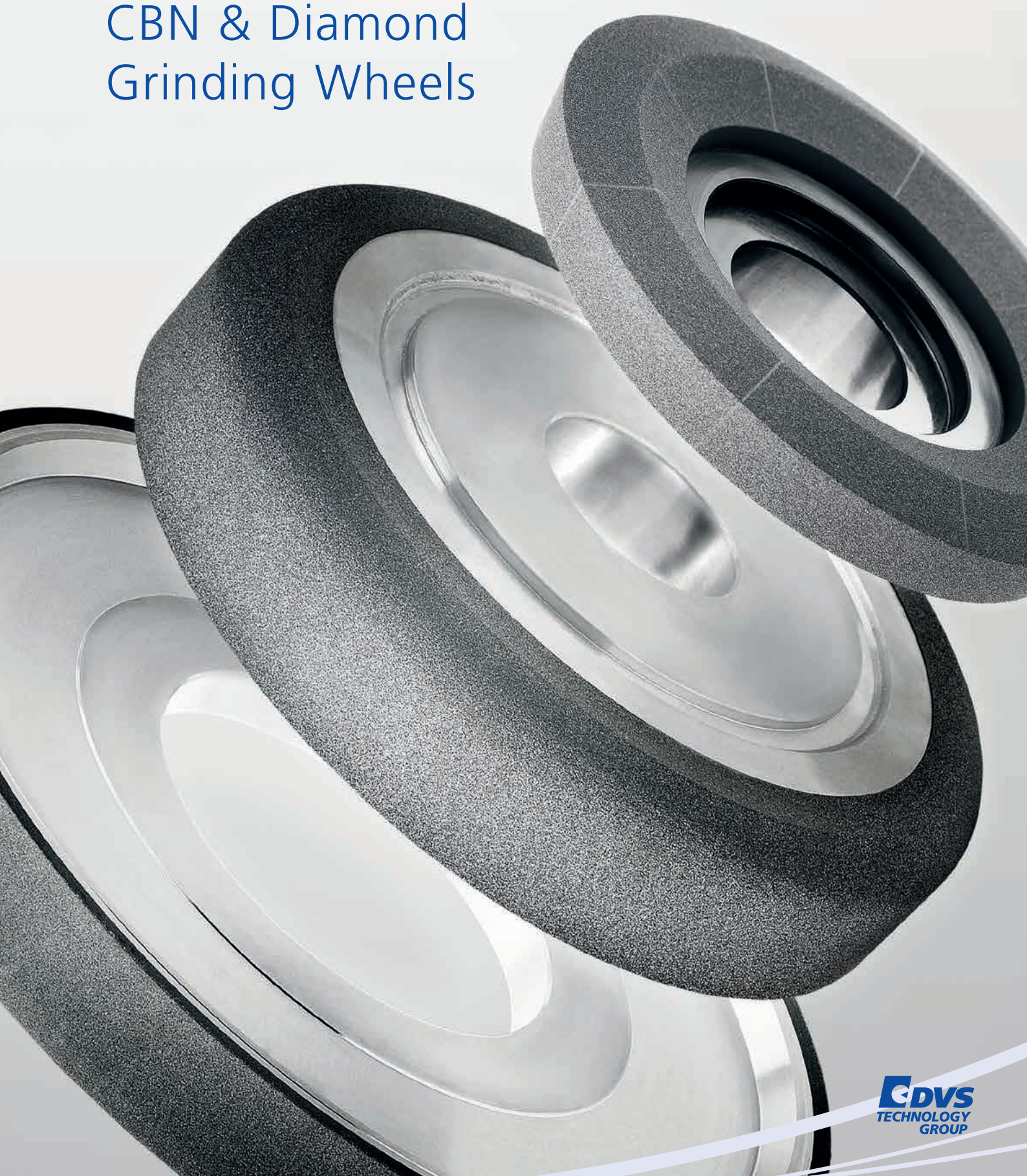
NAXOS DISKUS
SCHLEIFMITTELWERKE

CBN & Diamond Grinding Wheels



DVS TECHNOLOGY GROUP

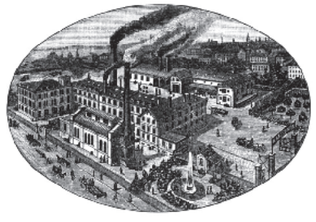
Contents

About the company

NAXOS-DISKUS Schleifmittelwerke GmbH

NAXOS-DISKUS Schleifmittelwerke GmbH was founded as NAXOS-UNION in Frankfurt in 1871, and manufactures precision grinding tools for greatly differing applications. The product range covers abrasive wheels for double face grinding, outer diameter grinding, centerless grinding as well as gear grinding and gear honing, from the conventional abrasive grit to extremely hard cutting materials such as CBN and diamond.
As a member of the DVS TECHNOLOGY GROUP, NAXOS-DISKUS can draw on the extensive experience of the DVS mechanical engineering and production companies, a fact which is clearly reflected in the quality and design of the grinding wheels. Special products such as mill wheels, leather polishing rollers, nurit rollers and bulk abrasives supplement the extensive range of products. NAXOS-DISKUS is one of the world's leading grinding tool manufacturers and produces vitrified and resin-bonded grinding wheels with an outer diameter of up to 1,600 mm.

