produce optimized wheels.
CBN grinding wheel consists of CBN (Cubic Boron Nitride) which is the second hardest material on earth.
Usually CBN grinding wheel is used for steel (ferrous material) grinding.



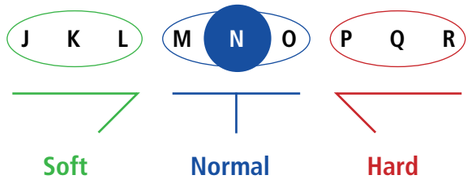
CBN abrasive

Abrasive Grit Size

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

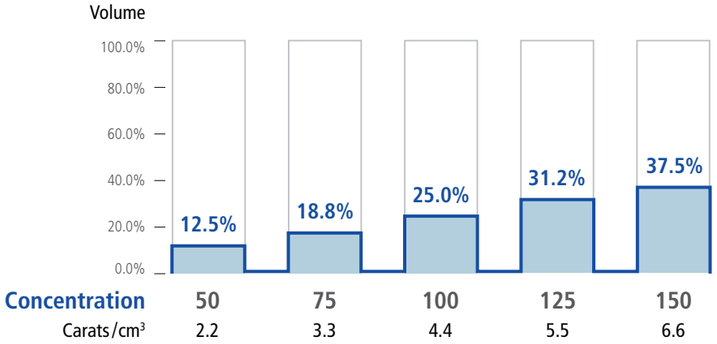
GENENTECH Grit Size		FEPA Designation		ANSI Grit Size	US Grit Number	JIS Size
Mesh	Size(㎛)	DIA	CBN			
#60	251	D251	B251	60/80	60	
#80	181	D181	B181	80/100	100	80
#100	151	D151	B151	100/120	120	100
#120	126	D126	B126	120/140	150	120
#140	107	D107	B107	140/170	180	140
#170	91	D91	B91	170/200	220	170
#200	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



Product line

Hybrid

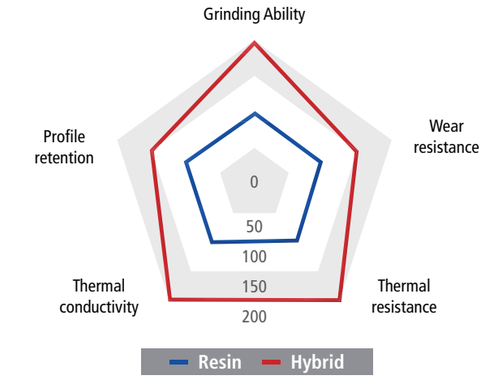
Genentech hybrid bond is combined with metal and resin bond.
This mixture has excellent grinding abilities : Heat & wear resistance
In particular, it has excellent machining ability at carbide and HSS tool.
(Genentech GMT series)

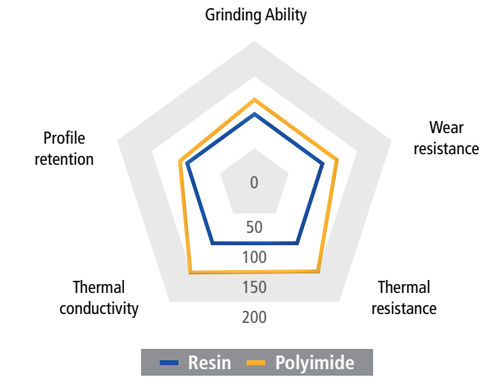
Resin

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.
(Genentech 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.
(Genentech GP series)





