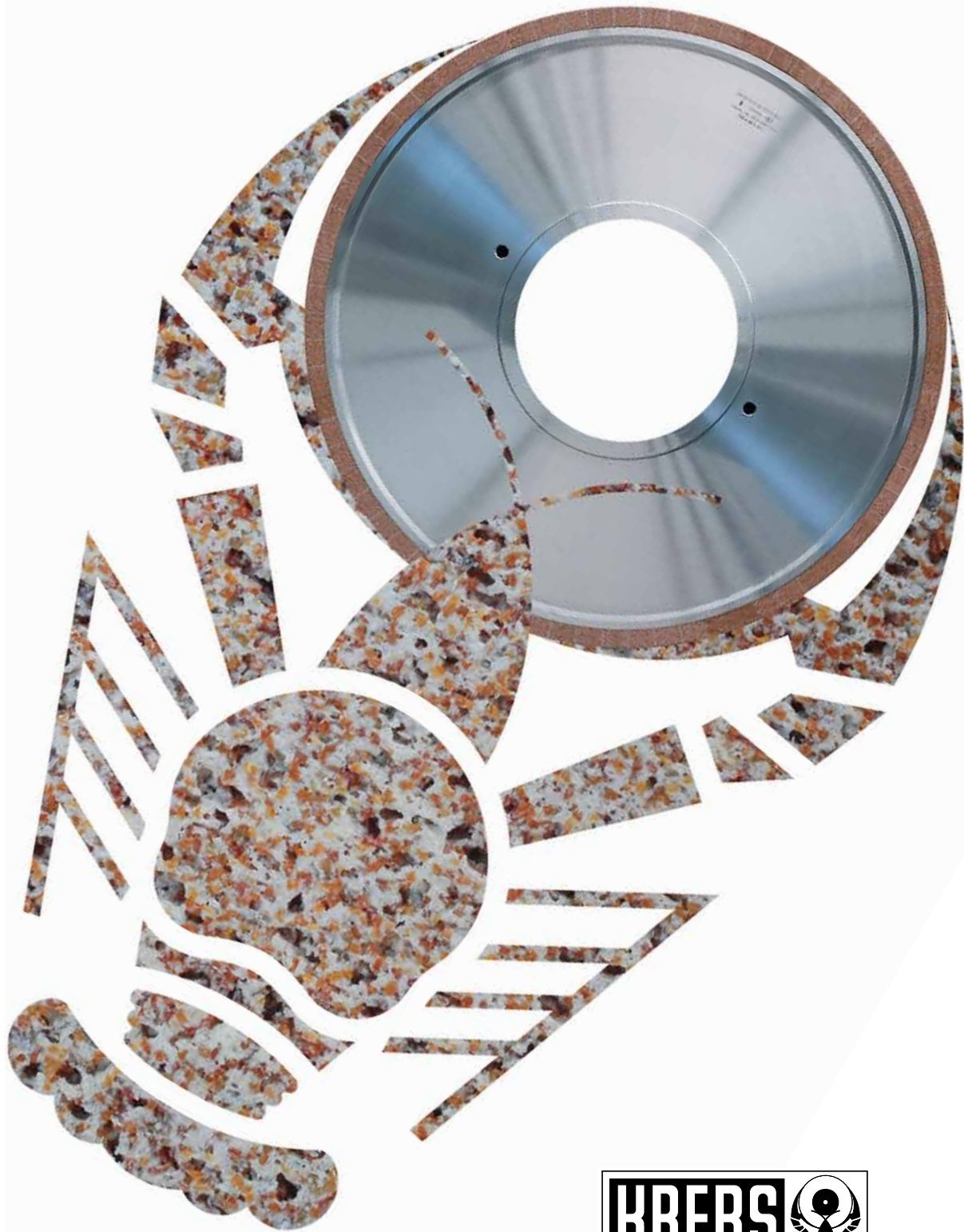


**Vitrified-bonded CBN and diamond
tools from KREBS & RIEDEL**

The ultimate in grinding.



Right for every application and every procedure.

Your production process – our product range.

Each procedure has its own special characteristics.
And we have the right individual tools for all of them.

In **cylindrical grinding** – the most widespread process – the interior or exterior of rotationally symmetrical workpieces are machined. We offer the solution for every area – whether you need precision down to the μ for machining minute components for injection technology, combustion engines, or rollers for the paper industry that weigh tons.