1871
Company founded



1900
Start of production of grinding wheels made of synthetic corundum

1905
Production of the first vitrified-bonded grinding wheel for crankshaft grinding

1910
Production of the first resin-bonded grinding wheels

1950
Focus on diamond in research and development work

1978
Production of the first CBN grinding wheels with vitrified bonding

1987
NAXOS Schleifmittelwerke plant is built in Butzbach

2005
Integration in the DVS TECHNOLOGY GROUP

2009
Takeover of the "Bonded" sector of The Carbo Group GmbH

The DVS TECHNOLOGY GROUP

The DVS TECHNOLOGY GROUP is made up of Germany-based companies focusing on the turning, gear cutting, grinding and gear honing technologies. Besides engineering and manufacturing machine tools as well as grinding and honing tools, DVS operates two production sites where automotive parts are machined in series production exclusively on DVS machines. This adds a high degree of production know-how to the experience of the DVS machine tool and tooling manufacturers.

With a unique combination of machining technologies, tooling innovation and production experience for the machining of vehicle powertrain components DVS is one of the leading system suppliers in the industry.

The DVS TECHNOLOGY GROUP has more than 1,000 employees worldwide. On key markets like China and the United States DVS supports its clients with their own staff in service and sales.

Members of the DVS TECHNOLOGY GROUP

Buderus SCHLEIFTECHNIK
DISKUS WERKE SCHLEIFTECHNIK
DVS UNIVERSAL GRINDING
PITTLER
PRÄWEMA
rbc robotics
WMS
WMZ WERKZEUGMASCHINEN
DVS TOOLING
NAXOS DISKUS SCHLEIFMITTELWERKE
DVS PRODUCTION
DVS PRODUCTION SOUTH
DVS TECHNOLOGY EUROPE
DVS PRODUCTION CHINA
DVS TECHNOLOGY CHINA
DVS TECHNOLOGY AMERICA

CBN grinding wheel for the grinding of synchronizer cones on BUDERUS grinding machines.

CBN and Diamond Grinding Wheels

Diamond and Cubic Boron Nitride (CBN)

Today's demands in terms of speed and precision in the manufacturing process are a challenge for the machining of highly wear-resistant and low-abrasion materials. NAXOS-DISKUS has a wide range of tools with diamond and CBN to grind amorphous materials or alloys containing carbide efficiently.

As the hardest material discovered thus far, diamond is an ideal grinding agent for very hard materials. However, its transformation back to carbon makes it unsuitable for the grinding of ferrous materials. CBN, which is the second hardest known material after diamond, is suitable for the grinding of these alloys.

Diamond and CBN are superior to all other materials as far as cutting edge consistency and wear-resistance are concerned. Our CBN and diamond grinding wheels are produced for performing highest precision grinding operations with exceptionally good reproducibility. Specially coated CBN abrasive and the newly developed vitrified and resin bonding systems are the basis for the CBN and diamond grinding wheels from NAXOS-DISKUS.

Application-specific development at NAXOS-DISKUS

Machine planners are familiar with the problem: the use of standardised grinding wheels is not always possible when modified, product-specific machines are used. Custom solutions for individual machines are a must! CBN and diamond grinding wheels from NAXOS-DISKUS are designed and manufactured exclusively for customer-specific use in circular and face grinding applications.

Expert application technicians help you to choose the right grinding agent for your application, so that the advantages of diamond and CBN can be fully exploited. NAXOS-DISKUS guarantees optimisation of your processes with maximum efficiency.

Grinding wheel construction

Body

NAXOS-DISKUS grinding wheels are available with a body made of steel, aluminium, aluminium wrought alloy, synthetic resin, ceramic or carbon fibre laminate.

With our vitrified and synthetic resin bonded CBN and diamond abrasives, we can supply you a tool to rely on.

