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Rotary Tool Grinding

Workpiece	Workpiece Material	Grinding Process	3M™ Grinding Wheel	3M Product Code	Most Common 3M Bond	3M Diamond Grinding Wheel Specification	Performance Description	Typical Machines	
Drill Bits	Tungsten Carbide	Flute Grinding	3M™ Hybrid Bond Diamond Wheel	6PHU	X-Series (X96A / X96B) 630H-/650H-Series NF/NFM-Series	D46-D64 X96A / X96B D46-D64 630H / 650H D46-D64-NF / NFM	<ul style="list-style-type: none"> ideal for fast deep grinding shorter production time reduced production costs high feed rates and large feed increments dedicated EDM dressable very good form retention 	ANCA, Walter, Haas, SAAKKE	
				6BPB	Q91	D64-B100Q91	<ul style="list-style-type: none"> balanced grinding behavior universal applicability extended wheel life 	ANCA, Walter, Haas, SAAKKE	
				6CHN 6CHE	NE 684HM	D46-D64 NE D46-D64 684HM	<ul style="list-style-type: none"> extreme feed and removal rates when grinding clearance angles 	ANCA, Walter, Haas, SAAKKE	
	Milling Cutters	Tungsten Carbide	Gashing	3M™ Hybrid Bond Diamond Wheel	6PHN 6PHE	NE 684HM	D46 - D64 NE D46 - D64 684HM	<ul style="list-style-type: none"> extreme feed and removal rates during gashing operations 	ANCA, Walter, Haas, SAAKKE
					6CBN	NP	D15-NP	<ul style="list-style-type: none"> extremely high flexibility and a brilliant polished finish while enabling minimal material removal at the same time 	ANCA, Walter, Haas, SAAKKE
					6PHU 6PHE 6PHN	X-Series (X96A / X96B) 630H-/650H-Series NF/NFM-Series	D46 - D64 X96A / X96B D46 - D64 630H / 650H D46 - D64 - NF / NFM	<ul style="list-style-type: none"> ideal for fast deep grinding shorter production time reduced production costs high feed rates and large feed increments dedicated EDM dressable very good form retention 	ANCA, Walter, Haas, SAAKKE
Milling Cutters	Tungsten Carbide	Endwork (Clearance Angle, Flank Grinding)	3M™ Hybrid Bond Diamond Wheel	6BPB	Q91	D64 - B100Q91	<ul style="list-style-type: none"> balanced grinding behavior with universal applicability extended wheel life 	ANCA, Walter, Haas, SAAKKE, Schütte, Rollomatic	
				6CHN 6CHE	NE 684HM	D46 - D64 NE D46 - D64 684HM	<ul style="list-style-type: none"> extreme feed and removal rates when grinding clearance angles NE & 684HM perfect support to NEW X-Series 	ANCA, Walter, Haas, SAAKKE, Schütte, Rollomatic	
				6PHN 6PHE	NE 684HM	D46 - D64 NE D46 - D64 684HM	<ul style="list-style-type: none"> extreme feed and removal rates during gashing operations NE & 684HM perfect support to NEW X-Series 	ANCA, Walter, Haas, SAAKKE, Schütte, Rollomatic	
				93BH 93BW	B674 B674	99DA 95DA	<ul style="list-style-type: none"> significantly higher specific material removal rates Q₁ improved cycle time per part increased productivity per dressing cycle reduced dressing amount minimal risk of burning 	ANCA, JUNKER, Normac	
Taps	HSS	Flute Grinding	3M™ Resin Bond Grinding Wheel 3M™ Cubitron™ II	6BPB	654PK 624PI	>D20-654PK <D20-624PI	<ul style="list-style-type: none"> 1st choice for Micro Tools Fluting 	ANCA, Rollomatic	
				6PBP	654PK 624PI	>D20-654PK <D20-624PI	<ul style="list-style-type: none"> 1st choice for Micro Tools Gashing 	ANCA, Rollomatic	
				6CBP	654DK	> D20 654DK < D20 654DK	<ul style="list-style-type: none"> 1st choice for Micro Tools Relief/ End-work 	ANCA, Rollomatic	

Dressing

Type	Dressing Wheel Information	Specification	Diamond Wheel		Application
			Grit Size	Bond	
Vitrified bonded green silicon carbide (SiC)	Harder than Al ₂ O ₃ , more aggressive to the diamond particles, more suitable for reprofiling the diamond wheel	15C120 H5V035W 15C320 G6V030W 15C500 F15VPMF030W	>= D46	Resin Metal/Hybrid	Dressing of diamond and CBN grinding discs in a synthetic resin and metallic bond
			<= D40	Resin Metal/Hybrid	
			<= D15	Resin Metal/Hybrid	

Note: All NEW High-Performance Fluting X-Series and NF/ NFM-bond specifications are dedicated also to EDM-dressing!

Application Guide Rotary Tool Grinding

3M Science.
Applied to Life.™



Grinding wheels for rotary cutting tools.

For the development of grinding wheels used to manufacture cutting tools.

Modern cutting tools like drills and milling machines often have complicated geometries with very tight tolerances and high requirements on the surface finish quality. To meet these requirements and be in the position to grind with high quality at low cost, the demands on the grinding machine and especially on the grinding wheels have risen dramatically.