Product Line-up for machining cutting tools

Hybrid

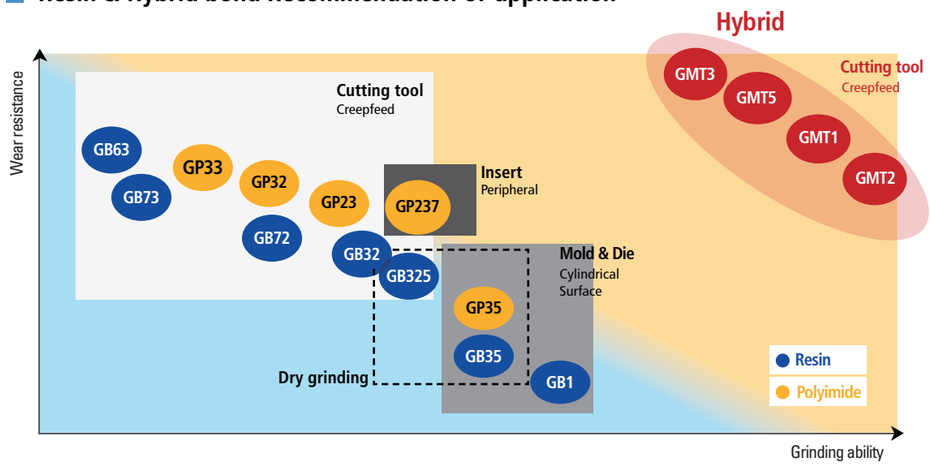
· GENENTECH Hybrid bond is the most suitable product for grinding of solid shank cutting tool process such as end-mills, drills and reamers which is especially needed much lead time like Flute, Gash.

· GENENTECH Hybrid bond is applicable for all of carbide and HSS tools.
Hybrid bond Diamond Wheel : For carbide tool grinding.
Hybrid bond CBN Wheel : For HSS tool grinding.

Advantages

· Excellent grinding ability, machining time is shortened significantly
· Improves wear resistance, high lifetime of the wheels
· Enhanced dressing interval
· Good surface roughness

Resin & Hybrid bond Recommendation of application



Resin / Polyimide

· Resin is a standard products especially for cutting tools manufacturing process such as endmills, drills and reamers.
· Resin 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	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
Infeed	3.4mm
Material removal rate (Qw')	7.9mm3/mms

Advantages
· flute wheel reduced cycle time for the flute grinding by 50%
· The wheel is working with self dressing
· Lower spindle load

Case Study 2 – Gashing for carbide endmill

Grinding wheel	D54 GMT1, 3V1 Ø125 x 10t x 50v
Machine	REX-5B(5-axis CNC grinder,18.5kw)
Coolant	Oil
Work piece	Carbide endmill 4FL-Ø16

Grinding Parameter

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

Advantages
· Gash wheel reduced cycle time for the flute grinding by 50%

Case Study 3 – Fluting for Carbide drill

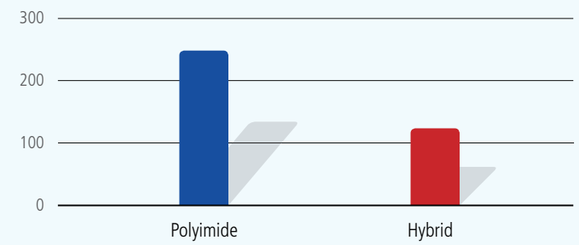
Grinding wheel	D54 GMT1, Ø150 Foremed wheel
Machine	ANCA TX7+(5-axis CNC grinder,18.75kw)
Coolant	Oil
Work piece	Carbide Drill 2FL-Ø10(fl 68mm)

Grinding Parameter

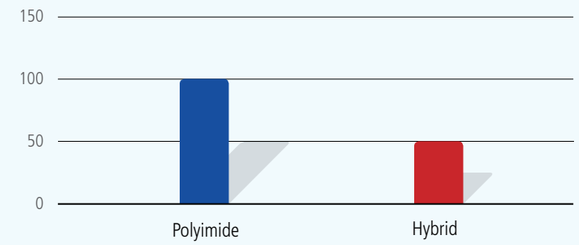
Grinding Process	Flute
Feed rate	190mm/min
Cutting speed	26m/s
Infeed	3.8mm
Material removal rate(Qw')	12mm 3/mms

Advantages
· The Wheel reduced cycle time for the flute grinding by 50%
· Lower spindle load

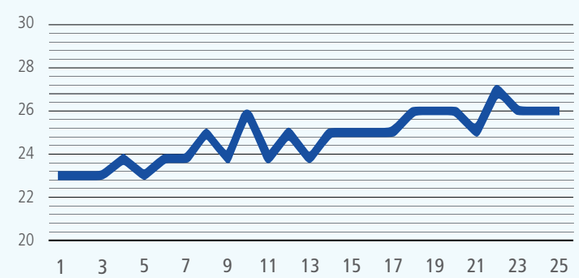
Flute cycle Time (sec)