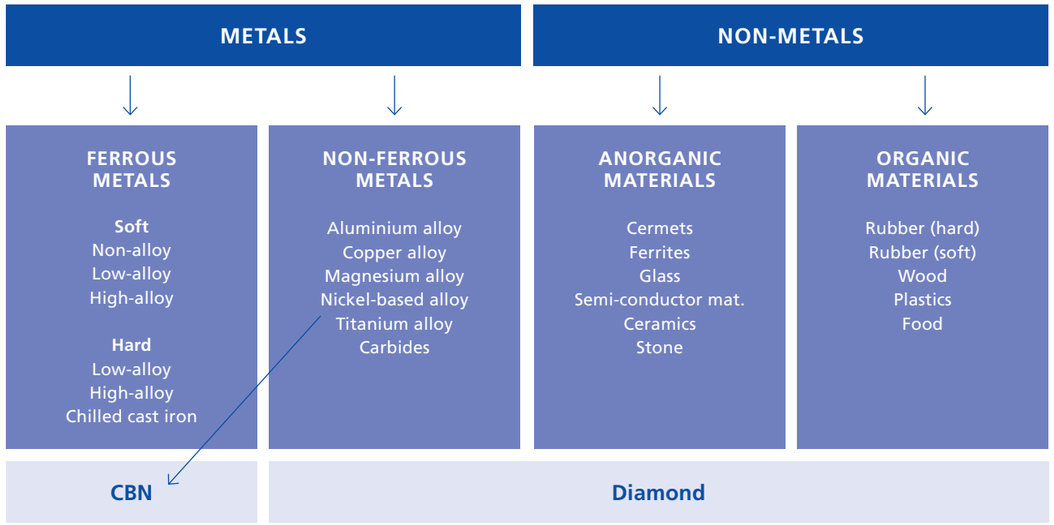
CBN body variants

MATERIAL	DIAMETER IN MM	V_c MAX IN M / S	HEAT EXPANSION	DAMPING	WEIGHT	COSTS
Steel	80 – 750	200	○○○○	●○○○	●●●●	●●○○
Aluminium	50 – 350	63	●●●●	●○○○	●●○○	●●●○
Aluminium wrought alloy	80 – 700	200	●●●○	●○○○	●●○○	●●●●
Synthetic resin	100 – 600	63	○○○○	●●●○	●○○○	●○○○
Ceramic	20 – 750	80	○○○○	●○○○	●○○○	●○○○
CF laminate	100 – 500	200	○○○○	●●●●	○○○○	●●●●

low ○○○○ ⟷ ●●●● high

Grit types

AREAS OF APPLICATION FOR DIAMOND AND CBN TOOLS



CBN AND DIAMOND GRIT TYPES

CODE	TYPE	DUCTILITY (TI)	DUCTILITY TTI	GRIT SHAPE	COLOUR	SURFACE	
985A	CBN	●●○○	○○○○	medium-blocky	black	rough	
979A	CBN	●●○○	●●○○	medium-blocky	black	smooth	
986A	CBN	●●○○	●●○○	to pointed	orange	irregular rough	
984A	CBN	●●●●	●●●●	medium-blocky	dark brown	very smooth	
972A	Diamond	●●●●	●●●●	blocky	black	smooth	
973A	Diamond	●●●●	●●●●	cubic	yellow	rough	

low ○○○○ ⟷ ●●●● high

Grit sizes

GRIT SIZE DEPENDS ON APPLICATION AND SURFACE QUALITY

FEPA	US-MESH	SIZE IN µM
181	80 / 100	180 / 150
151	100 / 120	150 / 125
126	120 / 140	125 / 106
107	140 / 170	106 / 90
91	170 / 200	90 / 75
76	200 / 230	75 / 63
64	230 / 270	63 / 53
54	270 / 325	53 / 45
46	325 / 400	45 / 35

MICRO GRIT		
M 40	600*	40 / 30
	700*	36 / 22
M 25	800*	30 / 20
	1100*	22 / 12
M 16	1200*	20 / 10
M 10	1600*	12 / 8
M 6,3	3000*	8 / 4

* Approximately equivalent mesh size

CONCENTRATION IN VOLUME COATINGS

DIAMOND		CBN	
DENSITY 3.52 g / cm³		DENSITY 3.48 g / cm³	
C (V %)	in ct / cm³	V (V %)	in Vol.-%
C 25	1,1	V 60	6,25
C 50	2,2	V 120	12,5
C 75	3,3	V 180	18,75
C 100	4,4	V 240	25
C 125	5,5	V 300	31,25
C 150	6,6	V 360	37,5
C 175	7,7	V 420	43,75
C 200	8,8	V 480	50

SPECIFICATIONS NAXOS CBN

999A	B126	V240	K	11	AUMENTO
Grit type	**Grit size**	**Concentration in volume**	**Hardness**	**Structure**	**Bonding**
in volume	46 µm	120	A	7	VNX1
998A	54 µm	180	B	8	AUMENTO
997A	...	...	...	...	AUMENTO pro
...	213 µm	420	U	26	
710A					

SPECIFICATIONS NAXOS DIAMOND

999A	D126	C100	K	11	VND1
Grit type	**Grit size**	**Concentration in volume**	**Hardness**	**Structure**	**Bonding**
999A	46 µm	25	C	7	Ke 114
998A	54 µm	50	D	8	...
997A	...	...	...	...	VND1
...	213 µm	200	Q	26	
710A					

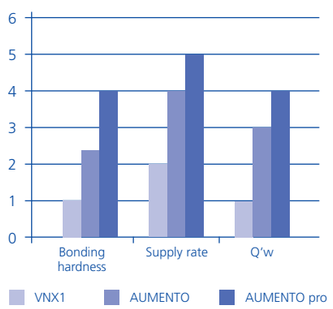
The key component: AUMENTO bonding

AUMENTO

AUMENTO is a vitrified bond. The advantage here is that the bonding share can be reduced in the grinding wheel, thus increasing the share of pore space. In turn leading to a cooler grinding process. In addition, tests on a Buderus CNC 235 have shown that significantly higher feeding rates can be achieved for the plunge grinding of gear shafts without any reduction in workpiece quality, generating cost savings for customers. Aumento Pro is an advanced development of the Aumento bonding with an even better performance.

AUMENTO PRO also has an even greater bonding strength.

COMPARISON OF DIFFERENT TYPES OF BONDING



AUMENTO Pro – top performance

Thanks to the further optimised stability of Aumento Pro, the CBN abrasive grit is bonded very tightly into the matrix. This makes it possible to reduce the bond hare even further, yet at the same time increase the bonding strength of the abrasive grit. In practice, this leads to an additional increase in grinding wheel performance. Furthermore, higher parameters for feed and infeed rates can be realised.