Surface grinding – plane-parallel machining of surfaces with the wheel periphery or grinding face – is primarily used in the construction of tools and molds. The growing diversity of materials here is a challenge we are happy to meet, with proven and lucrative solutions for you.

In **creep feed** or **deep grinding**, a workpiece is usually completed in a one-step procedure. This demands a high infeed motion for small workpiece feeds and thus large contact arcs between the workpiece and the grinding wheel. Our highly porous tools with very good cutting characteristics make this procedure fast and profitable.

In **profile grinding**, profiled wheels are used to machine outer peripheries. The workpiece itself determines which wheel is used, along with the wheel's specifications. We manufacture grit sizes and bonds especially adapted for specific radii and profiles, for example, to provide you with a wheel with excellent cutting characteristics, and less need for dressing and truing. We can handle the roughing of the wheel in order to save you set-up time.

Roll grinding involves workpieces that require extremely intensive grinding. The wide range of rolls are matched by an equally wide range of materials and dimensions that can be selected to produce the most suitable wheel. Vitrified-bonded CBN and diamond wheels have generally proven to be the most efficient for this.

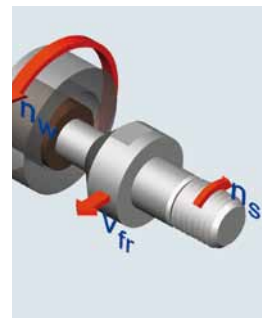
Non-round grinding of items such as camshafts or pump rings is one of the most complex of grinding tasks. The non-round contour leads to changing contact and motion ratios. Deviations from dimensional and shape tolerances are strongly influenced by the quality of the grinding tool. We match our tools precisely to these requirements.

Whatever you need to grind and whatever method you use, we can produce the perfect tool for you to get the job done.

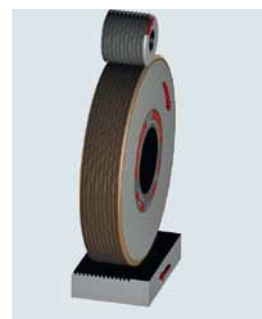


Maintains a profile on the outside, streamlined on the inside: We're experts in specialties such as the 3-zone wheel for flawless machining of crankshafts.

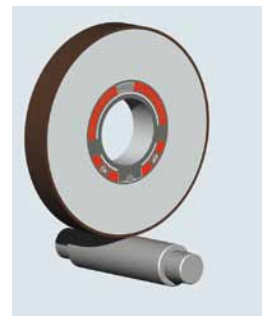
K&R for bore grinding, cone grinding, non-round grinding, jig grinding, grinding wheels with shank and threaded mandrel, tandem grinding wheels, and more.



K&R for surface grinding, deep grinding, and profile grinding of hardened steels.



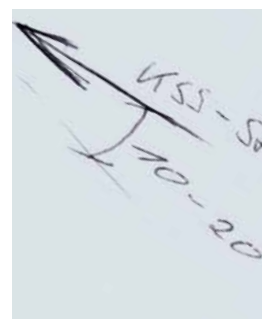
K&R for cylindrical grinding, straight and angular infeed grinding, and centerless grinding of cylinders, rolls, shafts, bolts, and more.



K&R for individual solutions for cam contours, crankshafts, gear cutting, thread profiles, and more.



K&R for the future. New procedures, materials, and machines? We're at the forefront for you!



Hard, harder . . . CBN and diamonds.

The hardest abrasive material in the world.