Gash Cycle Time (sec)

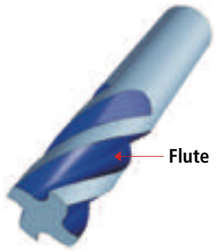


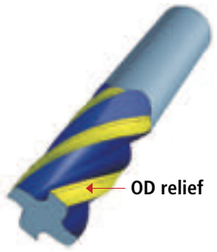
Spindle load(%)

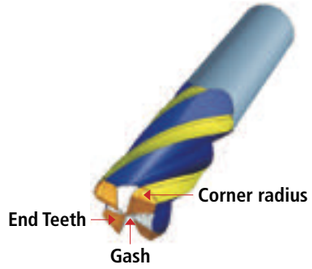


Information of *cutting tool grinding process*

Endmill

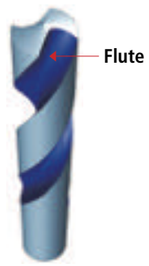






	Flute	OD relief	End teeth
Wheel Shape	1A1, 1V1, 3A1, 3V1, etc.	11A2, 11V4, 11V5, 3V1, etc.	Gash : 1V1, 3V1 (High angle), 1Y1, etc. End teeth : 11A2, 11V4, 3V1, etc. Corner radius : 11V5, 3V1
Wheel Grit Size	Carbide : D46~D91 HSS : B64~B107	Carbide : D20~D46 HSS : B46~B91	Carbide : D30~D76 HSS : B76~B107
Page	P10, P13	P11	P11, P14, P15

Drill



	Flute	OD clearance	Thinning	Point
Wheel Shape	1V1, 3V1, etc. Formed wheel	3V1 (Slight angle)	1V1, 3V1, etc.	6A2, 11A2 (Cup)
Wheel Grit Size	Carbide : D46~D91 HSS : B64~B107	Carbide : D46~D76 HSS : B76~B107	Carbide : D46~D91 HSS : B64~B107	Carbide : D30~D64 HSS : B46~B91
Page	P12, P16	P17	P17	P18

Recommended *operating parameter*

Fluting for carbide tools

$$Q'_w = \frac{a_e \cdot v_f}{60} \qquad V_f = \frac{Q'_w \cdot 60}{a_e}$$

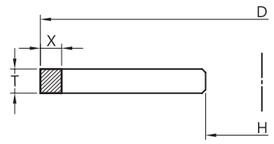
Numerous experience with tool manufacturing, Genentech recommend operating parameter as belows.
You can get more efficiency and productivity with this parameters under corresponding machine environments and working condition.

· Wheel speed : 18~22 m/s

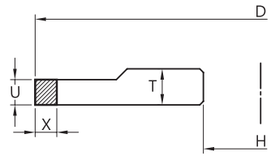
Q'_w		Feed rate [V_f : mm/min.]										
		50	60	80	90	100	120	140	160	180	200	220
Infeed [a_e : mm]	2.4	2.0	2.4	3.2	3.6	4.0	4.8	5.6	6.4	7.2	8.0	8.8
	2.6	2.2	2.6	3.5	3.9	4.3	5.2	6.1	6.9	7.8	8.7	9.5
	2.8	2.3	2.8	3.7	4.2	4.7	5.6	6.5	7.5	8.4	9.3	10.3
	3.0	2.5	3.0	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10.0	11.0
	3.2	2.7	3.2	4.3	4.8	5.3	6.4	7.5	8.5	9.6	10.7	11.7
	3.4	2.8	3.4	4.5	5.1	5.7	6.8	7.9	9.1	10.2	11.3	12.5
	3.6	3.0	3.6	4.8	5.4	6.0	7.2	8.4	9.6	10.8	12.0	13.2
	3.8	3.2	3.8	5.1	5.7	6.3	7.6	8.9	10.1	11.4	12.7	13.9
	4.0	3.3	4.0	5.3	6.0	6.7	8.0	9.3	10.7	12.0	13.3	14.7
	4.2	3.5	4.2	5.6	6.3	7.0	8.4	9.8	11.2	12.6	14.0	15.4
	4.4	3.7	4.4	5.9	6.6	7.3	8.8	10.3	11.7	13.2	14.7	16.1
	4.6	3.8	4.6	6.1	6.9	7.7	9.2	10.7	12.3	13.8	15.3	16.9
	5.0	4.2	5.0	6.7	7.5	8.3	10.0	11.7	13.3	15.0	16.7	18.3
	5.2	4.3	5.2	6.9	7.8	8.7	10.4	12.1	13.9	37.6	17.3	19.1
	5.4	4.5	5.4	7.2	8.1	9.0	10.8	12.6	14.4	16.2	18.0	19.8
	5.6	4.7	5.6	7.5	8.4	9.3	11.2	13.1	14.9	16.8	18.7	20.5
	6.0	5.0	6.0	8.0	9.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0