Reducing the bond share also increases the pore space, which in turn increases the supply of grinding coolant to the grinding contact zone, thus supporting the removal of grinding sludge and the grinding temperature. The grinding forces required are also reduced, thus lowering the grinding pressure used in the process.

The test results clearly prove that the process parameters feed and infeed rate were increased by 20 % when the advanced development Aumento Pro was used compared with Aumento. The resulting reduction in operating time frees up more production resources and reduces the costs per workpiece.

Bondings

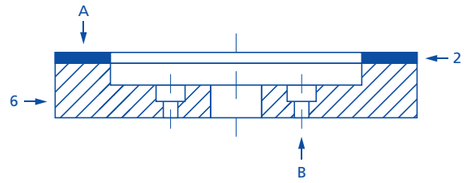
EXPLANATION OF THE NAXOS BONDINGS

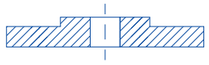
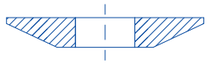
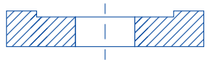
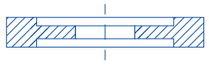
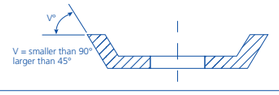
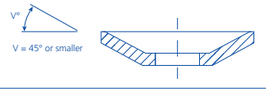
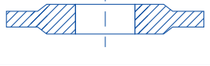
BONDING	STRENGTH	INTEGRATION ABILITY	TYPE OF BONDING	APPLICATION
VNX1	Low	Medium	Vitrified (vitreous)	Precision grinding, low to medium load
AUMENTO	High	High	Vitrified (vitreous)	Precision grinding, high load (crankshaft, camshaft, peel grinding)
AUMENTO pro	Very high	Very high	Vitrified (vitreous)	Precision grinding, high load (crankshaft, camshaft, peel grinding)
VND1	High	High	Vitrified (vitreous)	Bonding for diamond developed on the basis of AUMENTO
BNX1	Medium	Medium	Synthetic resin	Synthetic resin bonding for external cylindrical grinding. Good damping properties.
B26	Medium	Medium	Synthetic resin	Synthetic resin bonding for face grinding and face finishing. Very good damping properties with good grit bonding. Precision grinding e.g. for piston rings or pump vanes.
B36	Medium	Medium	Synthetic resin	Synthetic resin bonding for face grinding and face finishing. Very good damping properties with good grit bonding. Very cool grinding, for large workpiece areas.

Forms

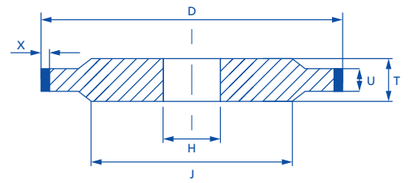
DESIGNATION OF THE GRINDING WHEELS IN ACCORDANCE WITH FEPA

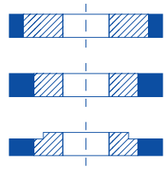
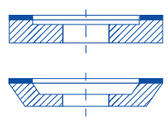
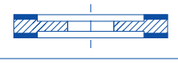
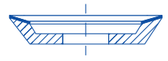
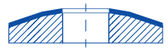
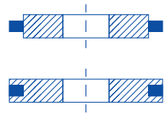
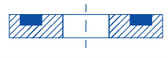
This designation example is intended to support you with selection of the optimum shape of grinding wheel.

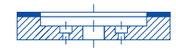
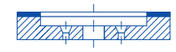
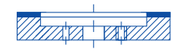
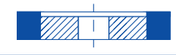
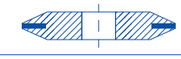
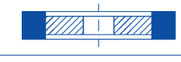
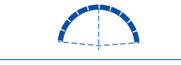
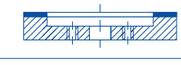
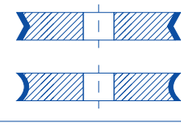
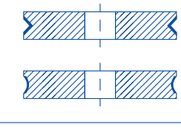
DESIGNATION EXAMPLE: 6A2B		
6	Body version	
A	Coating shape	
2	Coating position	
B	Modification of the body	

VERS.	STANDARD SHAPES
1	
2	
3	
4	
6	
9	
11	
12	
14	
15	

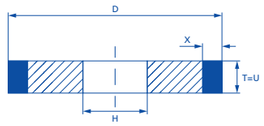
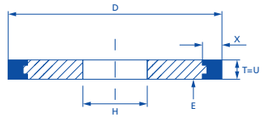
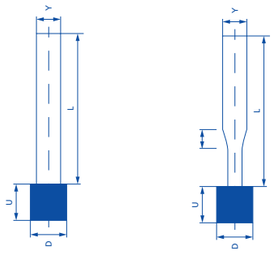
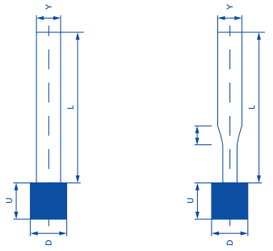
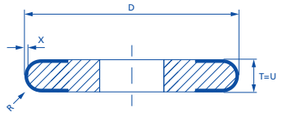
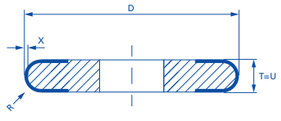
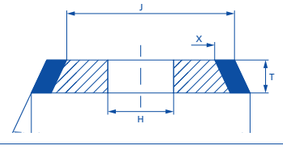
VERS.	COATING SHAPE	VERS.	COATING SHAPE
A		J	
AH		K	
B		L	
C		LL	
CH		M	
D		P	
DD		Q	
E		QQ	
EE		S	
F		U	
FF		V	
G		Y	
H			

