Hermes Bonded Abrasives

Grinding processes are subject to continuous change, the objective of which is frequently the improvement of workpiece quality and process productivity. This is achievable using new and optimized grinding systems and parameters. The heart of the process is the bonded abrasive. Its composition is a key determining factor in the quality and performance values of the process.

Contents

Hermes abrasive tools

Hermes is one of the largest suppliers of high-quality abrasives in the world. With production facilities and or sales offices in over 30 countries, the group is represented in all major industrial and developing countries.

Customer benefit is the focus for all Hermes products. This ensures that our customers always use the ideal tools.

Hermes bonded abrasives

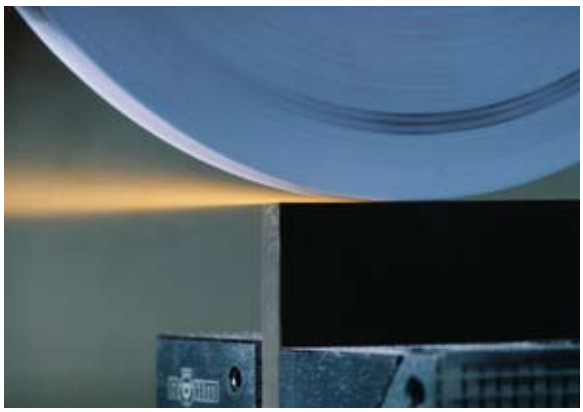
Bonded abrasives are manufactured in our German plants in Uetersen and Dresden. Using modern machines and production processes, these facilities produce high-performance tools which are supplied primarily to industrial customers throughout the world. Continuous process development is the route we take to satisfy ever more demanding quality and performance requirements.

Innovation and product engineering

Many years' experience with precision grinding processes and the knowledge acquired by Hermes product engineering giving on the spot advice and carrying out controlled tests on grinding machines allow us to develop customer-specific products and use them in the ideal way.

Hermes thus contributes to increasing the efficiency of its customers' product processes. Hermes considers this partnership with its customers the most important basis for their joint mutual success.

The "Sapphire Blue" microcrystalline aluminium oxide developed by Hermes is an example of the innovative drive that has increased performance of abrasives in recent years.



Range

Hermes focuses on the manufacture of precision bonded abrasives. The range includes bonded abrasives with external diameters of 4 to 1100 mm and a maximum operating speed of up to 125 m/s for conventional wheels or 160 m/s for CBN wheels.

Important sales sectors include the automotive, gear and roller bearing industries. Furthermore, there is a large number of companies for whom special tools are developed. Such as bonded abrasives with extremely homogeneous distribution of pores resulting in cool grinding and maximum wheel life for surface grinding with segments in the steel industry, for creep-feed grinding in the aerospace industry and for roll grinding in the printing and paper industry.

Gear manufacturers have access to a complete Hermes range of bonded abrasives and profiled honing tools. Honing tools in particular have recently adopted a significant market position as a result of innovative development work and improved production techniques.

Diamond and CBN tools are produced by Hermes primarily in vitrified bonds. The sophisticated production technique allows these abrasives to be produced in a single continuous layer up to a diameter of 600 mm.

Quality and Environmental policies

First certified to ISO 9001 in 1994 (Dresden factory) and 1995 (Uetersen factory), the Quality assurance system of the bonded abrasives factories was confirmed in accordance with the most recent guidelines.

The commitment of qualified staff and our many years experience in the production process generate consistent assured Quality.

Environmentally-compatible production has had a high priority in the Hermes philosophy for a long time, with raw materials resources being used sparingly and efficiently. This philosophy was expressly highlighted again in the environmental statement produced on the basis of the voluntary EC environmental audit regulations in 1995.

By using modern organizational and management methods, such as organizing production into self contained units or using group work, Hermes has been successful in setting a new standard of performance and quality. This is facilitated not least by our staff identifying with "their" machine, "their" product and "their" customer. The transfer of responsibility gives rise to a wealth of ideas, implemented for the benefit of our customers.


CERTIFICATE TÜV NORD

Management system as per
DIN EN ISO 9001 : 2000

In accordance with TÜV NORD CERT procedures, it is hereby certified that

Hermes Schleifkörper GmbH (HSR)
Lohrmannstraße 21
01237 Dresden
Germany

applies a management system in line with the above standard for the following scope

development, production and distribution of bonded abrasives, grain preparation and production of stitch bonded cloth

Certificate Registration No. 07 100 970044-010
Audit Report No. 3502 6898

Valid until 2011-07-14
Initial certification 1993

Essen, 2008-07-15

Certification Body
at TÜV NORD CERT GmbH

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits. This certificate is valid in conjunction with the main certificate.

TÜV NORD CERT GmbH
Langemarckstrasse 20
45141 Essen
www.tuev-nord-cert.com

IAF

Research & Development

At the parent factory of the Hermes Group in Hamburg, Research & Development concentrates on abrasive grain, bonded abrasives and coated abrasives.

R&D is divided into the following areas of expertise:

- development of abrasives such as the microcrystalline aluminium oxide "Sapphire Blue"
- chemical development with responsibility for syntheticresins, synthetic resin bonds and adhesives
- vitrified development focussing on "vitrified bonds" and "production engineering"
- materials testing for measuring material properties such as strength and toughness
- materials analysis using scanning electron microscope and X-ray diffraction
- abrasives lab where grinding forces, quality and performance variables can be measured
- converting expertise derived from new information into practice
- optimizing our customers' grinding processes

Research & Development tailors its activities to our customers' requirements. Results are implemented in the field by our product engineers and sales team.

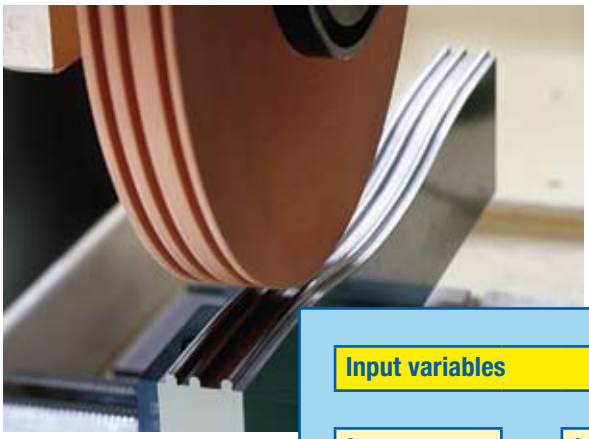
Processes

Grinding is one of the most important production processes for generating the required workpiece geometry and its surface quality.

Production engineering defines grinding as “machining with geometrically undefined cutting edges”. Via the surface to be generated and its characteristics and the kinematics of the stock removal process, one arrives at a series of different production processes including surface grinding, cylindrical grinding, roll grinding and so on.

The most important variables affecting these processes can be recorded systematically using the following schematic. The grinding system and parameters to be specified determine the outcome of the work. The grinding process can be described and optimized using these characteristic variables.

Of the system variables, the bonded abrasive occupies a central role. Its composition is a key determining factor in the characteristic quality and performance values of the process.