Flute grinding for endmills

1A1



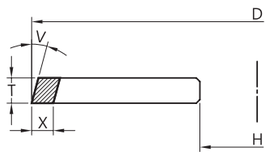
3A1



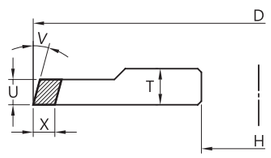
Metric

Shape	D	T	U	X	H	Carbide	
						Grit size	Bond
1A1	125	6~20	-	6,10	Per request	D54, D64	GMT1, GMT2
1A1	150	6~20	-	6,10			
3A1	125	10~15	6~12	6,10			
3A1	150	10~18	6~15	6,10			

1V1



3V1

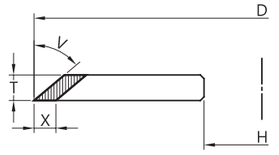


Metric

Shape	D	T	U	X	V	H	Carbide	
							Grit size	Bond
1V1	125	6~20	-	6,10	≤30	Per request	D54, D64	GMT1, GMT2
1V1	150	6~20	-	6,10	≤30			
3V1	125	10~15	6~12	6,10	≤30			
3V1	150	10~18	6~15	6,10	≤30			

Gash grinding for endmills

1V1

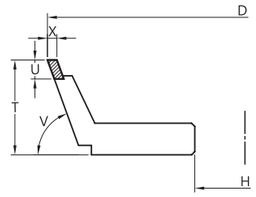


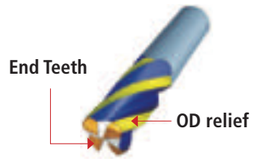
Metric

Shape	D	T	X	V	H	Carbide	
						Grit size	Bond
1V1	125	10~12	6,10	45	Per request	D54	GMT1
1V1	150	10~12	6,10	45			

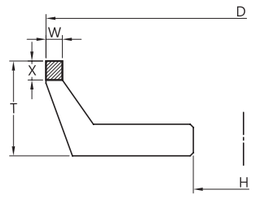
OD relief & end teeth grinding for endmills

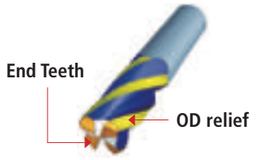
11V9





11A2



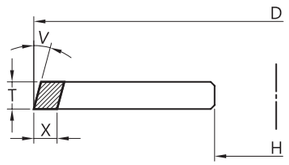


Metric

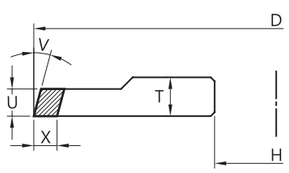
Shape	D	T	U	X	V	H	Carbide	
							Grit size	Bond
11V9	100	35	10	3	70	Per request	D46	GMT1
11A2	100	35	4,6	6	-			

Flute grinding for Carbide drills

1V1



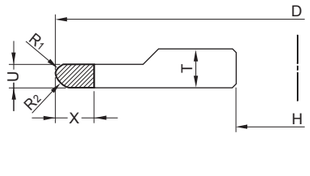
3V1



Metric

Shape	D	T	U	X	V	H	Carbide	
							Grit size	Bond
1V1	150	14~20	-	6,10	15	Per request	D54~D91	GMT1
3V1	125	8~15	3~12	6,10	15			
3V1	150	10~13	6~10	6,10	15			