DESIGNATION EXAMPLE: 14A1		
14	Body version	
A	Coating shape	
1	Coating position	

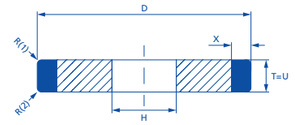
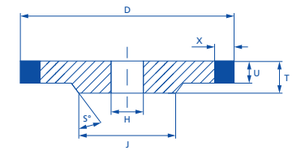
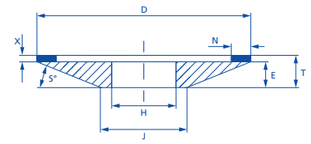
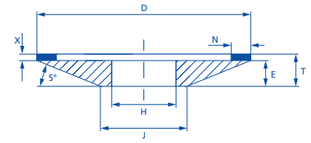
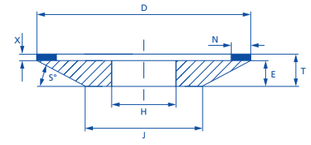
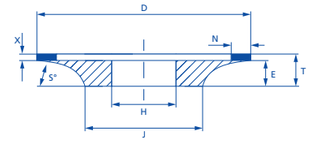
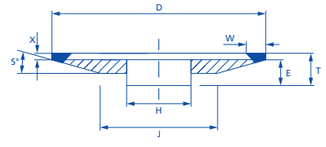
VERS.	POSITION OF THE COATING	COATING SHAPE
1	Circumference	
2	One side	
3	Both sides	
4	Angled inwards or concave	
5	Angled outwards or convex	
6	Part of the circumference	
7	Part of the side	
8	Completely filled	
9	Specific part of the circumference	
10	Inner ring	

VERS.	MODIFICATION	COATING SHAPE
B	Drilling and sinking	
C	Countersinking	
H	Drilling	
M	Bore and thread	
P	Free turning	
Q	Enclosed coating	
R	Undercut	
S	Coating segmented	
SS	Coating segmented and serrated	
T	Cut thread	
V	Sunken diamond coating	
W	On a shaft	
Y	Coating enclosed or sunken	

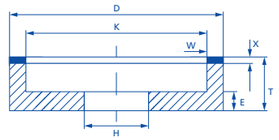
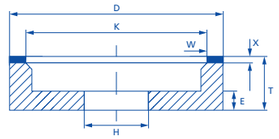
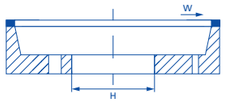
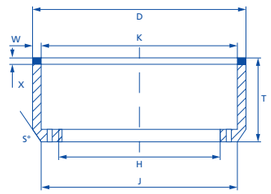
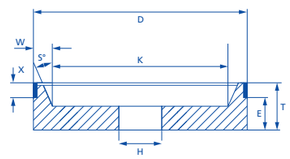
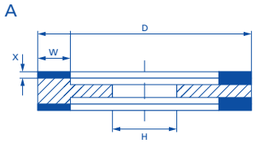
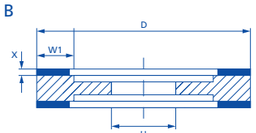
OVERVIEW OF SUPERABRASIVE SHAPES

SHAPE	DESIGNATION	SYMBOLIC IMAGE	ORDER DATA REQUIRED	AREA OF APPLICATION
1A1	Straight grinding wheel		D x T x H U – X	External cylindrical grinding, Centerless Crankshaft
1A1R	Straight grinding wheel with cut away area		D x T x H U – X	Cutting
1A1W	Cylindrical mounted point		D x T U – X – Y	Internal grinding
1A8W	Cylindrical mounted point		D x T U – Y	Internal grinding
1FF1	Straight grinding wheel		D x T x H U – X (R)	Tool grinding
1F1R	Straight grinding wheel with cut away area		D x T x H U – X (R)	Tool grinding
1V1	Straight grinding wheel		D x T x H U – X – V°	External cylindrical grinding

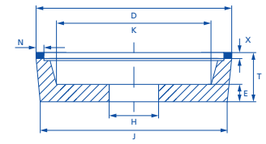
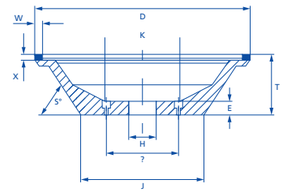
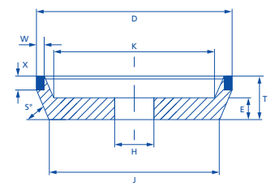
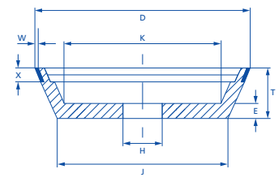
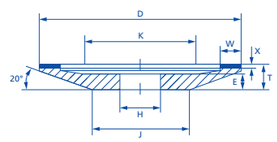
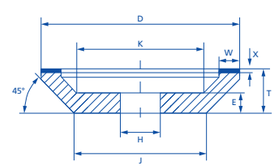
OVERVIEW OF SUPERABRASIVE SHAPES