Grinding applications

Surface grinding
- using peripheral grinding process
- using creep-feed grinding process
- using profiled wheels in a profile/surface grinding process
- using continuous-dressing grinding process
- using segments
- using cups
- using rings
- using cemented or screw mounted abrasive wheels

Internal cylindrical grinding

External cylindrical grinding
- between center longitudinal grinding (oscillating grinding)
- between center straight plunge grinding
- between center angle approach grinding
- Centerless plunge grinding
- Centerless through feed grinding

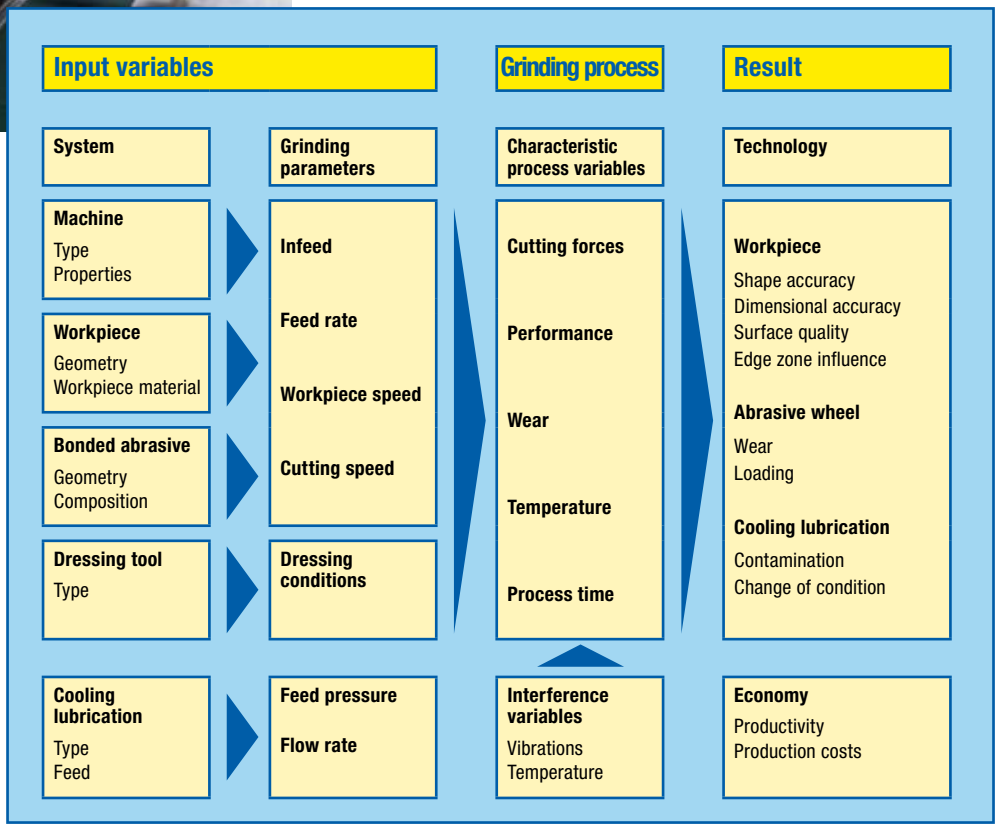
Thread grinding

Tooth flank grinding
- gear generating grinding
- gear profile grinding

Tooth flank honing
- using honing rings with internal teeth
- using honing wheels with external teeth

Tool grinding
- hand-held on backstand
- on tool grinding machines
- on saw-sharpening machines

Rough grinding



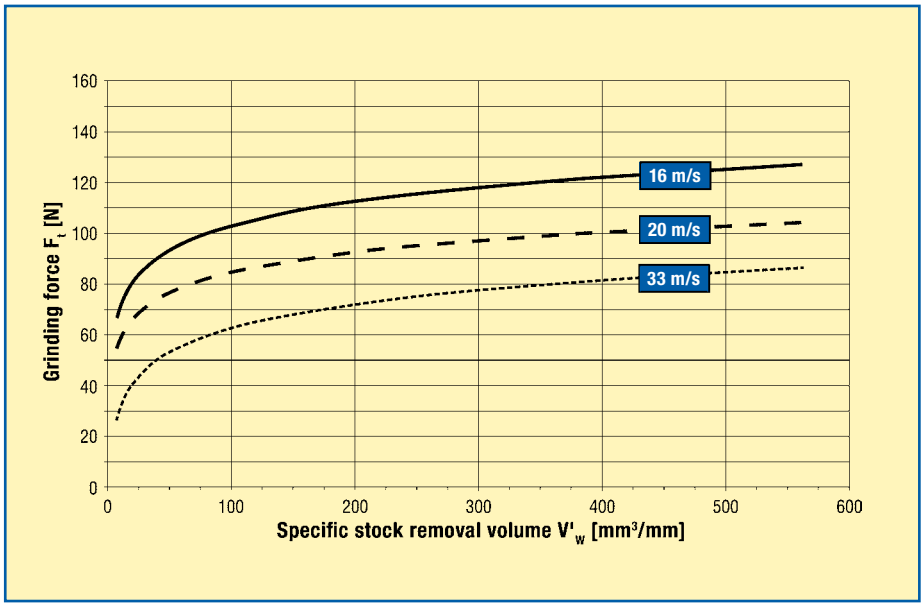
Relationship between input variables and grinding results (acc. to König)

Research

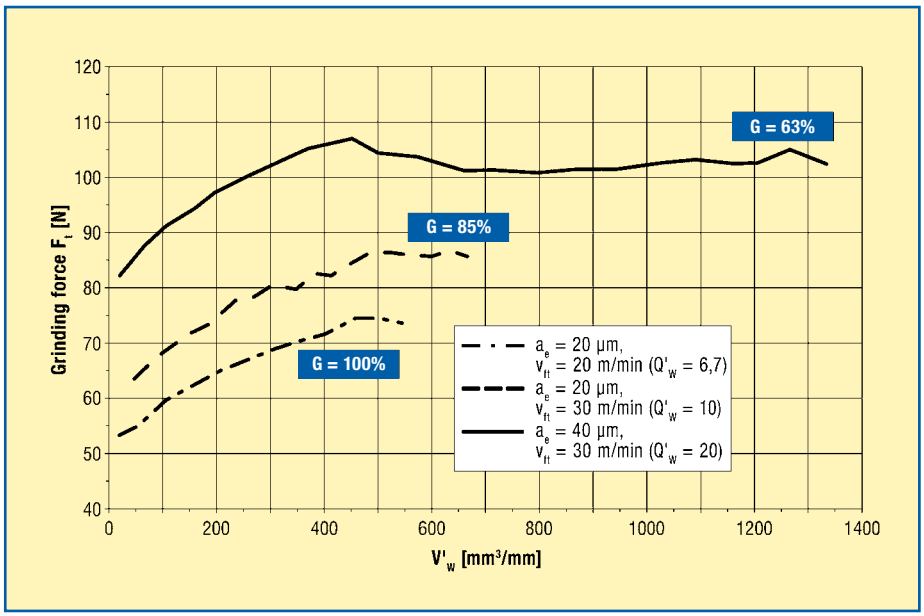
Basic Hermes research is involved among other things with the effects on the outcome of work of varying grinding system and parameters.

This work provides information which shows, for example, the effect of variations in input parameters on the grinding result and indicates options for increasing the performance of the abrasive tool.

The diagrams below are an excerpt of results which can be used as a guide in practical applications.



Effect of cutting speed v_c



Effect of specific stock removal rate Q'_w

Abrasives

An abrasive has to have the following properties:

- high hardness
- sharp cutting edges
- high thermal resistance
- chemical stability
- tendency to splinter
- high degree of consistency of Charge properties

These requirements are satisfied only by the synthetically produced hard materials

- fused aluminium oxide (Al_2O_3)
- microcrystalline aluminium oxide (Al_2O_3)
- silicon carbide (SiC)
- cubic boron nitride (CBN)
- diamond (C)

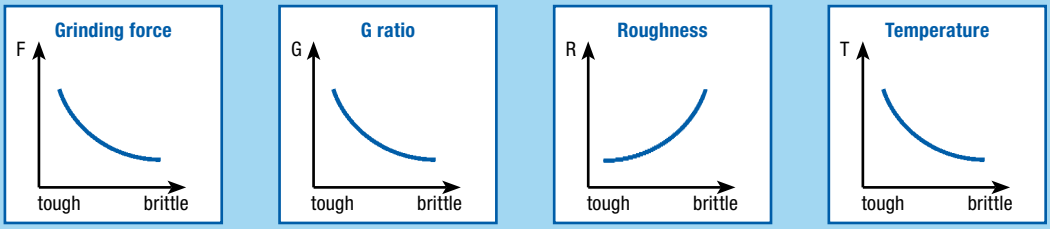
They are therefore used intensively in modern grinding technology.