Formed wheel for Carbide drill flute

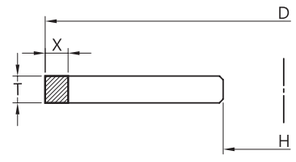


Metric

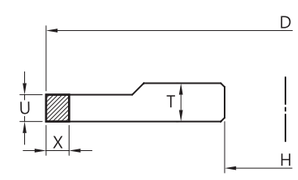
Shape	D	T	U	X	R1	R2	H	Grit size	Bond
Formed wheel	150	According to customer requirements						D46, D54, D64	GMT1, GMT5

Flute grinding for carbide endmills

1A1



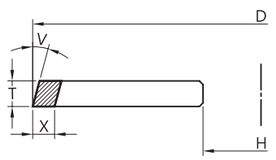
3A1

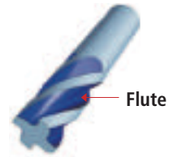


Metric

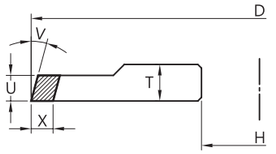
Shape	D	T	U	X	H	Carbide		HSS	
						Grit size	Bond	Grit size	Bond
1A1	125	6~15	6,10	-	Per request	D64~D91	GB72	B91~B107	GBS72
1A1	150	6~15	6,10	-		D64~D91	GB72	B91~B107	GBS72
3A1	125	10~15	1~12	6(U≤6) 6,10		D46~D91	GP33	B64~B107	GPS32
3A1	150	10~18	1~15	6(U≤6) 6,10		D64~D91	GP33	B64~B107	GPS32

1V1





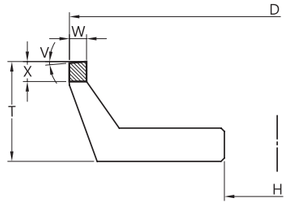
3V1

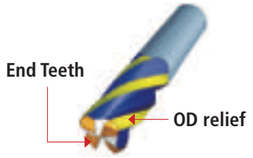


Metric

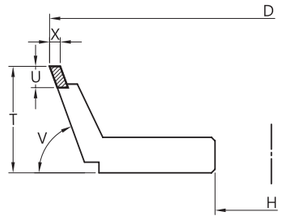
Shape	D	T	U	X	V	H	Carbide		HSS	
							Grit size	Bond	Grit size	Bond
1V1	125	10~12	-	6(U≤6) 6,10	≤15	Per request	D91	GB72	B107	GBS72
1V1	150	10~15	-	6,10	≤15		D91	GB72	B107	GBS72
3V1	125	10	1~2	6	≤15		D46	GP33	B64	GBS32
3V1	125	10	3~8	6(U≤6) 6,10	≤15		D64	GB72	B64	GBS32
3V1	150	10	1~2	6	≤15		D46	GP33	B64	GBS32
3V1	150	10	3~8	6(U≤6) 6,10	≤15		D64	GP33	B64	GBS32

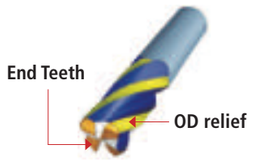
11V5



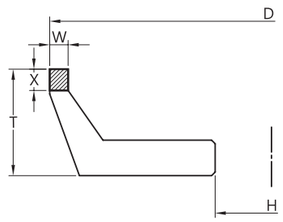


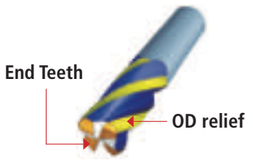
11V9





11A2



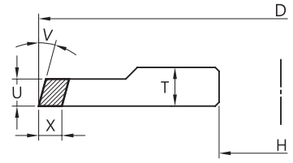


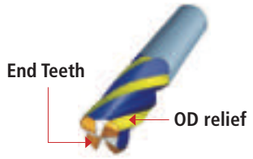
Metric

Shape	D	T	U	X	V	H	Carbide		HSS	
							Grit Size	Bond	Grit Size	Bond
11V5	100	35	4	6	20	Per request	D30~D46	GP32	B46~B64	GB73
11V5	100	35	6	6	20		D30~D46	GP32	B46~B64	GB73
11V9	100	35	10	3	70		D46	GB73	B91	GB32
11V9	125	40	10	3	70		D46	GB73	B91	GB32
11A2	100	35	4,6	6	-		D46	GB73	B91	GB32

