

**Conventional grinding tools
from KREBS & RIEDEL**

Diversity meets perfection.



**Tell us what you want to grind
– we will supply the wheel.**



All-round: all of our tools, whatever the shape or process, have one thing in common: they grind – and they help you reach your targets safely and economically.

Perfection for every process.

Every product demands its own particular process, and every process tends to have its own set of variables. We will supply you with precisely the wheels to match.

Cylindrical grinding, the most common process. It is used to machine rotationally symmetrical workpieces of varying sizes and materials, inside and outside. This may be anything from tiny parts for use in engines, all the way to enormous rollers, weighing tons, used in the paper industry. We can supply you with wheels in the dimensions, composition and hardness you require ... and that produce ultra-precise results.

Surface grinding is used mainly in the manufacturing of tools and moulds. Surfaces are machined plane parallel to the circumference of the wheel or its face. The growing diversity of materials involved demands effective, innovative and always lucrative solutions – all of which we have for you.

Creep feed or deep grinding usually produces a tool in one single procedure. We have the right tools to cope with large amounts of grinding performed in small infeed increments – in other words, large contact arcs between the workpiece and the grinding wheel. Highly porous and quick cutting, they make this process fast and profitable.

Profile grinding processes perimeters using profiled wheels. The workpiece, which could be a threaded or geared tool, defines the shape, structure and specifications of the wheel. For example, we use grain sizes and bonds adapted to radii and profiles. We can pre-profile these quick-cutting, dresser-friendly wheels for you – which saves you time and expense when setting up your system.

Roll grinding is a process that involves intensive levels of grinding. Different rollers made from very different materials and in different sizes always require the right wheel. What remains the same, however, is the defined surface quality that you will achieve using our tools. Our ceramic-bonded CBN wheels are often a more economical alternative for roll grinding.

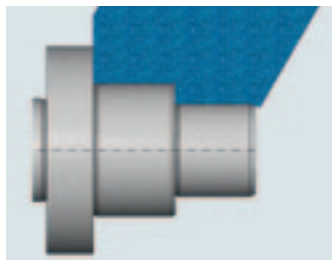
Abrasive cutting, an extremely powerful process for use on a wide range of materials and with a wide range of machinery. These very thin wheels, which may or may not be reinforced with fibres, can be used universally for wet and dry cutting. And they are always much more profitable than alternative processes such as sawing.

Rough grinding – the process for all things coarse. The machining speed is more important than the surface quality when it comes to deburring, grinding down and cleaning. For this application we can supply you with coarse, resin-bonded wheels – fibre reinforced if high machining speeds are involved. There's no burr our wheels can't cope with.

Tool grinding usually means cutting special steels into the right shape – accurately. For this purpose we can supply you with a wide range of suitable grinding cups, plates and bevelled wheels for the production of tools. Show us your tool and we will provide you with the ideal grinding solution.

Whatever you want to manufacture, and whatever process you want to use, we can make the perfect tool for it.

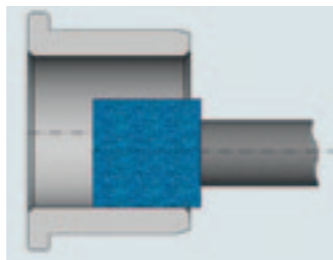
Delicate: because of the small contact zone on the end-face, angular plunge-cut grinding involves working at low pressure.



Keep in shape: with our tools your grinding will remain reliably plane-parallel, even over very large areas.



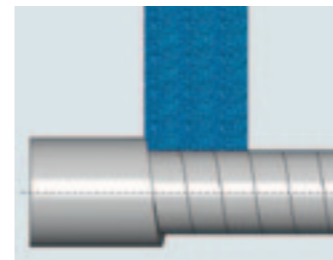
Round means round: cut using our tools, drilled holes really are round and surface finishes really are perfect.



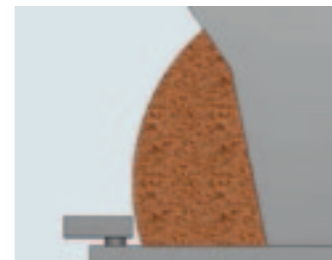
Get straight down to work: we can pre-profile your wheels for profile grinding – leaving you hardly anything to do when setting up.



Large or small, soft or hard: we have a comprehensive, all-round range of products for a host of exterior cylindrical grinding purposes.



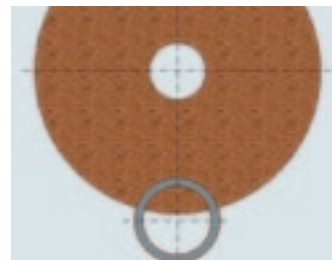
Bigger is better: at least it is in the world of rough grinding. Our wheels remove enormous amounts of material at high speed.



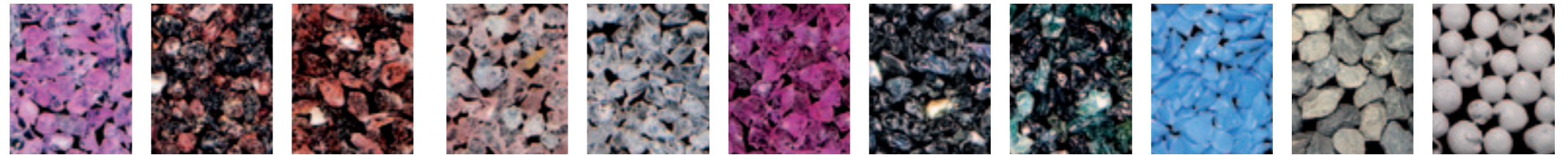
Big pores, big results: our deep-grinding wheels remove a lot of material quickly and precisely.



Thin but strong: two essentials for economical and precise abrasive cutting.



Little grains, big effect.



40A: Special fused pink aluminium oxide. Very hard and brittle, for hardened steels and alloys.

10A: Regular aluminium oxide. Hard and tough, for rough grinding and abrasive cutting of low-alloy steels.

15A: Semi-pure aluminium oxide. Less tough, very sharp, for thermally sensitive steels.

31A: Single-crystal aluminium oxide. Very hard and tough, for high-alloy hardened tool steel.

35A: Special fused white aluminium oxide. Very hard and brittle, for low- and medium-alloy steels.

47A: Special fused ruby aluminium oxide. Hard and very tough for hardened steels and hard chrome.

50C: Silicon carbide black. Very hard, brittle, pointed, for cast iron, non-ferrous metals and mineral materials.