Overview of abrasives

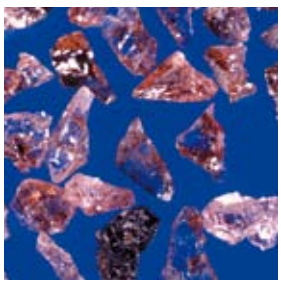
Friable aluminium oxides with mixtures	Semi-friable aluminium oxides with mixtures	Regular aluminium oxides with mixtures	Microcrystalline aluminium oxide	Silicon carbide with mixtures	Zirconia alumina with mixtures	Hollow spherical aluminium oxide
EKW	**HK**	**NK**	**CB**	**SCG**	ZK	EKK
EKR	**HKW**	**NKW**	SK	**SCS**	NK ... Z	
EKD	HKR	NKR		CGW		
EKT	HKD	NKD		CSN		
EWR	HKT	NKT		CSE		
EWD	HKN			CST		
ERD						
EWT						
ERT						
EDT						
FP						
TKR						

The preferred abrasives are shown in bold type **(e. g. EKW)**.

Strength of the abrasive



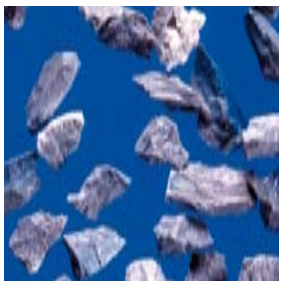
Variants and properties



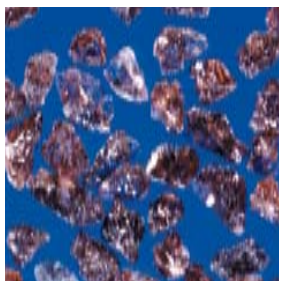
Regular aluminium oxide

Regular aluminium oxide has a high degree of toughness. In the grinding process, it is characterized by long wheel life but not particularly cool grinding. Regular aluminium oxide is used for off-hand and handguided processes for roughgrinding, smoothing and deburring, often in conjunction with extremely tough **zirconia alumina**.

Regular aluminium oxide is also used in either its pure form or as a mixture with semi-friable and friable aluminium oxide for precision grinding with adequate coolant supply.



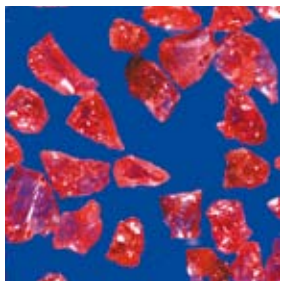
Zirconia alumina



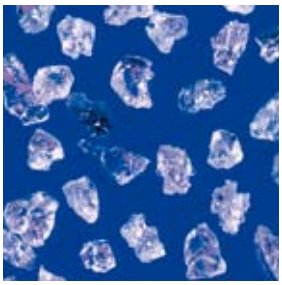
Semi-friable aluminium oxide

Semi-friable aluminium oxide has cooler grinding properties but is less tough. It is used in large areas of precision grinding technology, also in mixtures with friable aluminium oxides.

White, pink and ruby aluminium oxide make up the family of **friable aluminium oxides**. They are characterized by much cooler grinding As the colour red (i.e. degree of alloy) intensifies, so toughness increases.

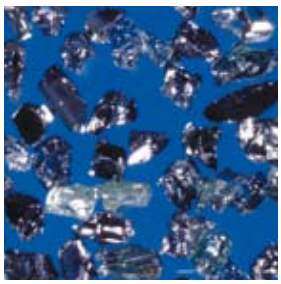


Ruby aluminium oxide



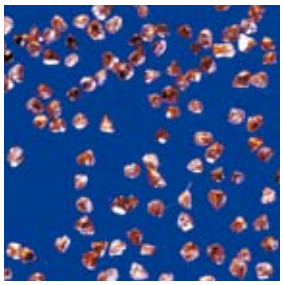
Mono-crystal aluminium oxide

The long wheel life of **mono-crystal aluminium oxide** is superior even to that of normal and ruby friable aluminium oxide and it does not develop additional heat.



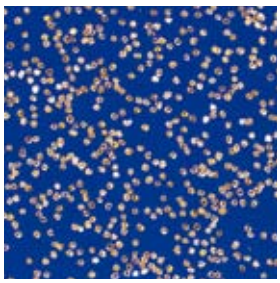
Silicon carbide

Silicon carbide is harder and less tough than aluminium oxide. Though it does tend to be subject to chemical wear on ferrous metals, its performance is unsurpassed for creep-feed grinding high-alloy steels or generating especially highquality surfaces. Silicon carbide is usually used for grinding glass, ceramic or natural stone, for nonferrous and hard metals and for organic materials. The green variant of silicon carbide is suitable for precision grinding, whereas the black variant is better suited to rough grinding, especially grey cast iron.



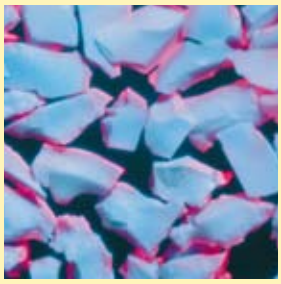
Cubic boron nitride (CBN)

Cubic boron nitride (CBN) is the second-hardest material after diamond, but has greater thermal resistance and is not subject to chemical wear when cutting steel. With cubic boron nitride, up to one hundred times longer wheel lives can be achieved compared to aluminium oxide abrasive wheels. CBN is especially suitable for processing steels which are hard to cut and for the high-performance grinding of high production volume components.



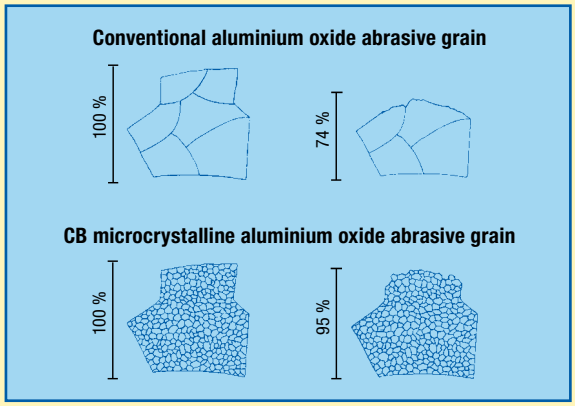
Diamond

Diamond is the hardest material known, but when processing steel, tends to be subject to chemical wear. Its high degree of hardness can be exploited to the full when processing hard metals, polycrystalline diamond, glass, ceramics, natural stone and organic materials.