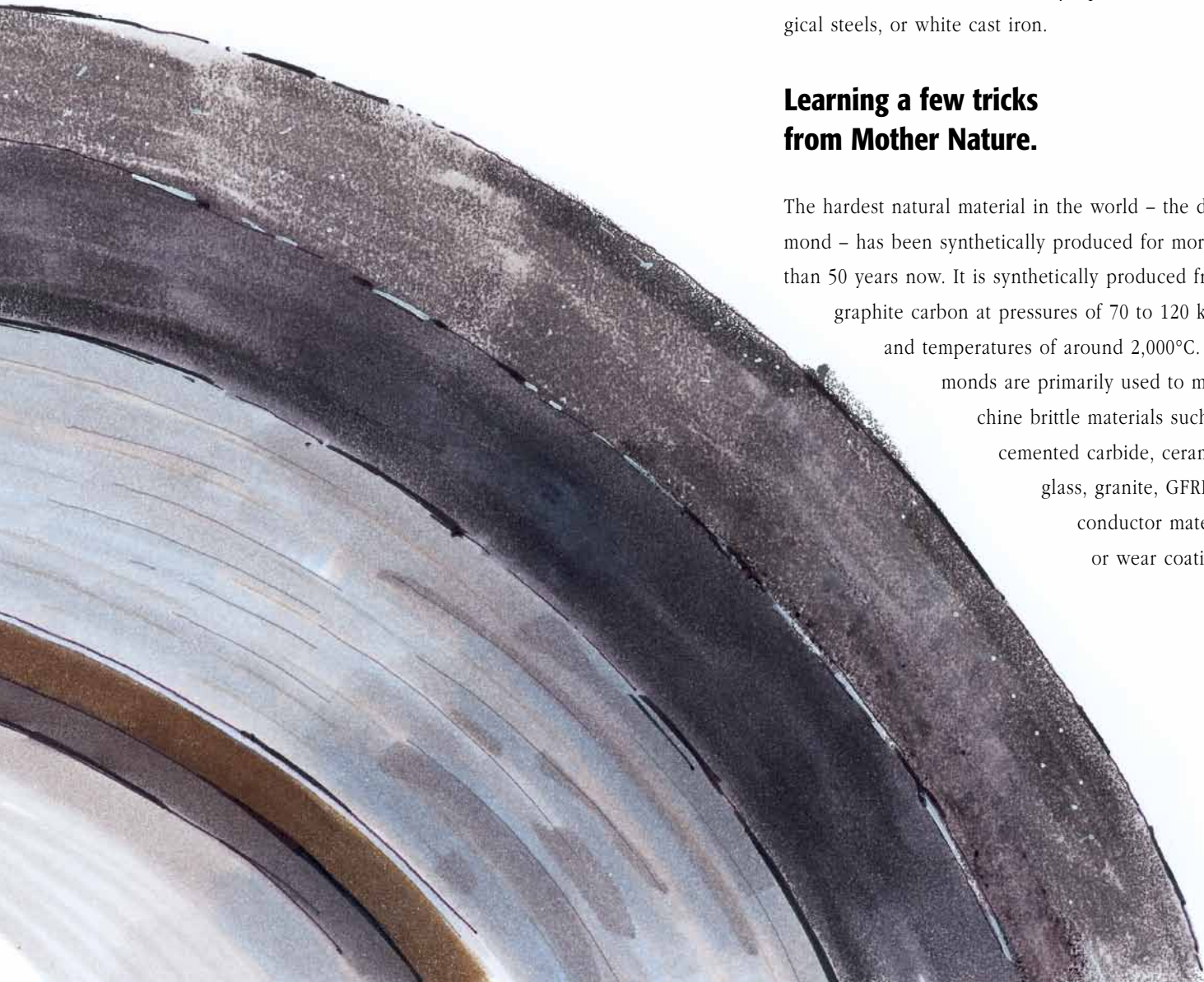
As always, the hardest materials in the world – CBN and diamond – offer the greatest precision when grinding extremely hard iron and steel alloys or hard, brittle materials, and offer the best stock removal rates and the longest wheel life.

Synthetic. Even better than the real thing.

Cubic boron nitride, or CBN for short, is synthesized, similar to diamonds, from a hexagonal boron nitride at 50 to 90 kbar and 1,800 to 2,700°C. It is especially suitable for hard-to-machine or high-alloy hardened steels starting at 54 HRC, such as high-speed, tool or chrome steels, nickel-based alloys, powder metallurgical steels, or white cast iron.

Learning a few tricks from Mother Nature.

The hardest natural material in the world – the diamond – has been synthetically produced for more than 50 years now. It is synthetically produced from graphite carbon at pressures of 70 to 120 kbar and temperatures of around 2,000°C. Diamonds are primarily used to machine brittle materials such as cemented carbide, ceramics, glass, granite, GFRP, semiconductor materials, or wear coatings.