SHAPE	DESIGNATION	SYMBOLIC IMAGE	ORDER DATA REQUIRED	AREA OF APPLICATION
1L1	Straight grinding wheel		D x T x H U – X (R)	Crankshaft External cylindrical grinding
3A1	Straight grinding wheel shouldered at one side		D x T x H U – X	Peel grinding External cylindrical grinding
4A2	Straight grinding wheel tapered at one side		D x T x H W – X	Tool grinding
4B9	Straight grinding wheel tapered at one side		D x T x H W – X	Tool grinding
4BT9	Straight grinding wheel tapered at one side		D x T x H W – X	Tool grinding
4C2	Disc wheel		D x T x H W/U – X (R)	Tool grinding
4ET9	Straight grinding wheel tapered on one side		D x T x H W – X	Tool grinding

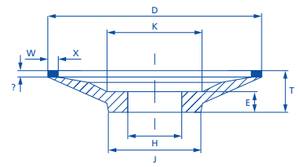
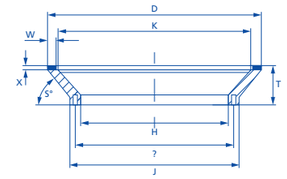
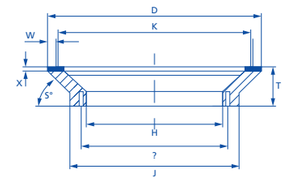
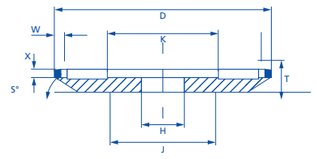
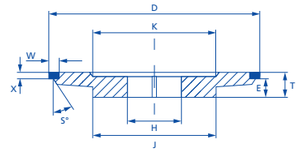
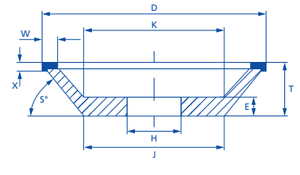
OVERVIEW OF SUPERABRASIVE SHAPES

SHAPE	DESIGNATION	SYMBOLIC IMAGE	ORDER DATA REQUIRED	AREA OF APPLICATION
6A2	Cylindrical cup wheel	Mod. A  Mod. B 	D × T × H W – X	Double face grinding
6A2H	Cylindrical cup wheel		D × T × H W – X	Tool grinding
6A2M	Cylindrical cup wheel		D × T × H W – X	Tool grinding
6A9	Cylindrical cup wheel		D × T × H W – X	Tool grinding
9A3	Straight grinding wheel shouldered at two sides	Mod. A  Mod. B 	D × T × H W – X	External cylindrical grinding

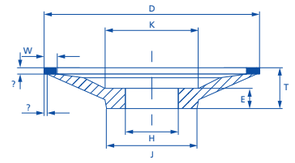
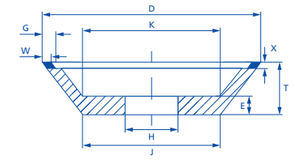
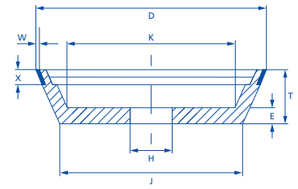
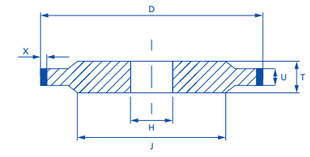
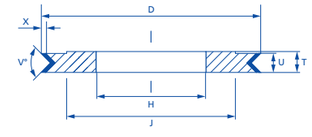
OVERVIEW OF SUPERABRASIVE SHAPES

SHAPE	DESIGNATION	SYMBOLIC IMAGE	ORDER DATA REQUIRED	AREA OF APPLICATION
11A2	Tapered cup wheel		D × T × H W – X	Tool grinding
11A2B	Tapered cup wheel		D × T × H W – X	Tool grinding
11A9	Tapered cup wheel		D × T × H W – X	Tool grinding
11V9	Tapered cup wheel		D × T × H W – X	Tool grinding
12A2 20°	Disc wheel		D × T × H W – X	Tool grinding
12A2 45°	Disc wheel		D × T × H W – X	Tool grinding