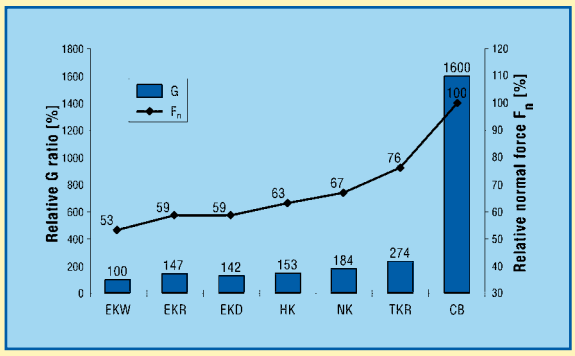
Sintered ceramic "Sapphire Blue"

The microcrystalline aluminium oxide CB **"Sapphire Blue®"**, developed by Hermes and produced by utilising the SOL-GEL process, demonstrates especially high performances. This abrasive combines the coolest possible grinding with minimum wear in an order of magnitude not achieved by fused aluminium oxides. A typical application for "Sapphire Blue" is the precision grinding of hardened, non-alloyed, alloyed and highly-alloyed steels.



Condition of grit after comparable usage

Changing the abrasive results in changes to G ratio and grinding force. The CB microcrystalline aluminium oxide results in an especially high G ratio for a moderately increasing normal force (see also graph below).



Aluminium oxide variants and CB with different G ratios and grinding forces. (Test with F 36 at $Q'_w = 20$ mm³/(mms). (CB was **not** yet in the self-sharpening range which usually results in smaller forces.)

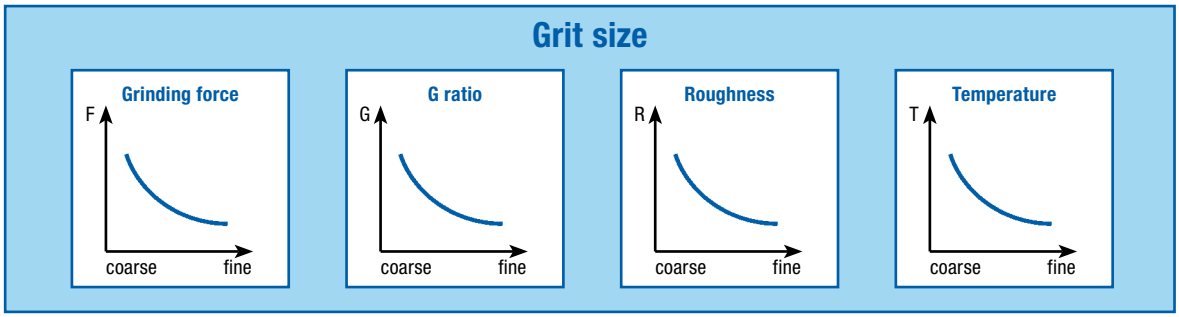
Grit size

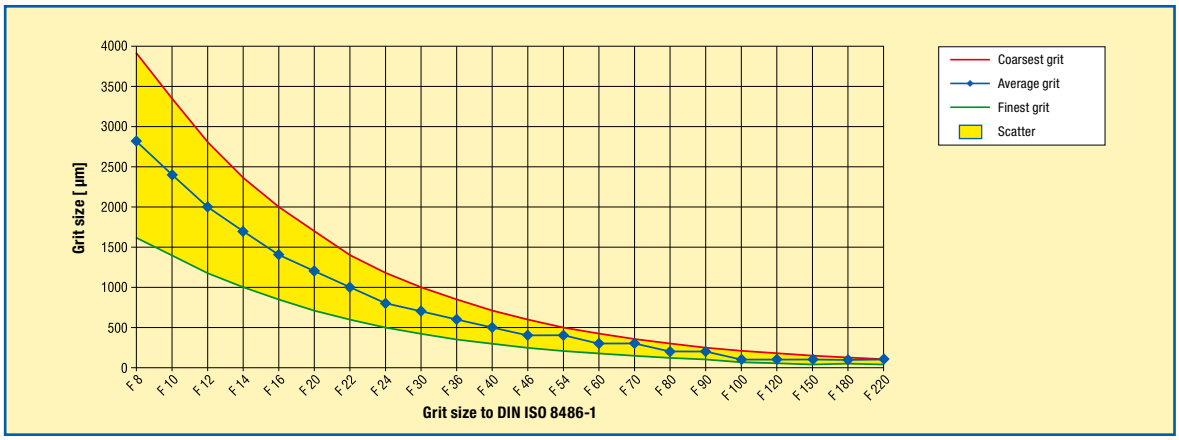
Aluminium oxide, sintered ceramic and silicon carbide

The grit size indicates the size of the individual particles of abrasive grit. The sizes are described by means of the grit particle distributions (F 8 - F 1200) standardized in DIN ISO 8486-1. The designation (e. g. F 60) describes the mesh width of a screen given in number of mesh squares per inch. Grit size F 60, for example, is defined by the 60 mesh squares of the nominal screen for one inch of screen length. A large number therefore describes a fine grit and a small one a coarse grit.

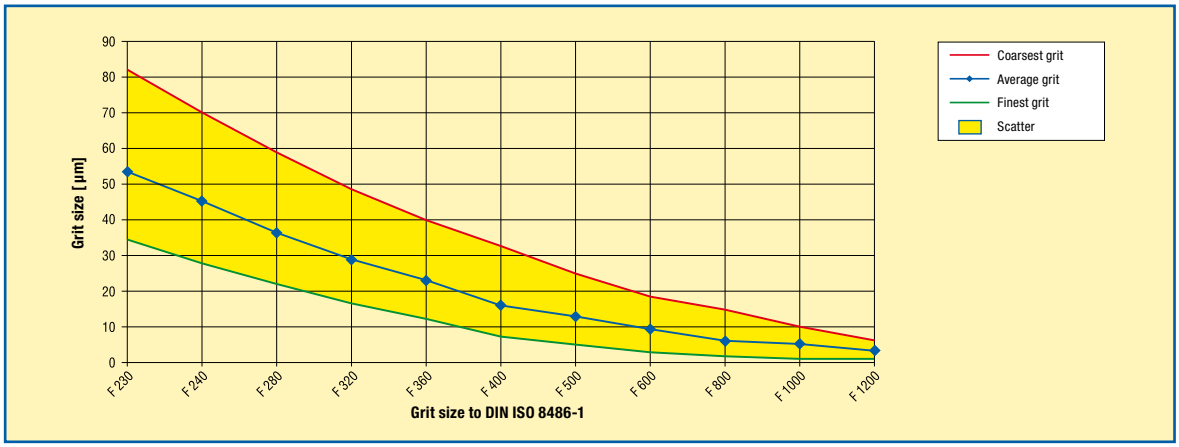
Diamond and CBN

The grit sizes of these abrasives are standardized by the FEPA standard. The numbers give average grit diameter in µm. In this case, a large number indicates a coarse grit (e. g. 181) and a small number (e. g. 46) a fine grit.





Grit sizes F 8 – F 220



Grit sizes F 230 – F 1200

Grit selecting

Together with hardness, the selection of grit size has a key influence on the grinding result. Grit size is selected to achieve specified roughnesses and radii. Grit sizes F 46, F 60 and F 80 are most frequently used for precision grinding.

It is possible and often also advantageous to combine grit sizes. This is stated in the specification of the bonded abrasive.