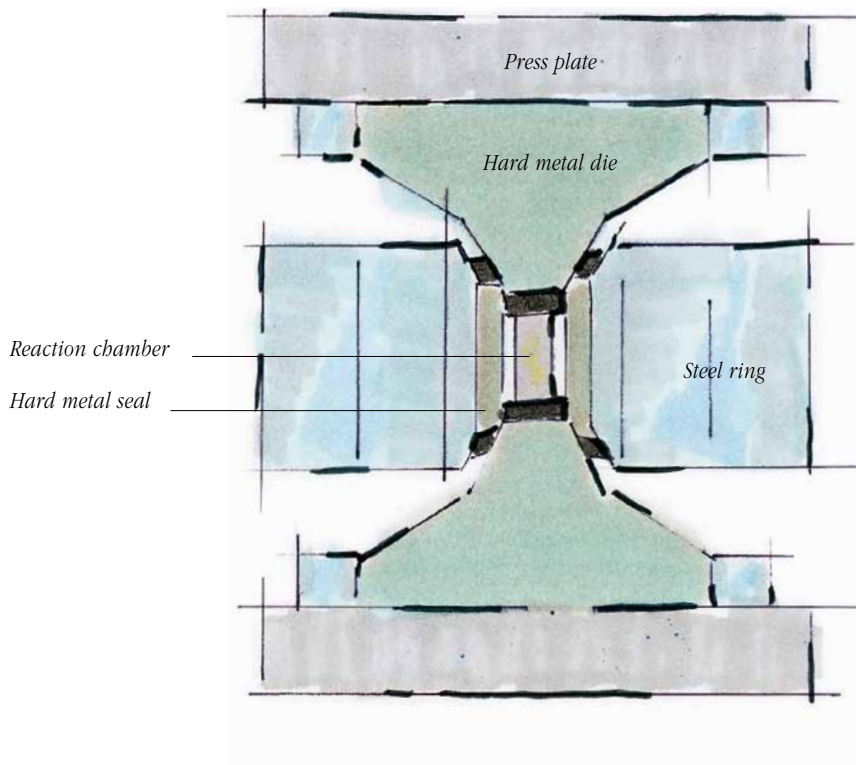


Putting our expertise to use.

We can target specific properties for the CBN and diamond grains by selecting the crystallization conditions in special synthesis reactors, an example of this, the belt chamber.

The shape and color are signs of various grain strengths and cutting and splintering behavior. We put our knowledge of these properties to good use.

*The belt chamber:
This is where the material
for superb grinding results is
created.*



*Irregularities:
The light, geometrically
irregular grain of medium
strength is suitable for
almost any application.*



*Blocky:
This dark, high-strength
grain is preferred for
internal grinding of hard-
ened steels.*



*Pointed:
Dark brown grains with
high thermal stability
cut hard-to-machine, hard-
ened steels.*



*Diamond:
Synthetic diamond grains
can be used to machine
hard, brittle materials such
as hard metal, ceramic, gra-
nite, and others.*