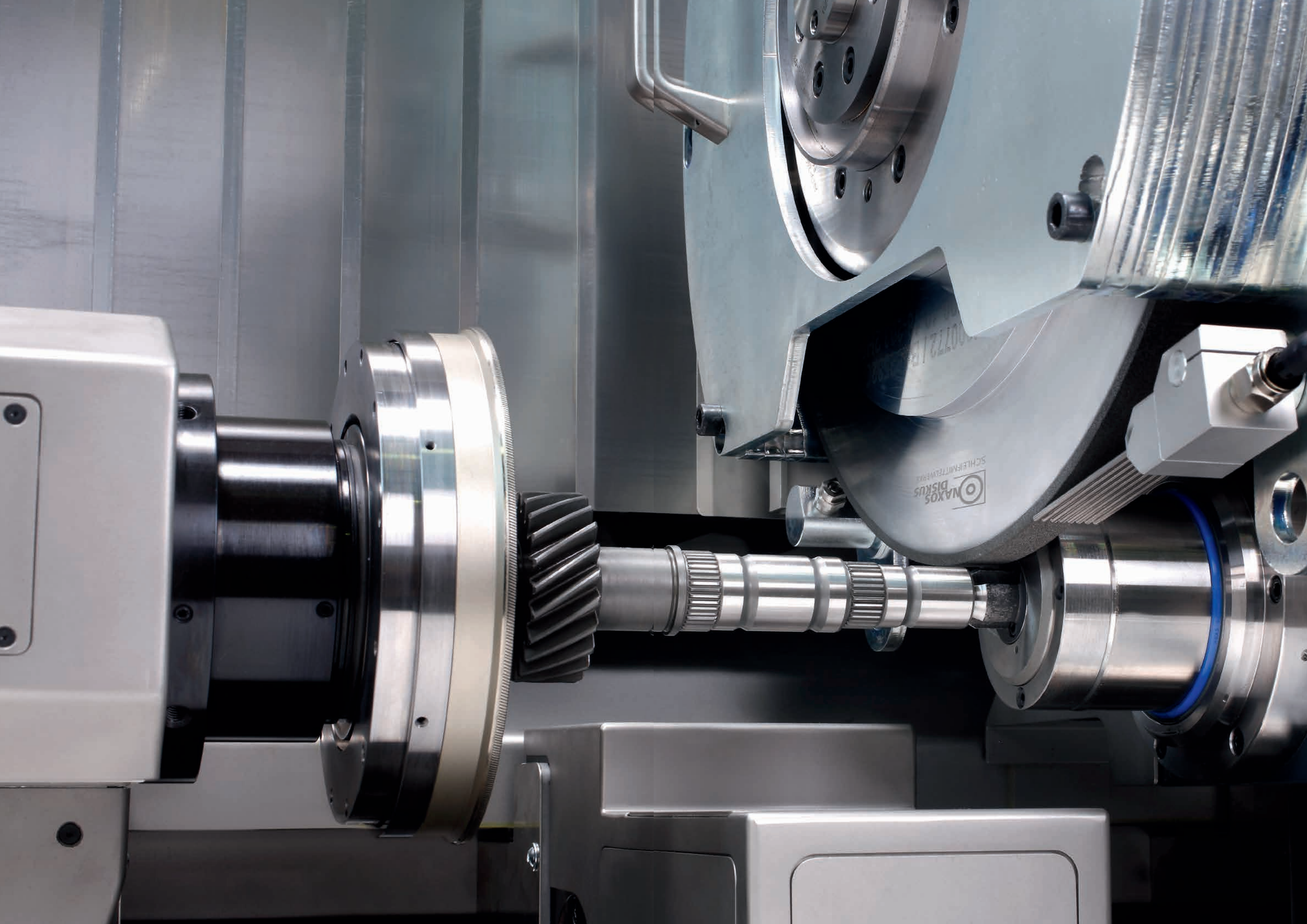
OVERVIEW OF SUPERABRASIVE SHAPES

SHAPE	DESIGNATION	SYMBOLIC IMAGE	ORDER DATA REQUIRED	AREA OF APPLICATION
12A2F	Disc wheel		D × T × H W – X	Tool grinding
12A2T	Disc wheel		D × T × H W – X	Tool grinding
12A2ZST	Disc wheel		D × T × H W – X	Tool grinding
12A9Z	Disc wheel		D × T × H W – X	Tool grinding
12B9N	Disc wheel		D × T × H W – X	Tool grinding
12C2	Disc wheel		D × T × H W – X	Tool grinding

OVERVIEW OF SUPERABRASIVE SHAPES

SHAPE	DESIGNATION	SYMBOLIC IMAGE	ORDER DATA REQUIRED	AREA OF APPLICATION
12C2F	Disc wheel		D × T × H W/U – X	Tool grinding
12V2	Disc wheel		D × T × H W – X	Tool grinding
12V9	Disc wheel		D × T × H W – X	Tool grinding
14A1	Straight grinding wheel shouldered at two sides		D × T × H U – X	External cylindrical grinding, Centerless Camshaft
3EE1V	Straight grinding wheel shouldered at one side		D × T × H U – X – V°	Angled plunge grinding gear shaft

All the grinding wheels shown (except for the mounted points) are manufactured with a diameter of 10 to 1000 mm at NAXOS-DISKUS. It goes without saying that we design your custom-made grinding wheels according to your application. We can of course also produce special designs according to your wishes.


NAXOS DISKUS
SCHLEIFMITTEL WERK

Request form

1. CUSTOMER INFORMATION			
Customer		Date	
Address			
Contact			
Department			
Phone		E-mail	

2. GRINDING APPLICATION

3. WORKPIECE DATA			
Workpiece des.			
Dimensions			
Material			
Heat treatment		Hardness	
Stock removal			

4. GRINDING MACHINE			
Manufacturer		Model	
V_c		P_S	
Condition			

5. COOLANT TYPE			
Coolant type		CL volume	
CL pressure			
HD cleaning pressure		Volume	

6. GRINDING TOOL			
Shape		Dimensions	
Competitor		Specification	
V_c		Price	

7. DRESSING TOOL			
rotating/fixed		Dimensions	
Supplier		Specification	

8. GRINDING PARAMETERS			
Grinding type		V_c	
a_e snagging		a_e finishing	
V_f snagging		V_f finishing	
n_w		Number of strokes	