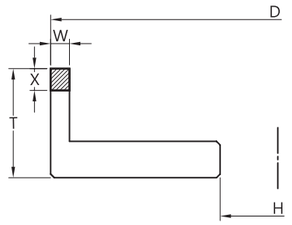
Wheels for CNC machining cutting tools
OD relief & end teeth grinding for endmills

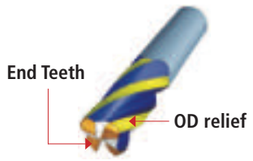
3V1

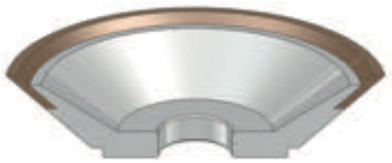




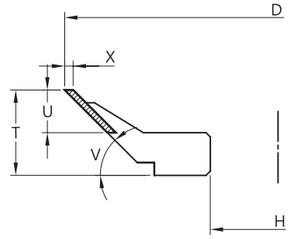
6A2

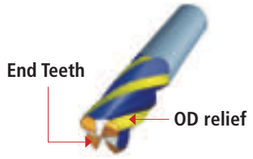






12V9



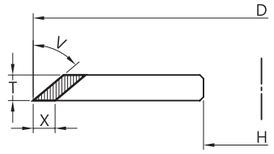


Metric

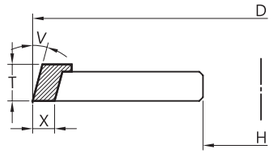
Form	D	T	U	X	V	H	Carbide		HSS	
							Grit Size	Bond	Grit Size	Bond
3V1	100	8	6	6	15	Per request	D30	GP32	B46	GBS32
3V1	125	10	6	6	15		D30	GP32	B46	GBS32
3V1	150	10	6	6	15		D30	GP32	B46	GBS32
6A2	80	10	6	4	-		D30	GP32	B46	GBS32
12V9	100	25	10	3	45		D46	GB73	B64	GBS73
12V9	125	30	10	3	45		D46	GB73	B64	GBS73

Gash grinding for endmills

1V1



1Y1

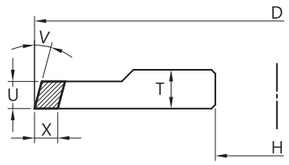


Metric

Shape	D	T	X	V	H	Carbide		HSS	
						Grit Size	Bond	Grit Size	Bond
1V1	125	10~12	6,10	45	Per request	D64	GP32	B91	GPS33
1V1	150	10~12	6,10	45					
1Y1	125	10~12	6,10	≤20					
1Y1	150	10~12	6,10	≤20					

Flute grinding for carbide drills

3V1

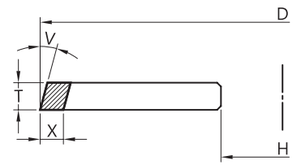


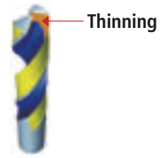
Metric

Shape	D	T	U	X	V	H	Grit Size	Bond
3V1	125	10	2~6	6	12	Per request	D46~D91	GB62 or GB63
3V1	150	10	2~6	6	15			

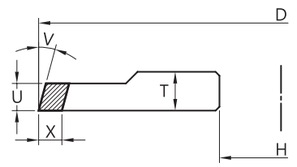
Grinding for thinning of carbide drills

1V1





3V1

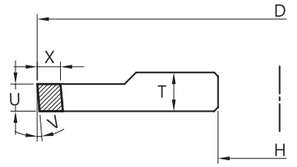


Metric

Shape	D	T	U	X	V	H	Grit Size	Bond
1V1	125	10	-	6	15	Per request	D64	GP32
3V1	125	10	6	6	15			