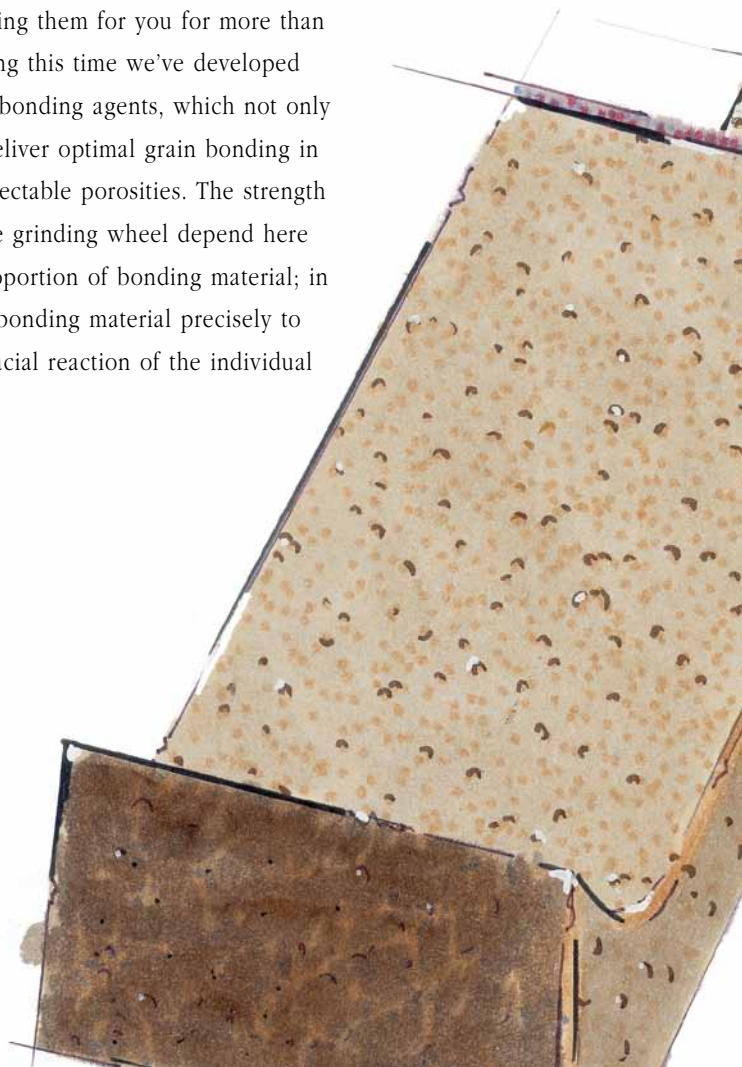


**A strong bond. So that every grain
does what it's supposed to do.**

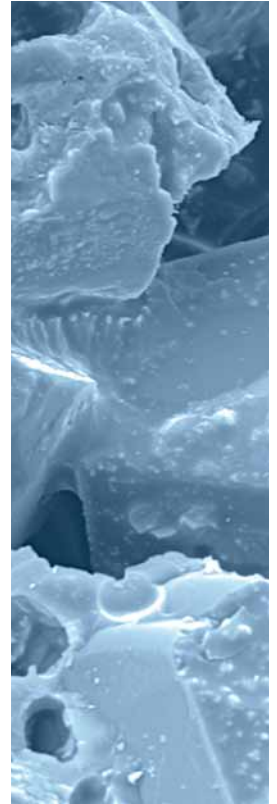
An abrasive material is only as good as its bond.

Outstanding wheel life, profiles that keep their profile, are easy to dress and true, with cool grinding and high cutting force. Benefits that are especially in demand in the automotive and roller bearing industries, in tool design and construction, and in making cutting tools. Our ceramic-bonded grinding wheels are distinguished by these properties and more.

We've been producing them for you for more than 20 years now. During this time we've developed numerous types of bonding agents, which not only promise but also deliver optimal grain bonding in a wide range of selectable porosities. The strength and hardness of the grinding wheel depend here not only on the proportion of bonding material; in fact, we adapt our bonding material precisely to the chemical interfacial reaction of the individual abrasive grains.



The sintered bond is soft and brittle and can be dressed with excellent results and minimal wear to the dressing tool.



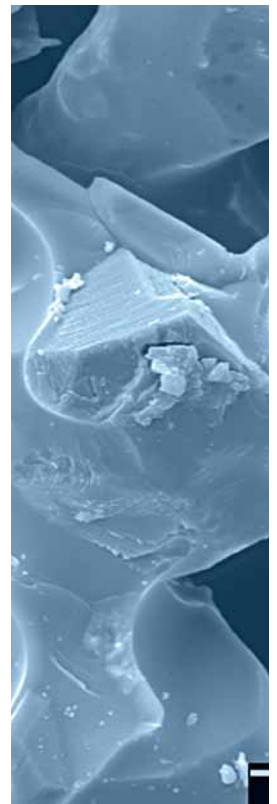
A matter of being well-adjusted: The vitrified bond and its structure.

You shouldn't have to adapt to our wheels – we adjust the bonding and thus the properties of the wheel precisely to your needs. Whether you need less fusible, soft and brittle wheels or fusible, hard and strong ones. Or anything in between – we adjust all that for you.

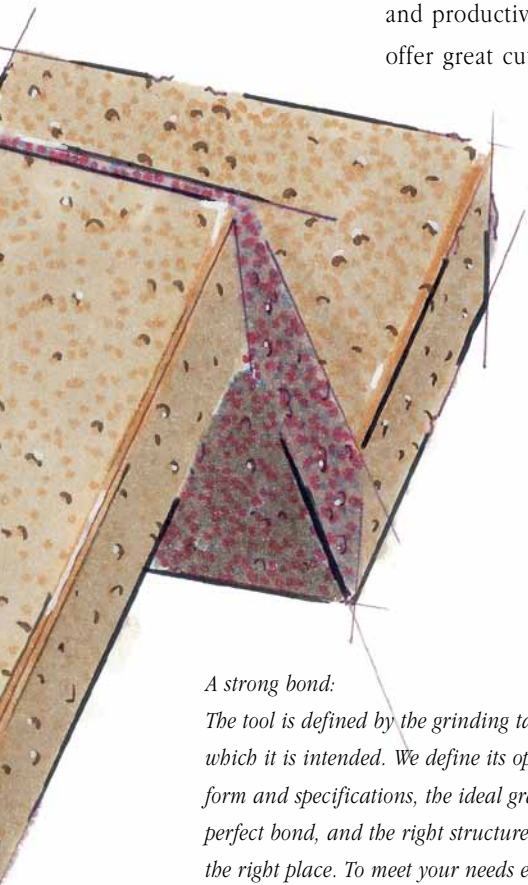
Being well-adjusted pays off: Our vitrified-bonded wheels are distinguished by their greater efficiency and productivity. Along with long wheel life, they offer great cutting performance at cool temperatures and without sharpening. And of course, they can also be easily tried with lasting results.