57C: Silicon carbide green. Very hard, brittle, pointed, for high-speed steels, glass, ceramic and brittle materials.

70A: Microcrystalline sintered aluminium oxide. Very hard and sharp, for hardened, alloyed steels. Alternative to CBN.

80A: Zirconium aluminium oxide. Extremely tough, sharp, aggressive, thermally unstable, for grey cast iron and cast steel.

33A: Hollow-ball aluminium oxide. Very hard, often used for additional pore formation. For very soft materials such as wood and rubber.

Where even regular is special.

Regular, semi-pure and special fused aluminium oxides are suitable for almost all grinding tasks. They are produced from raw materials at temperatures of more than 2,000°C. The way they are manufactured, and the way they are processed thereafter, determines the hardness, toughness and structure of the grain.

When these aluminium oxides are subsequently crushed and treated thermally and mechanically, possible defects in the crystal lattice are rectified and the block-like, cuboid grains are produced. With these aluminium oxides you are ready for almost anything.

Once sharp – always sharp. Single-crystal and sintered aluminium oxide.

To produce single-crystal aluminium oxide, single grains are crystallised out, which then have a more closed structure. The speed at which the molten material is cooled controls the resulting grain size very accurately.

Sintered aluminium oxide has a very fine crystalline structure. During grinding, tiny crystals are broken away from the surface so that the grinding wheel always remains very sharp. Sintered aluminium oxide wheels generally grind at a lower temperature and for longer, and are used in situations in which CBN wheels would be uneconomical or technically impossible to use.

Silicon carbide – few things are harder.

Silicon carbide is made from coke and quartz sand at temperatures above 2,000°C – and it's green and black at the same time. The green silicon carbide is hard to beat in terms of purity and hardness, and chemical processes can also be used to improve its quality further still, enabling the grinding of substances such as glass and ceramic.



The mixture is the key.

Every grain has its own particular properties – and we know them well. We draw from the numerous varieties we have on hand, to produce precisely the grinding result you want.

Face to face: at an angle of what is usually 30 degrees, less pressure is exerted on the workpiece. We do everything to ensure that you always have exactly the grinding wheel.

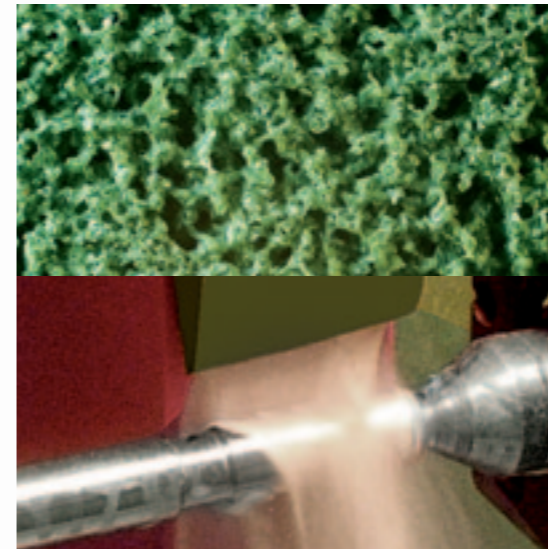
**Staying connected.
A symbiosis of grain and bonding.**

**Elastic – and always sharp.
Synthetic-resin bonding.**

Synthetic resin provides an elastic and interlocking binding for the grinding grains. This bonding also allows the wheels to be self-sharpening, which means we can produce wheels reliably using very coarse grains. This bonding hardens at 170°C to 200°C, which means we can make full use of all of the properties of every different type of grinding material. This kind of bonding is especially suitable for temperature-sensitive zirconium aluminium oxide, with its very high rough-grinding performance.

Additives are used to carefully control toughness, abrasion resistance and grinding behaviour. Each grinding grain remains in the bond only exactly as long as it is performing to its fullest. For very high cutting speeds and high-performance rough grinding and abrasive cutting, we reinforce our tools using glass fibre.

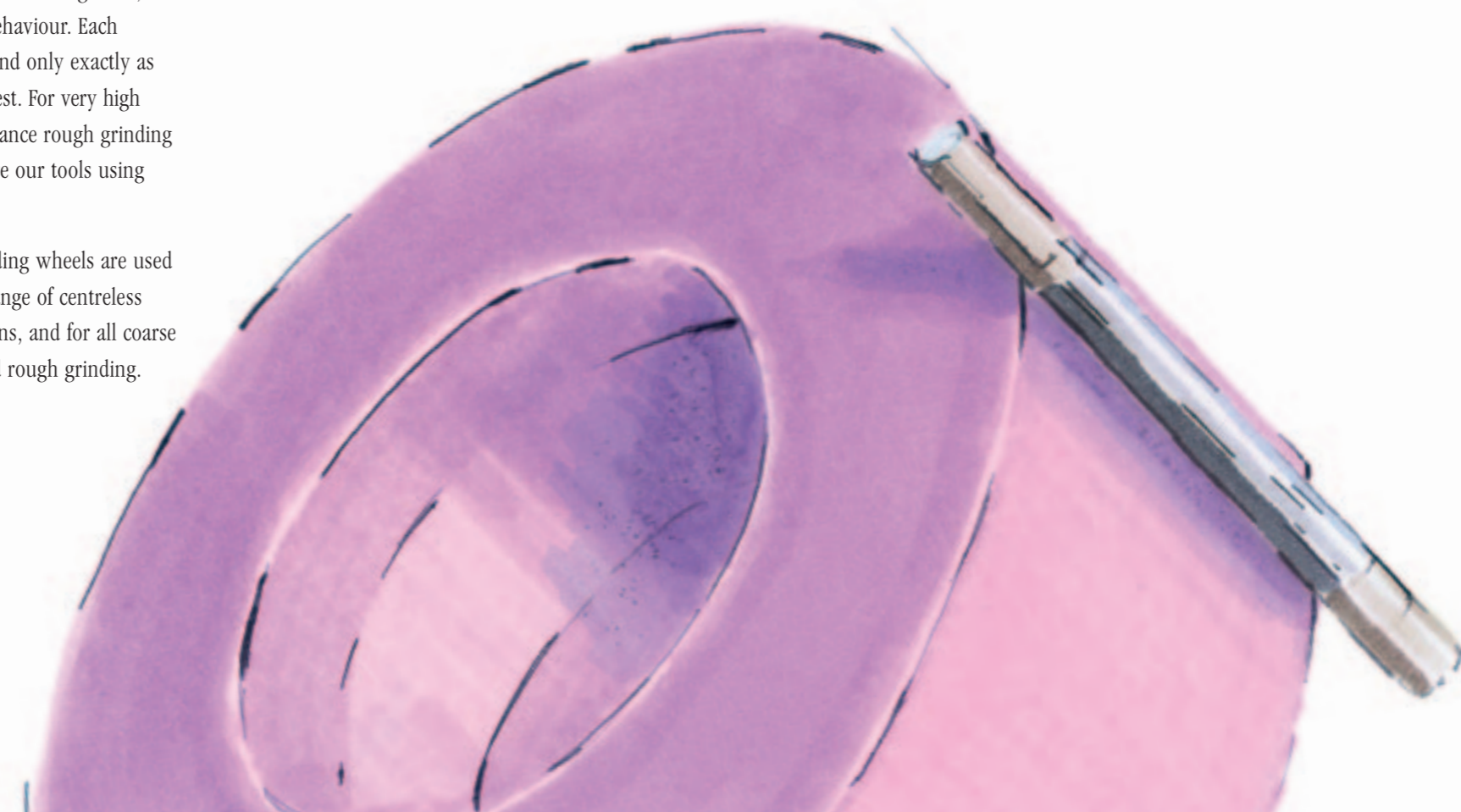
Our synthetic resin bonded grinding wheels are used for precision cutting in a wide range of centreless and cylindrical grinding operations, and for all coarse processes in abrasive cutting and rough grinding.