9. DRESSING PARAMETERS			
Dressing cycle		V_c	
V_r		q_d	
a_{ed}		Var	

10. OPERATING TARGETS			
Surface quality		Tool life	
Profile retention		Operating time	

11. OTHER DATA			
Employee first name		Employee surname	
Recording date		Recording type	

Technical information

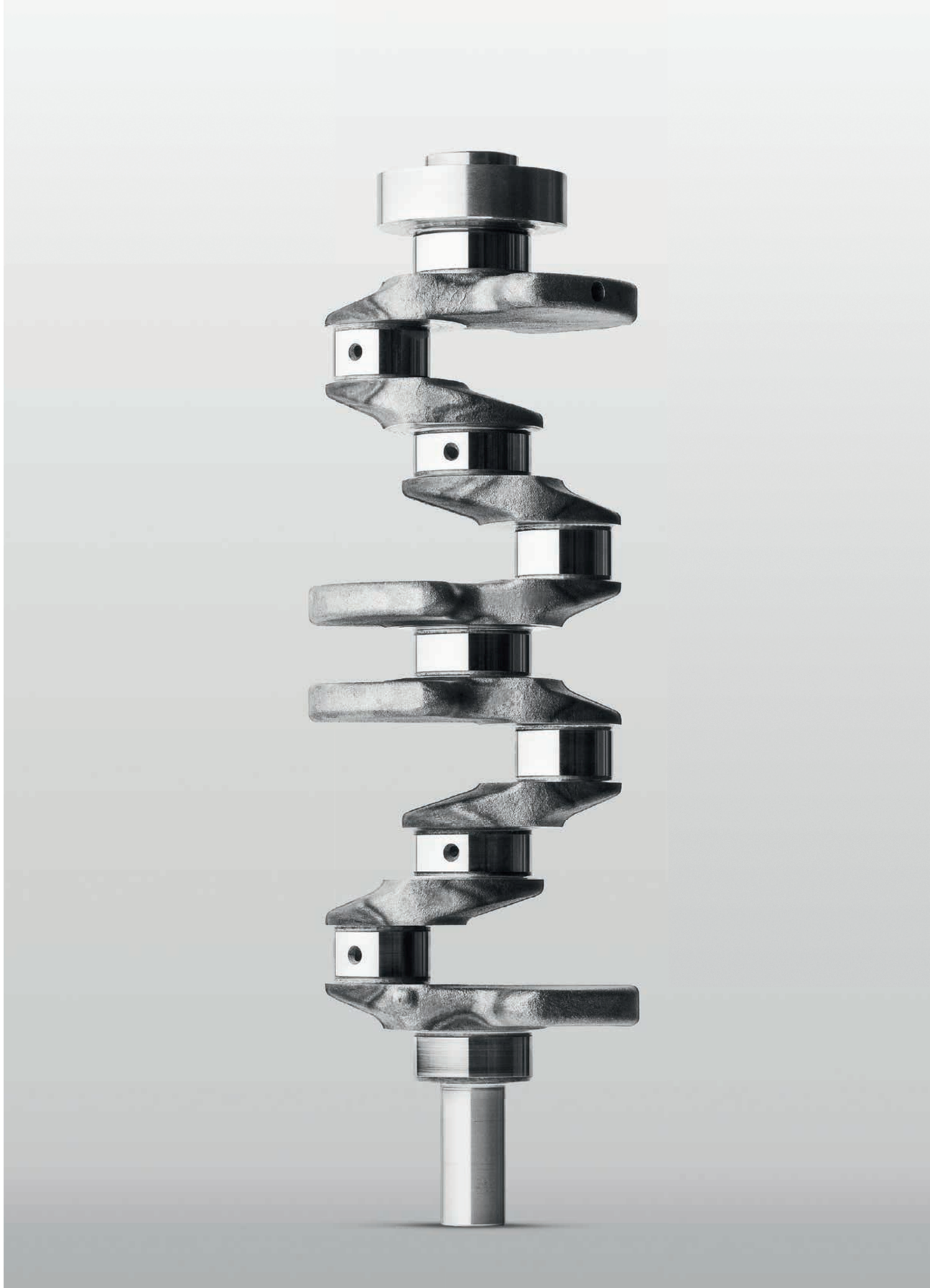
Customer group	Automotive
Sub-group	Engine
Grinding application	External cylindrical grinding

Workpiece	Crankshaft 4-cylinder passenger car
Application	Main bearing with radius
Material	GGG70
Stock removal	max 0.55 mm
Hardness	55 -2/+4 HRC

Machine	Landis
Coolant type	Oil

Wheel speed	82 m/s
Feed rates	
Dressing cycle	320 main bearing points
Dressing amount	6 × 0.0015 mm
Tool life	142,222 ground main bearing points
Surface	Rz is 2.5
Wheel dimensions	14A1 T 600-40-21.3-5-140 H5

Specification	B151 V360 L 15 AUMENTO
Contact	Mr Arnold
Remarks	Improvement for customer: Reduction of price per workpiece by € 0.02.



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NAXOS-DISKUS Schleifmittelwerke GmbH
Werner-von-Siemens-Straße 1
D-35510 Butzbach

Tel +49 (0) 6033 899-0
Fax +49 (0) 6033 899-300
Mail info@naxos-diskus.de
www.naxos-diskus.de

www.dvs-technology.com

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