OD clearance grinding for carbide drills

3V1



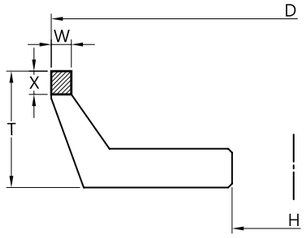
Metric

Shape	D	T	U	X	V	H	Grit Size	Bond
3V1	85	10	3~6	6	≤5	Per request	D40~D64	GP32
3V1	125	10	6~10	6	≤5			

Resin

Point grinding for carbide drills

11A2

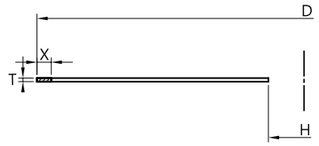


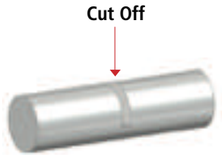
Metric

Shape	D	T	W	X	H	Grit Size	Bond
11A2	100	25	10	6	Per request	D40	GP32
11A2	100	25	15	6			

Cut off

1A1R



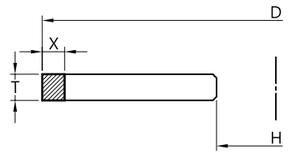


Metric

Shape	D	T	X	H	Carbide		HSS	
					Grit Size	Bond	Grit Size	Bond
1A1R	150	1	6	Per request	D126	GB35	B126	GB321
1A1R	150	1.2	6					
1A1R	200	1	6					
1A1R	200	1.2	6					

Chamfer grinding

1A1

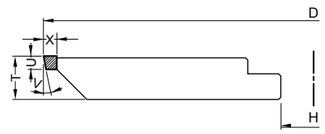


Metric

Shape	D	T	X	H	Grit Size	Bond	Machine Type
1A1	150	10~15	6	Per request	D64, D126, D251	GP35	Tool and cutter grinder
1A1	175	10~15	6				
1A1	200	10~25	6				

Cylindrical grinding for cutting tool blanks

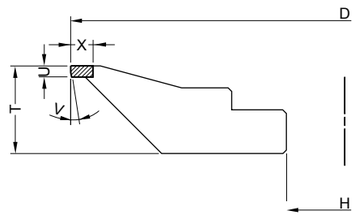
4B9



Metric

Shape	D	T	U	X	V	H	Carbide	
							Grit Size	Bond
4B9	250	20	6	6	11	Per request	D64, D91	GM5

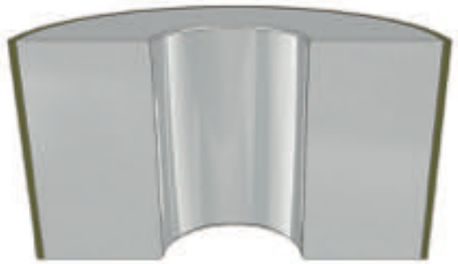
4B9



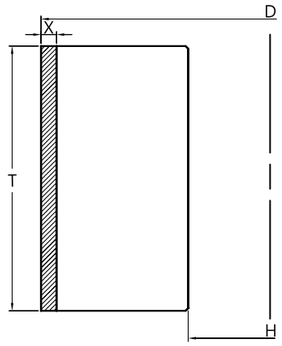
Metric

Shape	D	T	U	X	V	H	Carbide	
							Grit Size	Bond
4B9	150	24	3	6	11	Per request	D20, D30, D40	GP33
							D7, D10	GP23

Centerless grinding



1A1

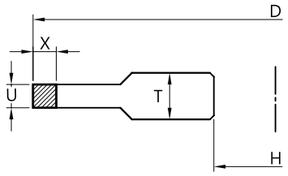


Metric

Shape	D	T	X	H	Grit Size	Bond	Machine Type
1A1	300	50~100	6	127	D126, D251	GB10, GB11	Through feed
1A1	355	100~205	6	152.4	D12, D30		
1A1	400~500	205	6	203.2			