**Brittle-hard to soft.
Ceramic bonding.**

Our ceramic bonded wheels are dimensionally stable and high performance, and they are suitable for all precision grinding processes. We produce wheels with melt-vitrified bonding or sintered bonding to enable you to perfect your applications. Sintered bonding enables particularly gentle grinding of tools. Melt-vitrified bonding allows for high machining performance combined with cool, fast grinding.

And of course we have gone a long way to meeting the growing demand for faster-cutting wheels that come with exceptional machining performance, hardness and sharpness. One of our specialities in this regard is high-porosity wheels. These tools combine what appear to be contradictory properties: using a minimum of bonding we anchor a maximum of grinding grains in a very open structure. The result is tools that are excellent at grinding difficult specialised steels such as those used for making turbine blades in jet engines.



Quality + cost = economy: our equation adds up because we design our wheels precisely according to your specifications.

**Customised wheels.
More than the sum of their parts.**

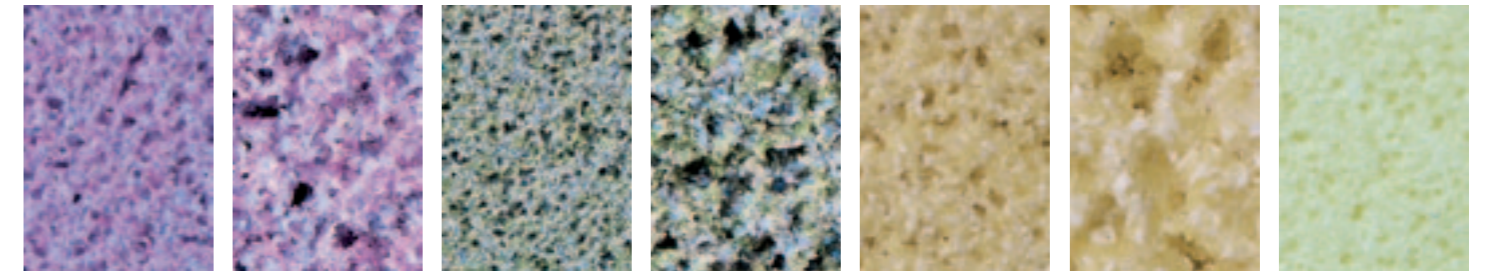


A wheel is not always just a wheel. Depending on the process involved, a wheel can sometimes consist of segments.

Simple wheel – complex tool.

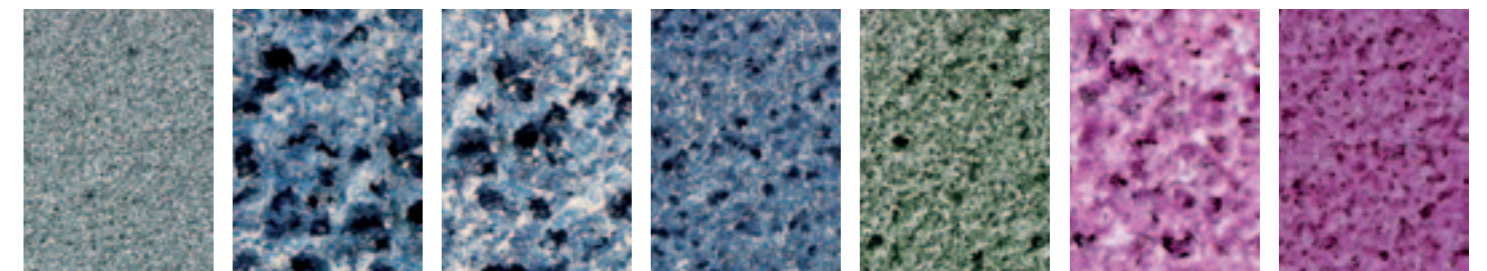
It all starts with the demands you place on our wheels. We use aluminium oxide or silicon carbide in a range of grain sizes, bonding types, additives and pore-forming substances to build your wheel. Grain size and type influence the surface quality that you achieve. The bonding component, the compression level, the grain structure, the firing temperature and duration – all of these ensure the correct hardness. Pore-forming materials combined with the right amount of pressure give the wheel the structure it needs. And of course, all of these factors also interact on one another.

We can draw from all of our experience and more that 60,000 recipes in order to make the right wheel for you – and if yours is not among them, we will develop it for you.



Grain size, FEPA Series F	Grain group	Average nominal grain ϕ in μm
12	very coarse	1765
14	coarse	1470
16	coarse	1230
20	coarse	1040
24	coarse	745
36	medium	525
40	medium	438
46	medium	370
54	medium	310
60	medium	260
70	medium	218
80	medium	185
90	medium	154
100	medium	129
120	fine	109
150	fine	82
180	fine	69
220	fine	58
240	very fine	44,5
280	very fine	36,5
320	very fine	29,2
400	very fine	17,3

Coarse or fine: the grain diameter determines the quality of the surface finish. We are very careful to make sure that coarse particles do not find their way into fine.