Summary of grit sizes

coarse	medium	fine	very fine
F 8	F 30	F 70	F 230
F 10	F 36	F 80	F 240
F 12	F 40	F 90	F 280
F 14	F 46	F 100	F 320
F 16	F 54	F 120	F 360
F 20	F 60	F 150	F 400
F 22		F 180	F 500
F 24		F 220	F 600
			F 800
			F 1000
			F 1200

Examples

Example 1

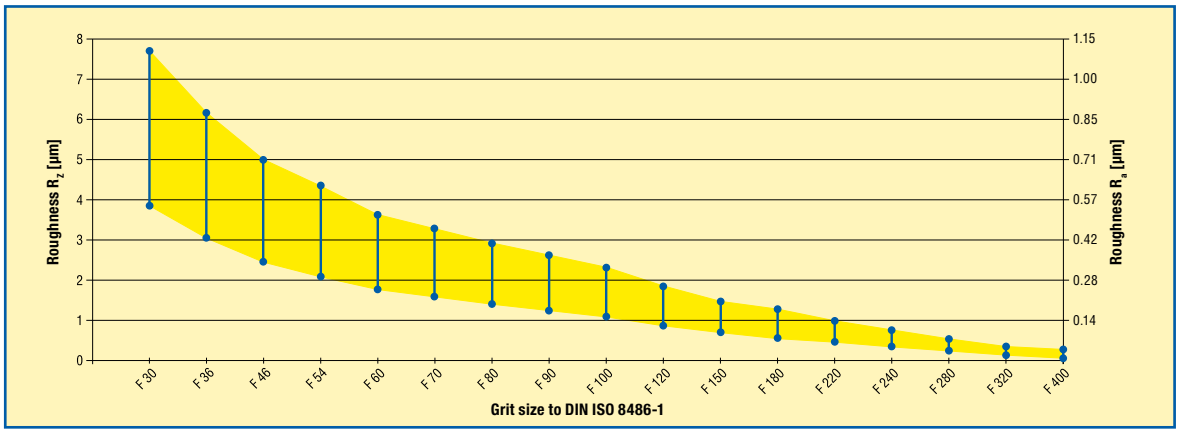
When grinding the outside diameter of a shaft, a roughness of $R_z \leq 2$ µm is required. Three grit sizes come into question: F 60, F 80 or F 100. If the specified surface is critical, F 100 should be selected.

Example 2

If a specific radius has to be guaranteed in addition to a specified surface, the finer grit size in each case should be selected.

Specified surface quality $R_z \leq 3$ µm ⇨ select: grit size F 60

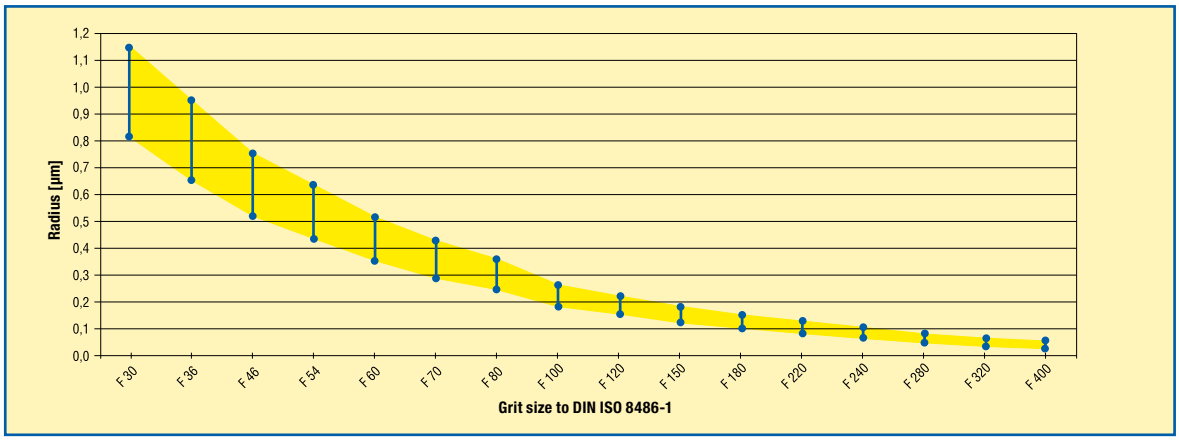
$Radius_{specified}$ R = 0.25 mm ⇨ select: grit size F 100



Effect of grit size on roughness, assuming a well controlled cylindrical grinding process (external cylindrical oscillating)

Notes

- when surface grinding with the circumference a select 1 grit size coarser
- when creep-feed cylindrical grinding internally or externally a select 1 to 2 grit sizes finer



Workpiece radius achievalble as a function of grit size

Hardness

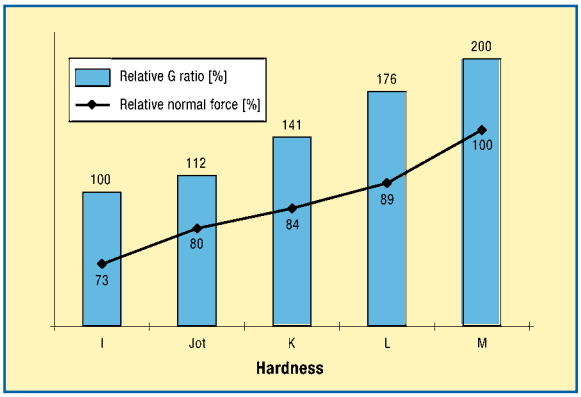
The nominal hardness quoted in the specification is indicated by the letters “A” (extremely soft) to “Z” (extremely hard). This hardness is a measure of the force required to break a particle of grit out of the bonded abrasive structure. It is controlled by the strength of the links in the bond and by the inherent strength of the bond.

Rising nominal hardness in a specification and process management which otherwise remain constant yields a higher G ratio (less wear) but also higher grinding forces and thus higher temperatures at the surface of the workpiece. A bonded abrasive of an ideal hardness sharpens itself as it works. This is as a result of grit splintering and breaking up or off. In the process, workpiece tolerances for shape and dimensions as well as surface quality are maintained. Too hard a bonded abrasive prevents self-sharpening. Reject parts may occur as a result of the workpiece burning, as well as unacceptable deviations in shape and dimensions. Although too soft a bonded abrasive will grind cool, it will wear so fast that in this case too, tolerances cannot be maintained.

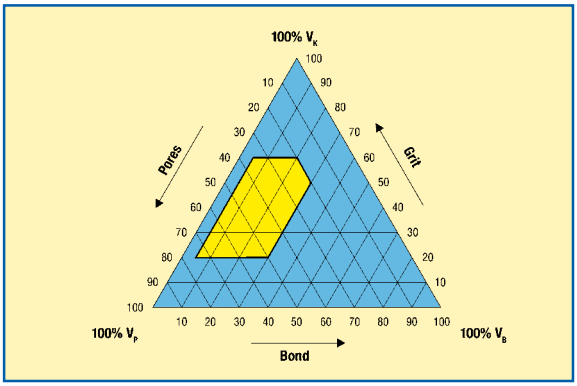
Nominal hardness is not always equivalent to the processrelated effective hardness of the bonded abrasive. A bonded abrasive containing normal aluminium oxide with the same nominal hardness as a friable aluminium oxide wheel, for example, will usually cause burns on the workpiece. The effective hardness of a bonded abrasive can be varied within wide limits by managing the grinding process.