To meet these demands, CNC tool grinding machines must have significantly higher performance and be more stable, flexible and equipped with an efficient cooling system. At the same time, though, this also increases the demands placed on the grinding wheels used.

Our products and services

- Complete product portfolio of high quality tool grinding wheels in Diamond and CBN
- New development of resin bonded 3M™ Cubitron™ II tool grinding wheels for HSS
- Competent application consultants at your production site
- Technical cooperation in order to increase productivity
- Calculation of the total cost
- Grinding seminars

Typical grinding operations: Tungsten carbide and HSS drills & mills production*

Peel grinding

Produces the final diameter.

Flute grinding

Flute grinding is the most critical, time consuming and cost intensive operation in manufacturing rotary tools.

Gashing

Creation of a taper along the cutting face to reduce the feed forces.

Clearance angle

Clearance angle reduces the contact area between the rotary tool and the workpiece. The clearance angles provide the tool with a free-cutting property and simultaneously reduce the feed forces when drilling and milling.

Relief grinding

Material is removed directly behind the cutting edge.

Profile roughing/finishing

Flute/Clearance angle polishing

Polishing is made to increase tool life and quality of the end product, the drill bit or milling cutters.

3M Grinding technologies for drills & mills for your special needs

2. Gashing

Shapes: 1V1, 12V9
3M Product Codes: 6PHN, 6PHE, 6CHN, 6CHE

1. Fluting

Shapes: 1A1, 1V1, 1B1
3M Product Codes: 6PHU, 6PHE, 6PHN

3. Clearance angle

Shapes: 6A2, 11V9
3M Product Codes: 6CHN, 6CHE

5. Clearance angle polishing

Shapes: 6A2, 11V9
3M Product Code: 6CBB

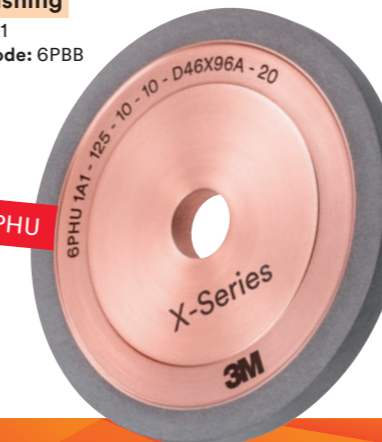
6. Peel grinding

Shape: 4M9
3M Product Code: 6PHN

4. Flute polishing

Shapes: 1A1, 1V1
3M Product Code: 6PBB

NEW! 6PHU
Perfect for Fluting!



2. Profile roughing

Shape: 14F1
3M Product Code: 6PHN

3. Profile finishing

Shape: 14E1
3M Product Code: 6PMS

1. Fluting

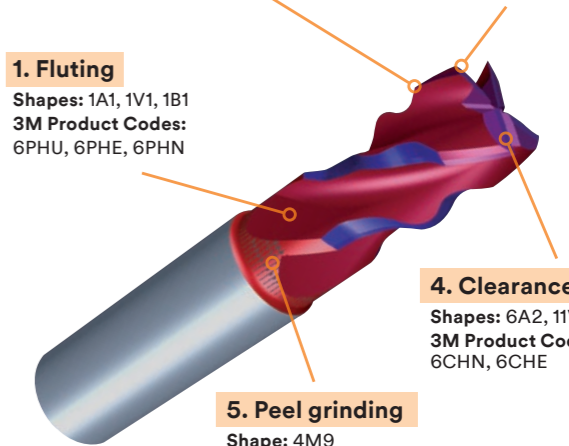
Shapes: 1A1, 1V1, 1B1
3M Product Codes: 6PHU, 6PHE, 6PHN

4. Clearance angle

Shapes: 6A2, 11V9
3M Product Codes: 6CHN, 6CHE

5. Peel grinding

Shape: 4M9
3M Product Code: 6PHN



2. Fluting

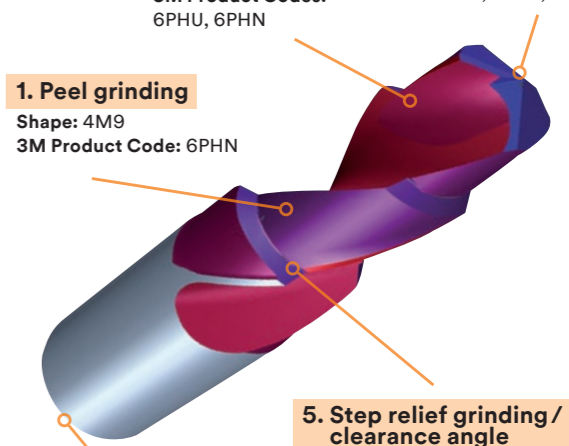
Shapes: 1A1, 1V1, 1B1
3M Product Codes: 6PHU, 6PHN

3. Gashing

Shapes: 1V1, 12V9
3M Product Codes: 6PHN, 6PHE, 6CHN, 6CHE

1. Peel grinding

Shape: 4M9
3M Product Code: 6PHN



5. Step relief grinding / clearance angle

Shape: 1A1
3M Product Code: 6PHN

4. Relief grinding

Shape: 6A2
3M Product Code: 6CBP

* All recommendations are examples and may have multiple options of wheel geometries and specifications depending on the specific application. Please contact your local 3M dealer for technical recommendations for your specific requirements.