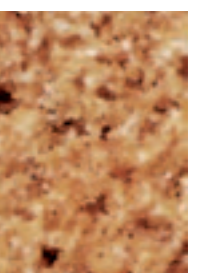


Hardness	Category
A B C D	extremely soft
E F G	very soft
H I J K	soft
L M N O	medium
P Q R S	hard
T U V W	very hard
X Y Z	extremely hard

Hard or soft: this is often a matter of taste, since the same results can be achieved in different ways. For instance: faster or cooler. Please speak to our application technicians.

Grain structure	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 ...	
Denser	Less dense

Open or closed: less dense wheels take a lot of coolant and cut large volumes away quickly. Dense structures last for a long time, for applications such as profile grinding. Whatever the case, we will find the optimum solution for your application



From silo to shipment.

Quality step by step.

Mixing, pressing, firing – we don't make things easy for ourselves. Of course, we begin by weighing all of our components very carefully in accordance with the recipe. When it comes to mixing we go to great lengths. The ingredients have to be distributed absolutely evenly, and every grain must be enveloped with temporary adhesive. Only that way can you produce a wheel that grinds well all round.

A precise quantity of the prepared mass is distributed completely evenly in the mould, and pressed in always using the same pressure. Irregularities would cause imbalance or differences in hardness – things you will never find in our wheels.

Gram by gram: we are fastidious even at the weighing and mixing stage.



Evenly does it: how the mould is filled determines how round the wheel will be.



Always the same: all of our tools are absolutely reproducible.



Each to their own: we know our wheels' favourite temperatures down to the degree.



In perfect shape: we can of course shape your tools exactly the way you want them.



From round to really round: precision even at extremely high speeds is essential for precise grinding results.



No debate: we don't do seconds. Our wheels are perfect – or they're not our wheels.

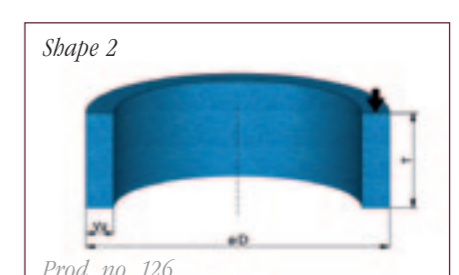
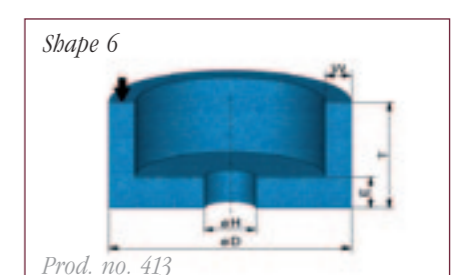
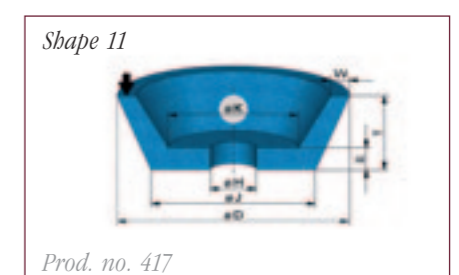
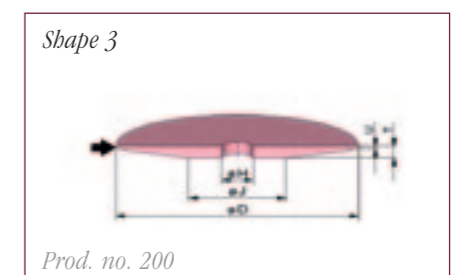
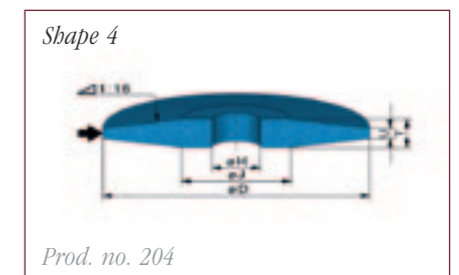
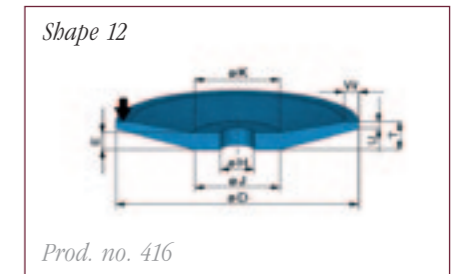
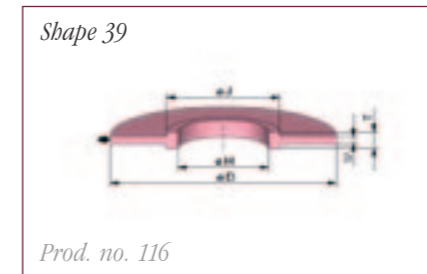
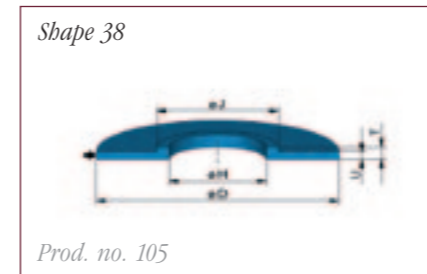
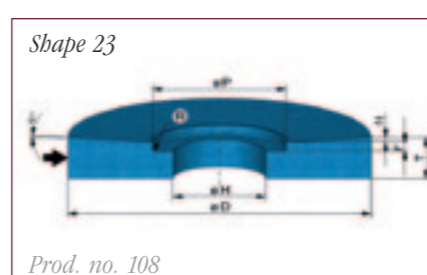
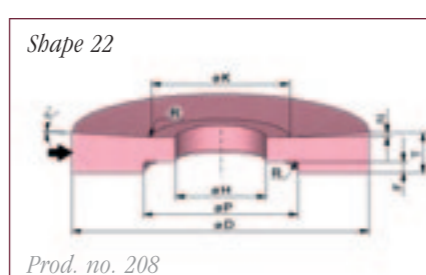
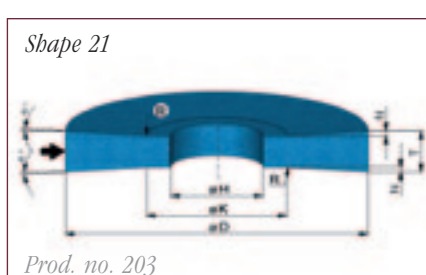
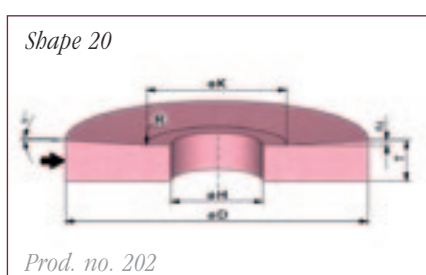
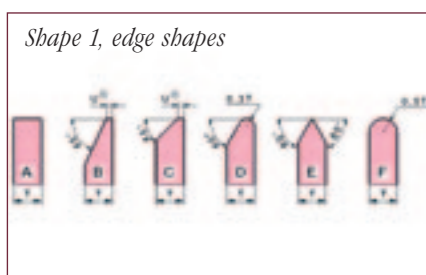
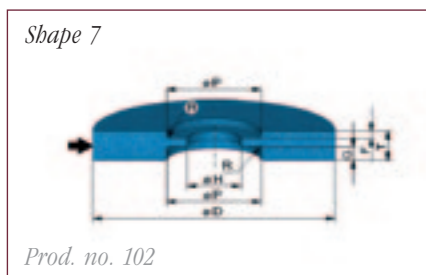
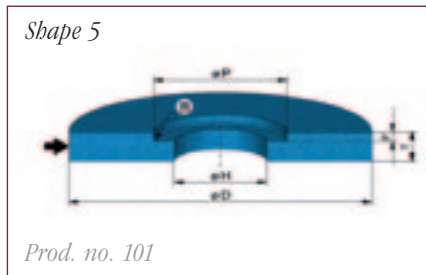
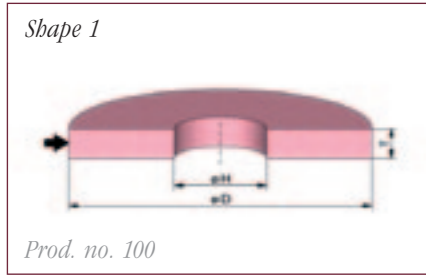
Because of our quality standards, the fired or hardened wheels are still far from finished. We balance them and give them their precise final shape on special machines, exactly in accordance with your requirements.