Degree of hardness

Extremely soft A, B, C, D	**Hard** P, Q, R, S
Very soft E, F, G	**Very hard** T, U, V, W
Soft H, I, Jot, K	**Extremely hard** X, Y, Z
Medium L, M, N, O	

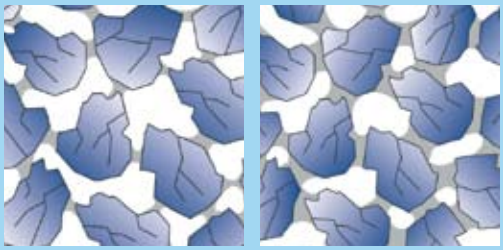


Effect of different hardnesses



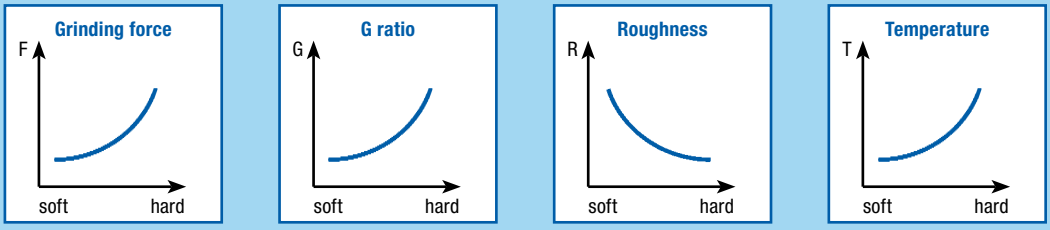
Three-components diagram (dark yellow area = field of specification)

Bond quantity variants

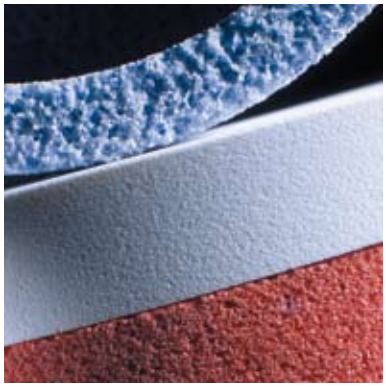


Soft wheel — Hard wheel

Hardness



Structure



The structure of the bonded abrasive is indicated in the specification by the figures “1” (very dense) to “22” (very open).

This structure number is a measure of the concentration of abrasive in the bonded abrasive. It drops continuously from structure number 1 to 22, with the distance between the cutting edges increasing in the process.

The structure has to be adapted to the grinding process and to the material to be cut.

Typical for the cylindrical grinding of steel is structure 4. Structures 7 to 12 are required for surface grinding at the circumference, and structures 14 to 19 for creep-feed grinding.

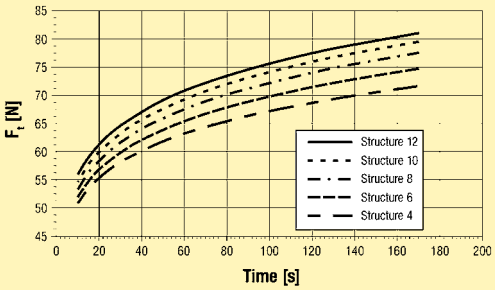
The influence of the material on selection of the appropriate structure is particularly obvious when processing rubber. In this case, it is only possible to grind economically using structure 18 or even more open structures.

Classes of structure

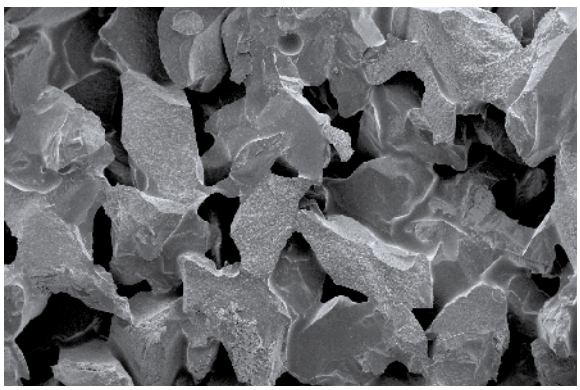
Dense	Medium	Open
0, 1, 2, 3	4, 5, 6, 7	8, 9, 10, 11

Porous
12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22

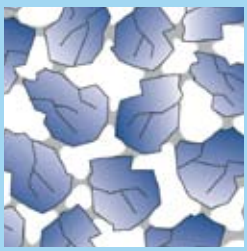
Key numbers
1 … 97



Effect on tangential force of different structures for the same nominal hardness.



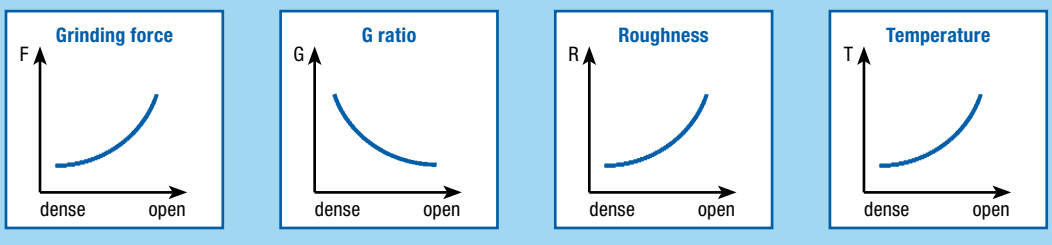
Structure variants



Medium-dense structure

Open structure

Structure



Bonds

Vitrified-bonded abrasives are fired at high temperatures of up to approx. 1400°C.

All the sintering stages possible in terms of production technology, from porcelain to glass bond, from the softest to the extremely hard bond, are available to suit the machining task in question.

In bonded abrasives with bonds of different strengths, it is possible to achieve an identical G ratio by varying the quantity of bond. In this case, smaller grinding forces are achieved.

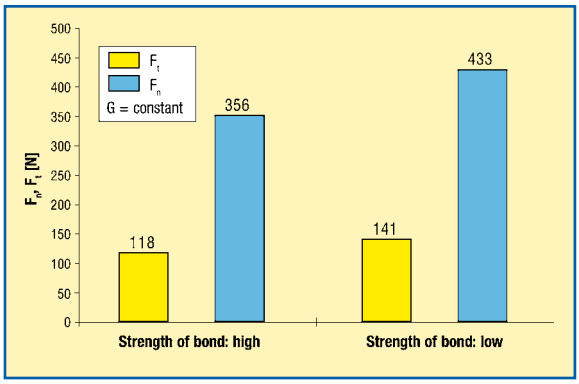
Resin-bonded abrasives are cured at a max. temperature of 190°C. Compared to vitrified-bonded abrasives, they are less rigid, but are more impact-resistant.

Their high degree of thermal resistance and brittleness mean that phenol resins are mainly used. They can be mechanically elasticized or chemically modified to make them resistant to lubricants. Fillers to promote grinding also have a cooling effect on the process.

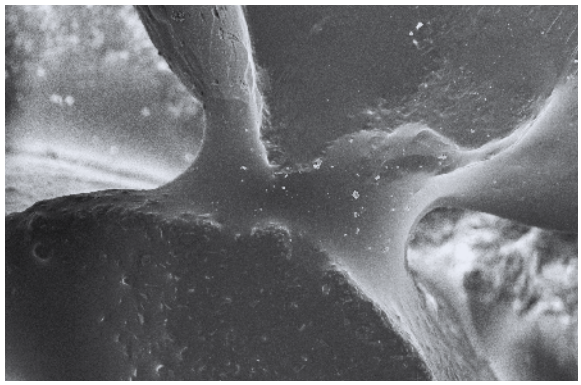
Resin-bonded abrasives have proved their worth as longlived and good self-sharpening tools primarily in centerless through feed, roll and side grinding. They are also used for off-hand grinding and hand-guided grinding.