A clear result of a well-adjusted outlook: An uncompromisingly goal-oriented tool.

Good cutting properties. Due to the high grain protrusion with low bond content and high strength, it's one of the easiest tasks for the grinding wheel with a fusible bond.



*A strong bond:
The tool is defined by the grinding task for which it is intended. We define its optimal form and specifications, the ideal grain, the perfect bond, and the right structure in the right place. To meet your needs exactly.*



Your KREBS & RIEDEL grinding wheel starts out as grains and bonding material.

Solidly built. From the inside out.

To ensure this, we consider the tasks you assign to the wheel. We select the corresponding base structure and determine the appropriate active surface.

The base structure is of great importance at low cutting speeds as well. We select from a wide array of materials depending on the grinding and centrifugal forces, the heat build-up and dissipation, and the vibration of the machine and workpiece.

Grain size and concentration have a direct influence on the performance of the wheel and on the surface quality that can be achieved on the workpiece. As a rule, we use grains in the particle size range of 46–251 μm in accordance with FEPA.

Clear to see:

*Even at high speeds, the color coding
can be clearly distinguished.*



Wheels according to strength ranges:

Operating speed m/sec	Machining dimensions Ømm	Base structure
bis 63	bis 900	Ceramic, aluminum, steel, composites
80	20 – 750	Ceramic, steel, ceramic-steel
125	200 – 750	Ceramic-aluminum, steel
140	200 – 750	Ceramic-steel, steel
180	200 – 750	Ceramic-steel, steel

K&R base structure versions:

Base structure	Damping	Strength
Ceramic (standard)	Good	Moderate
Aluminium	Good	Good
Resinoid	Good	Good
Steel	Low	Excellent
Steel/ Ceramic bond	Good	Excellent

We manufacture grinding wheels – big and small. With outer diameters from 3 mm to 900 mm.



Naturally, we're also happy to supply you with pre-profiled wheels. This allows you save on the materials and time required for truing.



CBN/DIA grain sizes (in accordance with FEPA/DIN narrow, compared to international standards):

K&R diamond according to FEPA or DIN 848 narrow	K&R CBN according to FEPA or DIN 848 narrow	Nominal machine width according to ISO 565 (µm)	US standard ASTM E 11 70 Particle size (mesh)	Japan JIS 6002-63 Designation (µm)	GUS GOST 3647-71 Designation (µm)
D251	B251	212 – 250	60 / 70	250 / 210	250 / 200
D213	B213	180 – 212	70 / 80	210 / 177	250 / 200
D181	B181	150 – 180	80 / 100		200 / 160
D151	B151	125 – 150	100 / 120	149 / 125	160 / 125
D126	B126	106 – 125	120 / 140	125 / 105	125 / 100
D107	B107	90 – 106	140 / 170		100 / 80
D 91	B 91	75 – 90	170 / 200	105 / 74	
D 76	B 76	63 – 75	200 / 230	88 / 63	80 / 63
D 64	B 64	53 – 63	230 / 270		63 / 50
D 54	B 54	45 – 53	270 / 325	53 / 44	60 / 40
D 46	B 48	38 – 45	325 / 400	44 / 37	50 / 40
	B 30	40 – 25			40 / 28
D 25		52 – 32			

A classic: For wheels up to 400 mm with speeds of 63 m/s, we place what is usually a closed layer on a ceramic base structure.



The core of the wheel: Aside from classic ceramic, we also employ aluminum or steel materials and steel/ceramic composites.