Not until they have been tested once again very carefully for quality may the tools be sent off to you – and always on time.

Timing: even while we are mixing, we already know when you will receive your tools.



**Whatever the complexity
– it's a done wheel.**

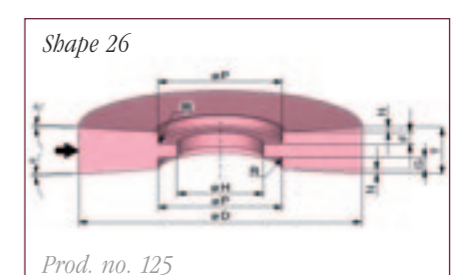
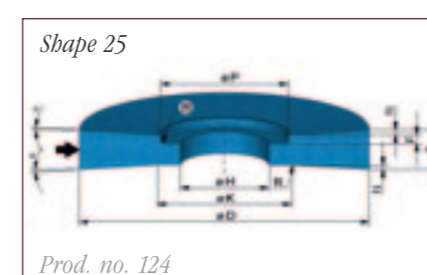
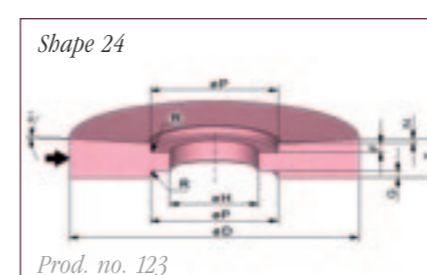


DIN ISO 525 – and much more.

Standards like DIN ISO cover many eventualities – and it's a good thing they do. That is why we have a comprehensive range of products that comply with (and often exceed) these standards in formats ranging from 50 mm to 900 mm.

Many things, however, are too specialised or unusual to fall within standards. This may include special shapes or unusual mixtures, rare structures or unique compositions.

We can naturally produce any grinding tool, even if not standard-compliant, in order to meet your challenge. The only thing that then still comes as standard across the board is precise fulfilment of your requirements, the utmost dependable quality, and punctual delivery of the right quantities.



**Every wheel
has a business card.**



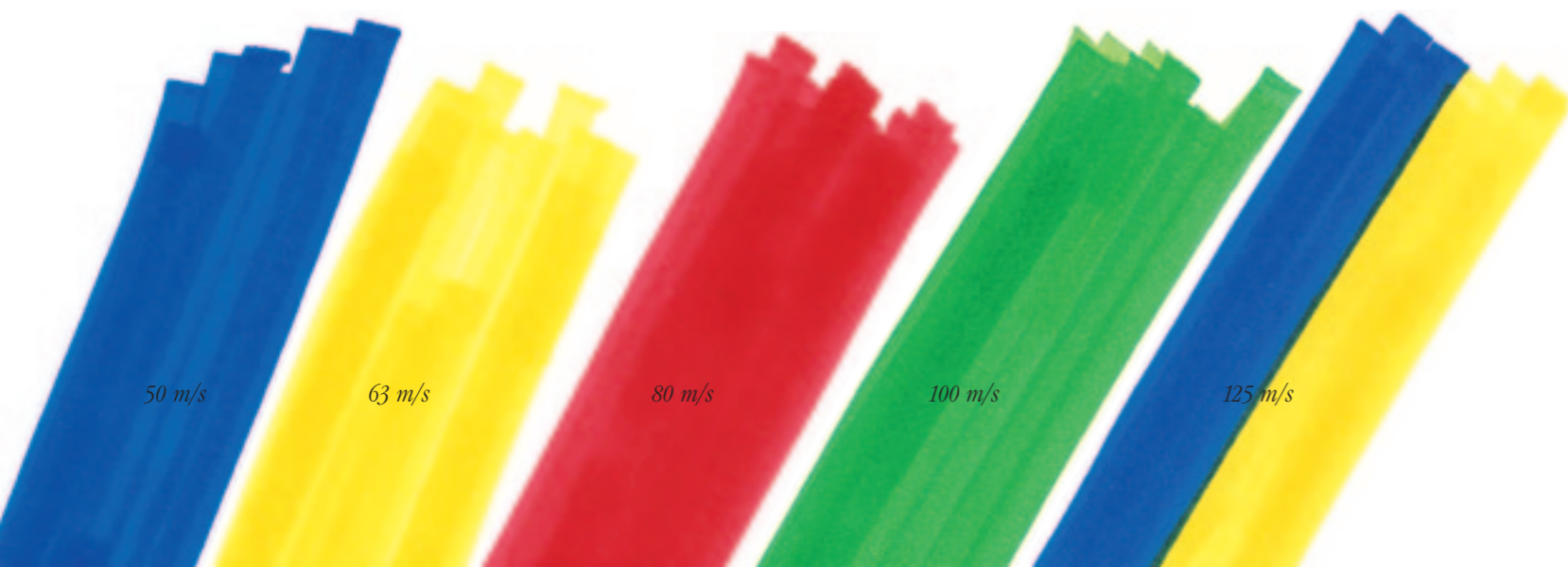
Read the signs – read the wheels.