Vitrified bonds for aluminium oxide bonded abrasives				
Application	**Name**			
Universally applicable bonds (VA = red)	VA	VC	V20	
Bonds with improved performance potential	V62	V02	V14	V354
Vitrified high-performance bonds, not available for all dimensions	VH	V30	V11	V61
Standard and high-performance bonds for microcrystalline alluminium oxide	VE	V09	V21	V096
For sulphurized bonded wheels	VL	V50		
For very hard and fine-grained abrasives	V33			

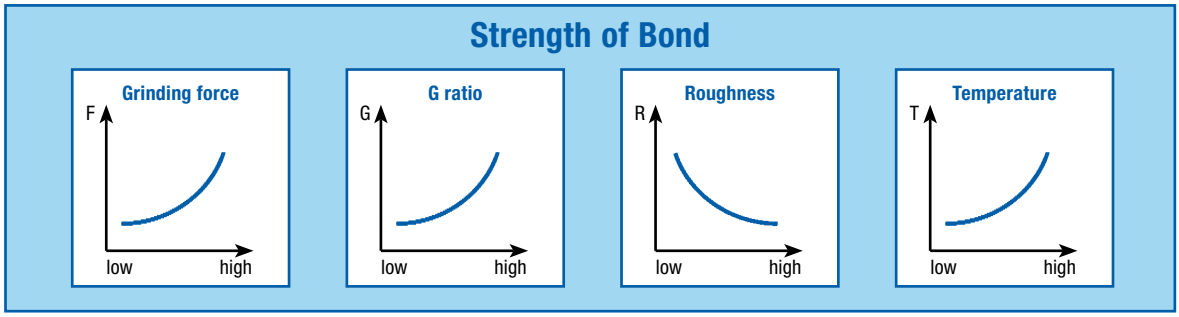
Vitrified bonds for silicon carbide bonded abrasives				
Application	**Name**			
Universally applicable bonds	V5	V18		
For low and average hardnesses	V40			
For average and high hardnesses	V06			
For high and very high hardnesses	V7	V15		
For creep-feed grinding	V4			



Grinding forces with different strength bonds and different quantities of bond



Bond post (SEM image)



Synthetic resin bonds		
Application	**Name**	**Type**
For special wet-grinding processes with soft and medium-hard bonded abrasives, e. g. for roll grinding and for side grinding	BE B20 B70	modified phenol resin
Standard bond for wet-grinding with soft and medium-hard bonded abrasives	BW B30 B50	
For flute grinding and similar processes	BA1	phenol resin / filler mixture
For centerless bar grinding	BC1 - BC4 B60	
For rough grinding, dry	BS1 BS2	
For rail grinding	B40	
For wet-grinding processes in which extra soft-acting bonded abrasives are required	BG B10	modified phenol resin
For cut-off bonded abrasives, including wet	B6	phenol resin / filler mixture
Special developments, e. g. for off-hand grinding or for special precision grinding processes	B B1 - B3	special bonds

Different flow characteristics of bonds at the same firing temperature

Additional treatments

For special grinding operations, bonded abrasives can be given additional treatments.

- Impregnating a bonded abrasive with sulphur (XS) leads to cooler grinding, better stock removal, improved surface and higher performance, especially for internal cylindrical grinding, honing and superfinishing.
- Another impregnation option is to fill the pores of the bonded abrasive with wax (XC and XP).
- To improve edge stability, the side surfaces of bonded abrasives intended for circumferential grinding can be impregnated with resin (XO). It is possible to treat cup wheels of shapes 6 and 11 similarly.
- Soft bonded abrasives whose inherent strength is inadequate for elevated circumferential grinding speeds can be impregnated with resin (XZ) in an area around the bore which ensures the required protection from fracture due to centrifugal forces.

Special instructions

Specification system	Impregnation types
A, X, Y, Z, Z1, HZ, G	X, XC, XO, XP, XS, XT, XZ
Porous structures	**Special curing**
z. B. P45, P32, 13/47	SH

Example specification: 3SK3 60 H12 VEG

Abrasive	Grit size	Hardness	Structure	Type of Bond	Special instructions
3SK3	60	H	12	VE	G

Designation of bonded abrasives (wheel + label)

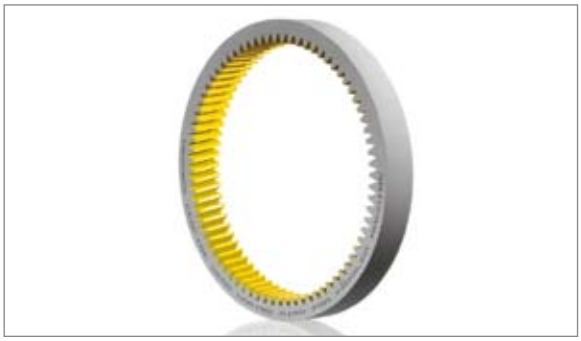
Specification | **Permitted rpm** | **Max. operating speed**

Coloured stripes indicating max. operating speed

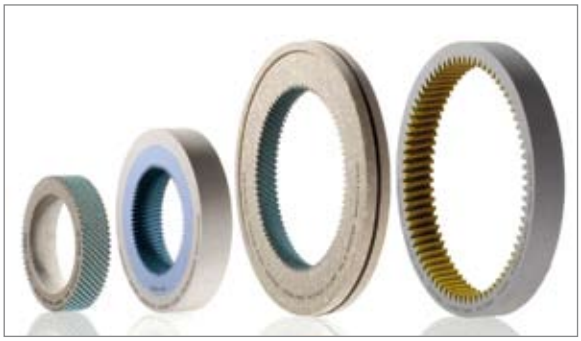
- **none:** below 40 m/s
- **blue:** max. 50 m/s
- **yellow:** max. 63 m/s
- **red:** max. 80 m/s
- **green:** max. 100 m/s
- **blue/yellow:** max. 125 m/s
- **blue/red:** max. 140 m/s
- **blue/green:** max. 160 m/s
- **yellow/red:** max. 180 m/s
- **yellow/green:** max. 200 m/s
- **red/green:** max. 225 m/s
- **blue/blue:** max. 250 m/s
- **yellow/yellow:** max. 280 m/s
- **red/red:** max. 320 m/s
- **green/green:** max. 360 m/s

Hermes bonded abrasives are manufactured and tested in accordance with oSa safety regulations. They satisfy or exceed the requirements of standards EN 12413 (safety requirements for bonded abrasive products) and EN 13236 (safety requirements for superabrasives (diamond and boron nitride)).

Tools for gear honing



Hermes Cerfine honing ring



Hermes honing wheel with external teeth and
Hermes honing rings with internal teeth

Gear honing is a continuous fine-processing method in which the honing tool and the workpiece roll off one another. The crossed axes angle between the workpiece and the tool axis results in a sliding movement in the processing area running diagonally from the tip to the base of the tooth. The surface structure consequently generated on the face of the tooth is typical for this microgrinding process.

As the final processing step for tooth flanks in gear production, gear honing should be integrated in the overall production sequence as follows, with a distinction being made between three variants: Fässler honing, power honing and RZF honing.

A distinction is made between two types of tool for gear honing:

- honing rings with internal teeth
- honing wheels with external teeth

The honing rings/wheels consist of a synthetic resin matrix in which abrasive grit made of friable aluminium oxide, "Sapphire Blue" microcrystalline aluminium oxide or conglomerates and Hermesit hollow spheres are embedded. The main objective of gear honing is to reduce noise in the gear as a result of the altered surface structures of the tooth flanks. Further improvements are:

- reduced roughness
- improved concentric running
- elimination of damage
- correction of distortion on hardening
- extension of workpiece service life

Many years' experience in gear honing mean that Hermes has the expertise and the technology to design the tooth geometry for honing rings.

Hermes specifications for honing rings with internal teeth and honing wheels with external teeth

Friable aluminium oxide or CB "Sapphire Blue"

Resin-bonded friable aluminium oxide.

Example specification: **EWT 150/1 V2 B13** or

Resin-bonded mixture of "Sapphire Blue" highly-abrasive microcrystalline aluminium oxide and with friable aluminium oxide.

Example specification: **3SK3 150/1 V2 B13**

Profine

Conglomerates of a defined particle size in a matrix made of synthetic resin and abrasives. Friable aluminium oxide or CB grit can be used equally for the conglomerates and the matrix. These tools are used for performance honing with high level of stock removal.