OD cylindrical grinding

14A1

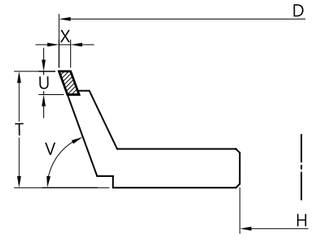


Metric

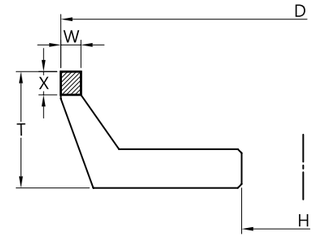
Shape	D	U	X	H	Grit Size	Bond	Machine Type
14A1	300	12~20	6	Per request	D126, D251	GB10, GB11	Cylindrical grinder
14A1	350	12~20	6		D12, D30		
14A1	400	15~25	6				

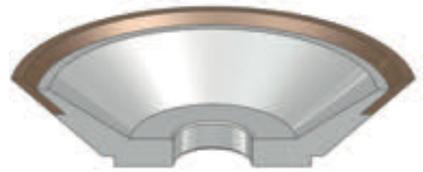
Resharpening for cutting tools by tool and cutter grinder

11V9

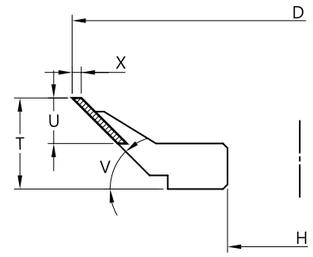


11A2





12V9



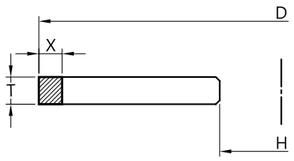
Metric

Shape	D	T	W	X	V	H	Carbide		HSS		Machine Type
							Grit Size	Bond	Grit Size	Bond	
11V9	75	30	10	2,3	70	Per request	D64	GB521	B91~B126	GB321	Tool and cutter grinder
11V9	100	35	10	3	70						
11V9	125	40	10	3	70						
11A2	75	34	3	5	-		D46	GB751	B54~B126		
11A2	100	35	5	5	-						
12V9	100	25	10	3	45		D64	GB521	B64~B126		
12V9	125	35	10	3	4						

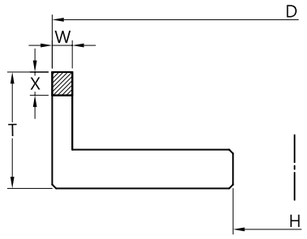
Resin

Resharpening for cutting tools by tool and cutter grinder

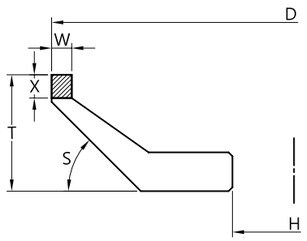
1A1



6A2



12A2



Metric

Shape	D	T	W	X	S	H	Carbide		HSS		Machine Type
							Grit Size	Bond	Grit Size	Bond	
1A1	100	10	-	6	-	Per request	D64	GB65	B64~B126	GB35	Tool and cutter grinder
1A1	125	10	-	6	-						
1A1	150	10	-	6	-						
6A2	100	25	5	5	-						
6A2	125	25	6	5	-						
6A2	150	25	8	5	-						
12A2	100	25	5~10	3~5	45			GB521		GB321	
12A2	125	35	5~10	3~5	45						

VALUED CUSTOMER IN THE WORLD

YOUR BEST SOLUTION FOR GRINDING WHEEL

Since 2009, Genentech all the members aim to produce **high quality products**
and **on time delivery** and optimized technical service for valued customer in whole the world.
We are manufacturing product range of almost fields of industry like tool, electronic, automotive, aero-space and etc.
By this in everywhere you can meet products with manufacturing by Genentech wheels.
Genentech customized wheels provide your best solution for grinding.

GENENTECH CO., LTD.
131B - 8L, 56, Neungheodae-ro 649beon-gil,
Namdong-gu, Incheon, Korea
TEL. +82-32-812-1520
FAX. +82-32-812-1522
E-mail sales@genentech.kr
www.genentech-abrasives.com

GENENTECH Europe GmbH
Rudolf Diesel Str. 12b 65760 Eschborn Ts. Germany
TEL. +49-6173-9997460
E-mail info@gt-abrasives.com
www.genentech-abrasives.com