We use a clear set of symbols and designations to ensure that every wheel performs its work perfectly on the right machine and at the right speed.

Each label includes all of the necessary information, from the dimensions to the test stamp. Maximum circumference speeds are also highlighted such that you'll even see them at 125 m/s!

This makes it almost impossible to get tools mixed up, so nothing can get in the way of perfect results.

Easy to recognise: our colour coding is clear to see even at high speed.



50 m/s

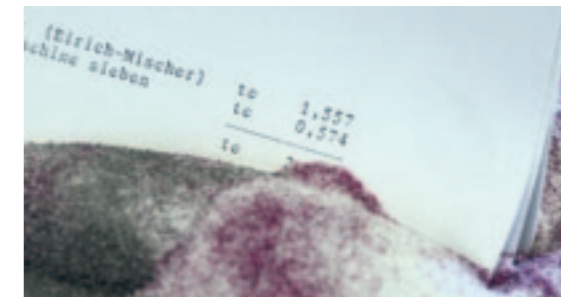
63 m/s

80 m/s

100 m/s

125 m/s

Designation	Grinding material mixture
10A	Regular aluminium oxide
15A	Semi-pure aluminium oxide
23A	Semi-pure aluminium oxide blend
24A	Semi-pure aluminium oxide blend
31A	Single-crystal aluminium oxide
33A	Spherical aluminium oxide
35A	Special fused white aluminium oxide
37A	Special fused white aluminium oxide blend
38A	Special fused white aluminium oxide blend
40A	Special fused pink aluminium oxide
43A	Special fused pink aluminium oxide blend
45A	Special fused pink aluminium oxide blend
47A	Special fused ruby aluminium oxide
60A	Special fused aluminium oxide
61A	Special fused aluminium oxide blend
66A	Special fused aluminium oxide blend
67A	Special fused aluminium oxide blend
70A	Sintered aluminium oxide
71A	Sintered aluminium oxide blend
74A	Sintered aluminium oxide blend
77A	Sintered aluminium oxide blend
80A	Zirconium aluminium oxide
81A	Zirconium aluminium oxide blend
82A	Zirconium aluminium oxide blend
50C	Silicon carbide black
57C	Silicon carbide green



In writing: to ensure that what it says on the wheel is actually in the wheel, we are very careful about mixing – and about mixing

Using the whole potential of every wheel.

Good for the tool. Even better for your results.

OK, you've got the right tool for the right material fitted to right machine.

There are a few more details to watch out for in order to achieve the best possible results all round. First, check the wheels for possible transport damage before mounting them on your machine. By tapping them lightly you can hear whether they're healthy or not: defective wheels sound dull and rattle, and may on no account be used. Flange-mount the wheel between clean flanges in such a way that it is not subjected to any uneven pressure. You then check the wheel for any imbalances, using diamonds at operating speed, to check whether it is running round and plane. Now you're ready to go.

Plenty of cooling lubricant – ideally supplied in accordance with the wheel shape – not only achieves better results, it also significantly increases the lifespan of your wheel.

As with good food, it's the interplay between carefully selected ingredients that produces a good outcome. Please ask our application technicians what they recommend.

Pays off twice over: with the right cooling lubricant you can achieve better results at lower cost.

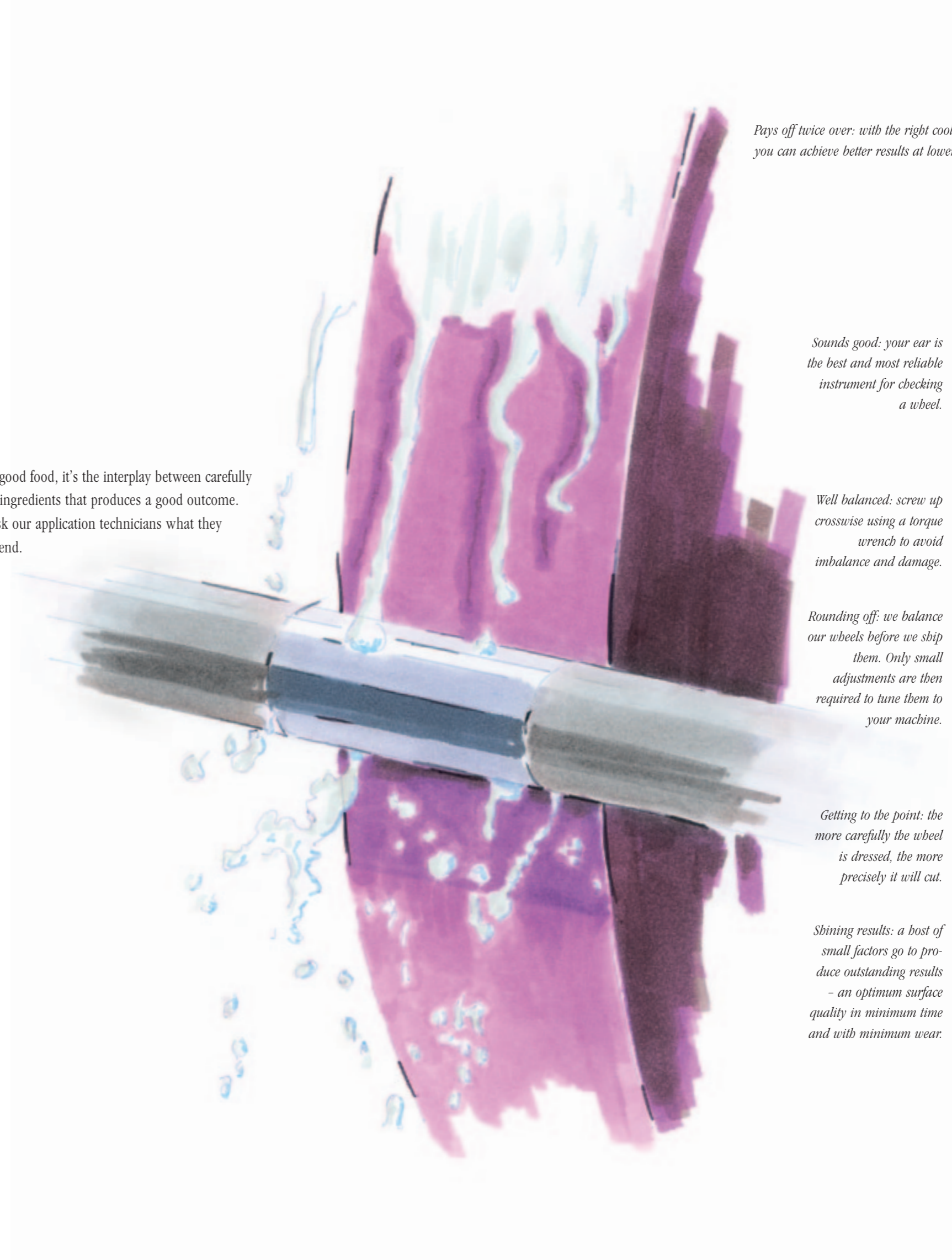
Sounds good: your ear is the best and most reliable instrument for checking a wheel.