Example specification: **Profine 8A4 1610 W-1 B13**

Hermesit

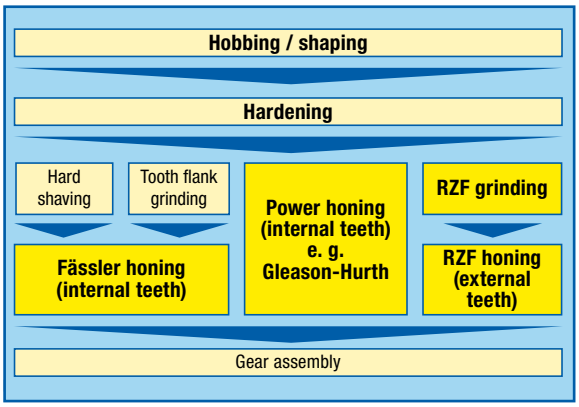
Hollow ceramic spheres coated with common abrasive particles in a matrix made of synthetic resin and abrasives. Type of grit and grit size can be varied both in the matrix and in the Hermesit sphere.

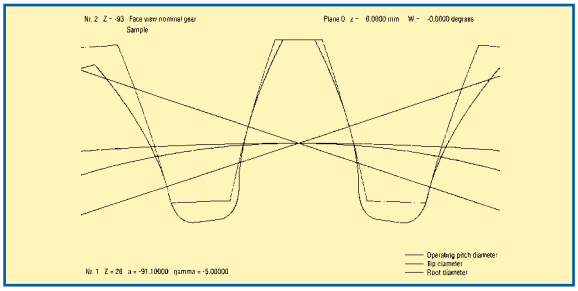
Example specification: **Hermesit C3 100 W0 B13**

Cerfine

Ceramic-bonded friable aluminium oxide or microcrystalline aluminium oxide.

Example specification: **Cerfine C3 220 P4 V09**





Computer-aided design calculation

CBN and diamond bonded abrasives

Modern grinding technologies are increasingly requiring the use of very hard cutting materials based on synthetic diamond and cubic boron nitride (CBN). Vitrified-bonded CBN wheels in particular have proved their worth in the field in large-scale mass production grinding in the automotive and roller bearing industries, for example. In these fields, much longer wheel lives and much shorter process times have led to economic benefits.

Hermes vitrified-bonded CBN and diamond abrasives are used especially successfully in the following methods:

- **bore grinding**
- **external cylindrical and creep-feed grinding**
- **profile grinding**
- **thread grinding**
- **roll grinding**
- **centerless grinding**
- **camshaft and crankshaft grinding**
- **double-sided surface grinding**
- **hard metal grinding with diamond bonded abrasives**

The product range comprises all the common shapes as per DIN EN 13236 up to D = 750 mm with single continous or segmented layer and max. operating speeds of up to 160 m/s.

Main applications

CBN

- Steel materials which are difficult to cut and have a high proportion of alloy, hardness primarily > 55 HRC
- High-speed steel, steel castings, roller bearing steel, grey cast iron, stainless steels, tempered castings, heatresistant steels

Diamond

- Hard, brittle, short-chipping and nonferrous metals
- Hard metal, glass, ceramics, quartz, semiconductor materials, plastics, glass fibre-reinforced plastics

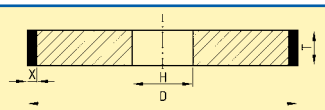
Application benefits

Hermes supplies a comprehensive selection of vitrified bonded CBN and diamond bonded abrasives. Together with structure control of up to 55% pore volume, it is possible to customise product optimisation and provide unique application benefits:

- maximum wear resistance and profile retention
- much longer wheel lives
- outstanding good dressing and profiling ability
- applicable at very high cutting speeds
- high specific stock removal rates
- considerable reduction in costs through reduce processing time
- reduced tool usage
- heat damage to edge areas avoided through high thermal conductivity
- generating surface compressive tension

Shape / dimensions

Shape	Diameter D	Width	Layer depth X	Bore H
1A1	20	10	3	8



Dimensions in mm

Specifications

Grain	Abrasive	Grit size	Hardness	Structure	Type of Bond	Special instructions	Concentration	Max. operating speed (MOS)
10	D	64	S	3	V04	R	100	40
12	B	64	X	4	V31	K	240	63

Specification variants

Grain		Abrasive		Grit size to FEPA	Hardness	Structure	Type of Bond	Concentration	Special instructions
CBN	Diamant	CBN	Diamant						
10 ... 19 20 ... 29 30; 31 40 50 ... 52 60 ... 76 and others	10 ... 14 20; 28 30 43 50 ... 52 and others	B	D	301 251 213 181 151 126 107 91 76 64 54 46	A B : H (soft) : M (medium) : P (hard) : R (very hard) : Z	– 18 (very open) : 14 (open) : 10 (medium) : 4 (dense)	V04 V24 V241 V242 V31 V41 V42 V95 and others	25 50 75 100 125 150 175 200 220 240	R K
				Fine grit		Artificial pores			
				40 : 6.3		/ 4 / 8 / 12 and others			

Example specification:
1A1 20x10x8-X3
12B 64 X 4 V31K 240 63

microlite bonded abrasives

With their polyurethane bond, **Hermes microlite bonded abrasives** satisfy the most stringent requirements regarding the gloss and fine finish of surfaces when processing a wide variety of materials. They are elastic and their outstanding adaptability makes them especially suitable for fine-grinding and microdeburring.

Variants

Grain	Grit range
Silicon carbide, green Regular alumnium oxide	F 16 - F 600 (F 800)
External diameter	**Width**
40 mm - 400 mm	10 mm - 150 mm
Max. operating speed (MOS)	**Bonds**
18 m/s - 35 m/s (depends on hardness)	BU10 to BU70
Example specification	
F1 150 x 10 x 51 SCG 46 BU60 22 m/s	

Applications

Polishing, decorative grinding, deburring, cleaning, descaling

Materials

Non-ferrous metals: brass, aluminium, titanium, bronze

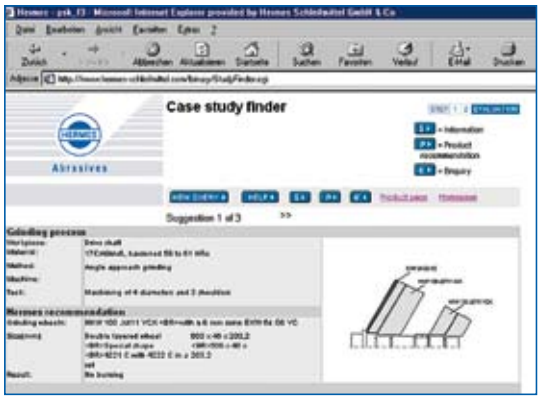
High-temparature steels: Inconel, Nimonic

Stainless steels, metal carbide, cast iron, ceramic, glass, plastic, wood, glass fibre-reinforced plastic

Internet case study finder

Interactive tools on the Hermes home page **"www.hermes-abrasives.com"** help you obtain detailed and up-to-date information about Hermes abrasives quickly.

For more information about bonded abrasives, go to the "Case study finder" under "Products – Bonded Abrasives", where numerous application examples can be selected and displayed with the relevant suggested solutions. Brochures about the proposed solution shown (where available) can also be selected. You can view these on-screen or order them from Hermes.



Detailed e-mail forms also give you the option of requesting from us or submitting to us qualified product recommendations or prices customized to your specific grinding process.






Hermes Schleifkörper GmbH

Lohrmannstraße 21
01237 Dresden, Germany

Tel. +49 351 28 01-0
Fax +49 351 28 01-390

hsr@hermes-schleifmittel.com
www.hermes-abrasives.com