K&R CBN/DIA concentrations:

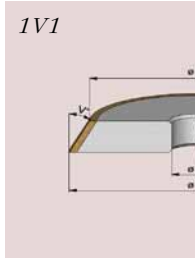
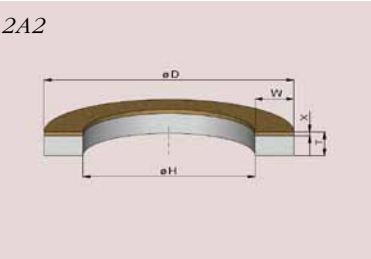
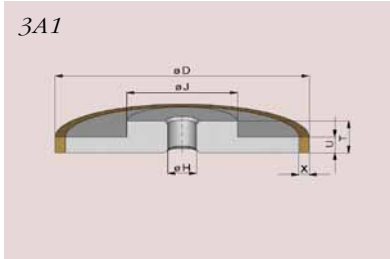
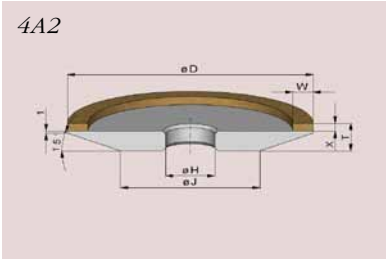
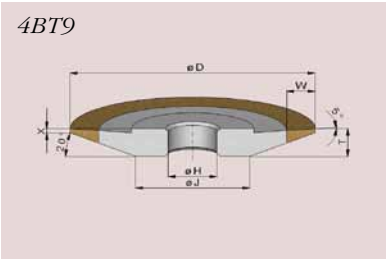
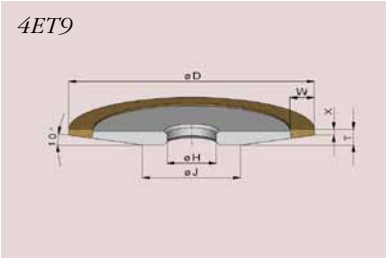
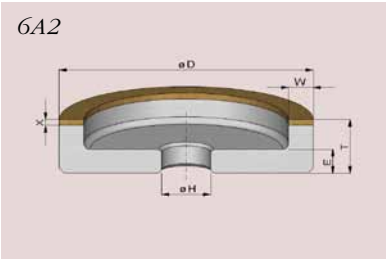
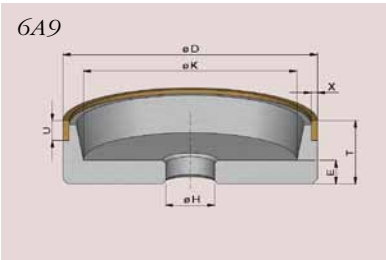
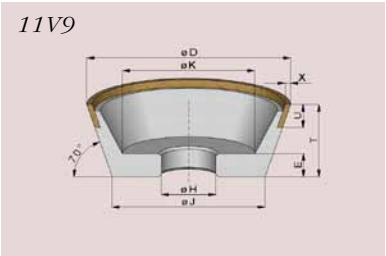
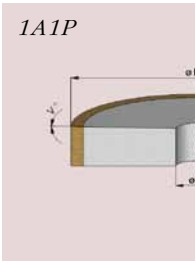
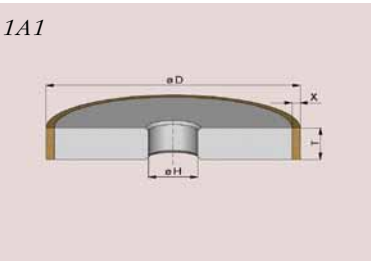
Concentration	Carat/cm ³	CBN volume %/ diamond, rounded
50	2,2	12,50
75	3,3	18,75
100	4,4	25,00
125	5,5	31,25
150	6,6	37,50
175	7,7	43,75
200	8,8	50,00

Rough, fast or special: We produce anything that is larger than 400 mm, has speeds up to 160 m/s or has a special a shape in segments on an appropriate base structure.



140 m/s

Form follows function.
A selection of wheel shapes in
accordance with DIN / ISO.



The wheel is round.

That's the one thing that all wheels have in common. Diameters and thicknesses, base structures and coating layers, as well as compositions and profiles are at least as diverse and often just as unique as the tasks and challenges they face.

Since we began producing vitrified-bonded diamond and CBN wheels, we've developed and produced countless special shapes.

Because wheels can vary widely, we place a priority on working with you to determine exactly what your needs are. What workpiece do you need to process on which machine, and what is the goal?

Then we construct a wheel for you that not only gets you close to your goal, but that actually lets you achieve it. Safely and efficiently. No matter what the wheels of the future will look like, you'll get the one you need from us.