Well balanced: screw up crosswise using a torque wrench to avoid imbalance and damage.

Rounding off: we balance our wheels before we ship them. Only small adjustments are then required to tune them to your machine.

Getting to the point: the more carefully the wheel is dressed, the more precisely it will cut.

Shining results: a host of small factors go to produce outstanding results – an optimum surface quality in minimum time and with minimum wear.



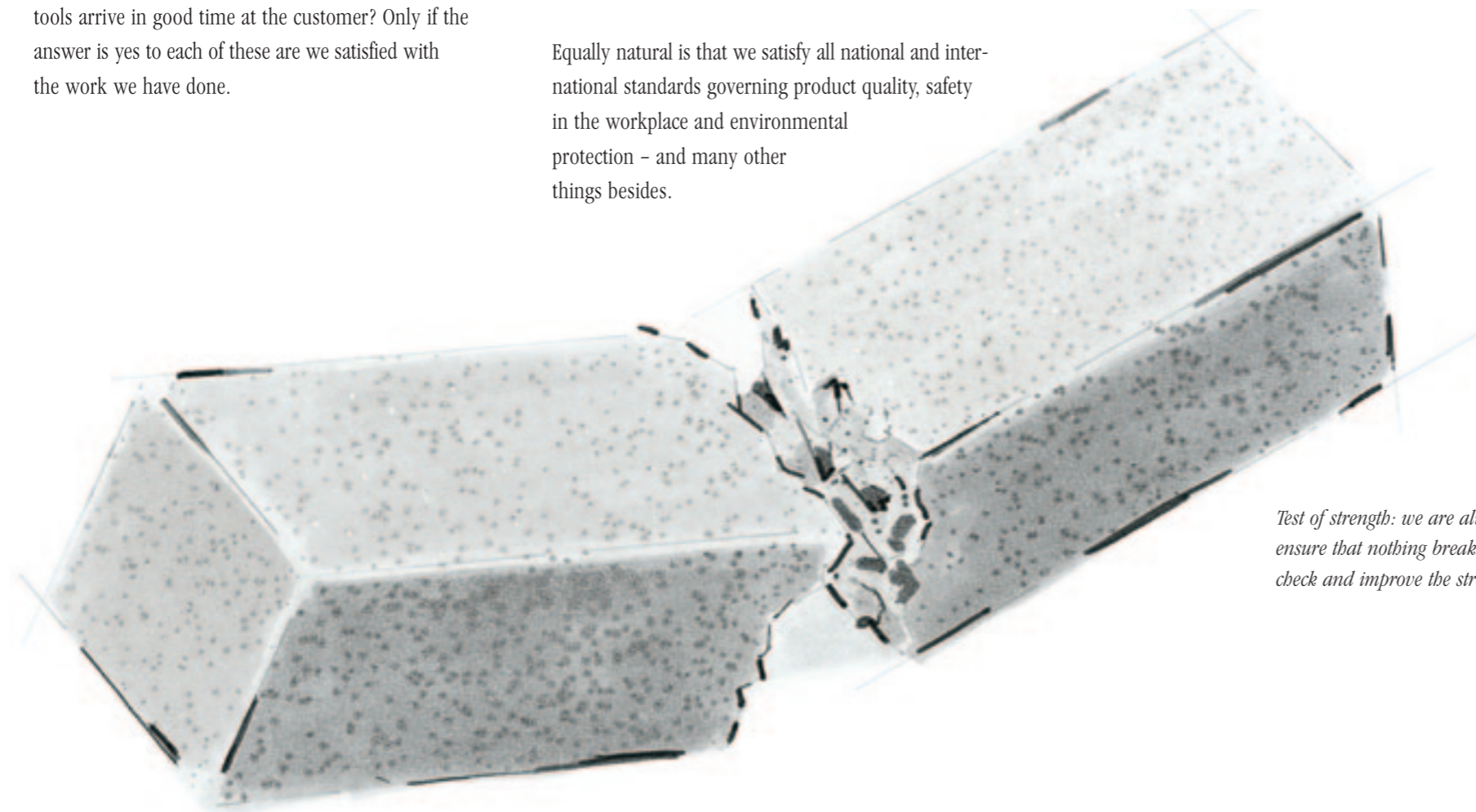
In our wheels, every grain counts.

From the raw material, to your machine.

Behind every wheel is of course the latest technology. That, however, is only any use if operated by skilled and committed people. Our staff love their work and have fun doing it, but they never take things lightly when it comes to the absolute quality of every single wheel – however small. That begins by critically testing incoming raw materials. Every single step of production is monitored uncompromisingly. Are the mixture and distribution just right? Are the pressure and firing temperature absolutely on target? Did the tools arrive in good time at the customer? Only if the answer is yes to each of these are we satisfied with the work we have done.

Even once your wheel is mounted on your machine, our 'Quality in Process' is still far from over. Your experience, suggestions and aims all flow continually into our work. After all, we want our range to keep getting better from your point of view. Furthermore, our application technicians don't stop advising and assisting you once you have purchased your wheels. We of that we consider a challenge: we consider it a normal part of being a partner in your production process.

Equally natural is that we satisfy all national and international standards governing product quality, safety in the workplace and environmental protection – and many other things besides.



Test of strength: we are always breaking things to ensure that nothing breaks at your end. We constantly check and improve the strength of our wheels.

Pen pushing: test results are carefully documented. Random samples are taken from large batches, special customised wheels are checked individually.



Round alone is not enough: all of the dimension have to be just right, and are checked within narrow tolerances.



Good vibrations: the e-module checks the density and hardness of the wheel.



No one is more German than the Germans: the German TÜV testing organisation has certified our company for its quality.



Matter of course: we comply with all of the relevant international standards in every respect.