Optimal performance, optimal benefits, and optimal efficiency.

Combined for strength: Machine, coolant, and grinding wheel.

You shouldn't use a compact car to tow a 60-foot yacht. Likewise, your machine and abrasive need to be compatible. In order to get optimal use from your CBN and diamond grinding wheel, you also need a certain amount of machine rigidity, the right guide mechanism, and spindle bearing arrangement. The ability to use a rotary dressing and truing system is a major advantage. You can use the abrasive more efficiently with the speed control of the grinding spindle and the use of oil emulsions or grinding oil as coolants.

As a rule, wet grinding is the method used, with plenty of coolant that should be fed and adapted to the contour, especially where profile wheels are involved. The influence that the amount of coolant and the feeding method used have on grinding results and efficiency should not be underestimated. While you may also use synthetic or semi-synthetic solutions, experience has shown that you can most effectively use the wheels with oil emulsions or pure grinding oil.

With dressing or truing you determine the precise geometric shape of your grinding wheel and ensure that your wheel runs perfectly true. With the correct parameters, you also achieve even better cutting properties for your wheel and can actively influence the actual surface roughness.

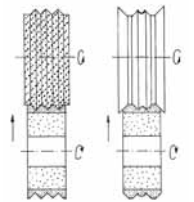
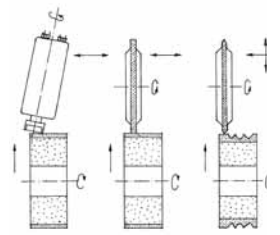
The infeed increments when dressing and truing are in the micrometer range. The wheels are then ready for immediate use, without further sharpening.

Rotary tools are ideal for dressing and truing. These tools run in the same or opposite direction depending on their task.

Crush dressing is a special form of dressing with steel rolls that allows tiny profile radii to be achieved. We employ a crushable bond for this purpose.

Naturally, we can also supply you with suitable dressing and truing systems for our wheels.

Please discuss your objectives with our application technology staff. That's the first step to achieving fantastic grinding results.



*Cool grinding is better grinding:
We recommend the use of oil emulsions or pure oil as a coolant under all circumstances.*

Intolerant and uncompromising.

Where quality is involved, we don't kid around. And we never have. We've been producing grinding wheels for more than 100 years now, and have produced CBN and diamond grinding tools for more than 20 years. Always under uncompromising quality criteria. From the idea to the finished product, from the receipt of the raw materials to the dispatch of the balanced wheels. From your first phone call to the service and consultation lasting long beyond the sale. We critically examine each step we take, and continuously integrate your ideas, desires, and objectives. Today, this is called "quality in process". To us, it's always simply been our way of doing business.

Our way of doing business also involves fulfilling the strictest national and international standards. Not only when it comes to product quality, but also where it relates to the environment and occupational safety.

We follow these unconditional quality standards not only where our CBN and diamond tools are involved, but also throughout our entire production range:

- Corundum and silicon-carbide wheels in ceramic and resinoid bonds and with outer diameters up to 900 mm for cylindrical grinding, surface grinding, tool grinding, centerless grinding, rough grinding, and more.
- Abrasive cutting wheels in a resinoid bond, with or without fiber reinforcement and up to 600 mm outer diameter for wet and dry chop cutting, for pendulum and rotary cutting, and more.
- Rough and pendulum grinding wheels with and without fiber reinforcement for contract blast cleaning and for foundries, for pendulum grinding machines, wheel stands, grinding manipulation, and more.







Always the right tool for every task.

We've been developing and producing CBN and diamond tools for more than 20 years. This experience and visionary far-sightedness are our foundation for continuous innovation. Our service is based on our unconditional desire to always be able to offer you the ideal solution for your task.

Our well-grounded expertise in materials, processes, and machining equipment allows our application technicians to provide you with extensive, precise consultation and assistance, from the planning phase on. Through all the usual channels of communication, here at our facilities or at yours. Anytime.

Unusual applications represent an especially exciting challenge for us. We conduct tests along with you whenever needed, until we've developed the solution that precisely meets your requirements.

We look forward to seeing you!



KREBS & RIEDEL *Schleifscheibenfabrik GmbH & Co. KG*
Bremer Straße 44, 34385 Bad Karlshafen, Germany
Telephone +49 (0)56 72 184 0, Fax +49 (0)56 72 184 218
mail@krebs-riedel.de, www.krebs-riedel.de