K + R = R + D.

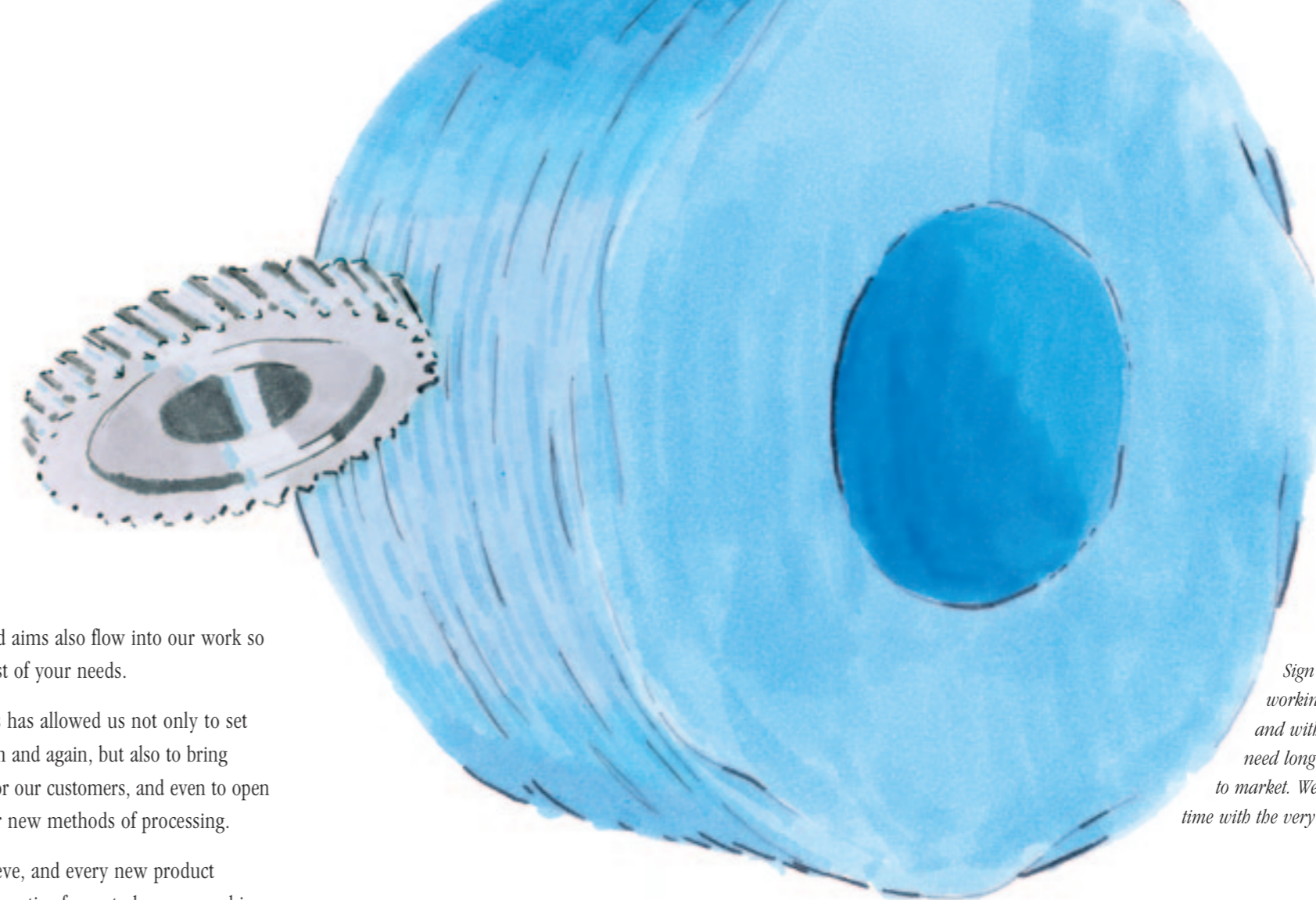
R + D = Reflection and dedication.

All of our staff are dedicated and inquisitive – but some especially so. In our laboratory and testing facilities, our development engineers not only test and modify our own existing products in order to improve them, they also get hold of every conceivable new material and work out how best to process it. This may be a new kind of special steel such as that used for turbine blades, or increasingly popular ceramic materials and plastics.

Your experience and aims also flow into our work so that we keep abreast of your needs.

Over the years, this has allowed us not only to set new standards again and again, but also to bring increased benefits for our customers, and even to open up new avenues for new methods of processing.

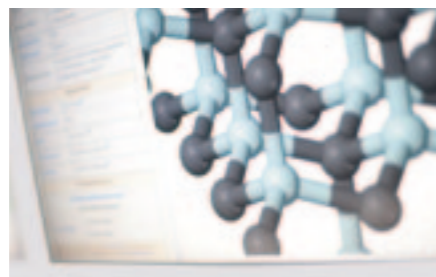
Every goal we achieve, and every new product we develop, is an incentive for us to keep researching, open to every challenge that may come along.



Sign of the times: we are always working with the latest materials and with new processes so that we don't need long to respond when they come to market. We will always supply you in good time with the very latest tools.



Progressing together: our development engineers are good at listening. Your experience and aims flow into their work. This means you will have exactly the right tools you need in the future to get the job done.



To achieve big things you need to look at the details: the structure of abrasive bodies provides us with clues about the performance of future grinding materials.



Ink is an important ingredient in modern abrasive materials: we work through numerous possibilities on a theoretical level in order to minimise the number of errors and arrive at a finished product as quickly as possible when it comes to trying things out in practice.



The fate of creative people: ideas don't just materialise between 9 and 5 – and they hardly ever arrive when you're at your desk. In that sense, our engineers are working for you practically around the clock, 365 days a year.



We need to know exactly: do our crystalline structures behave the way we expect them to long term and under load? We look very closely to ensure that 1 µm does not impact on a wheel measuring 900 mm across.



Theory is only the beginning: to arrive at series production, our tools first have to prove themselves in tough everyday environments by achieving the required results – or surpassing them. This we test on our specially constructed grinding wheel test machine in our factory.

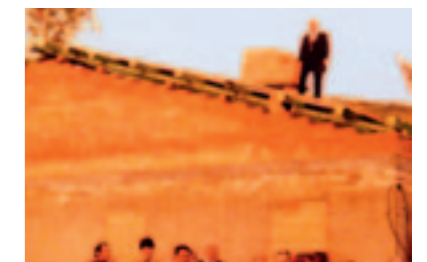
**Millions of wheels of experience.
And more by the day.**

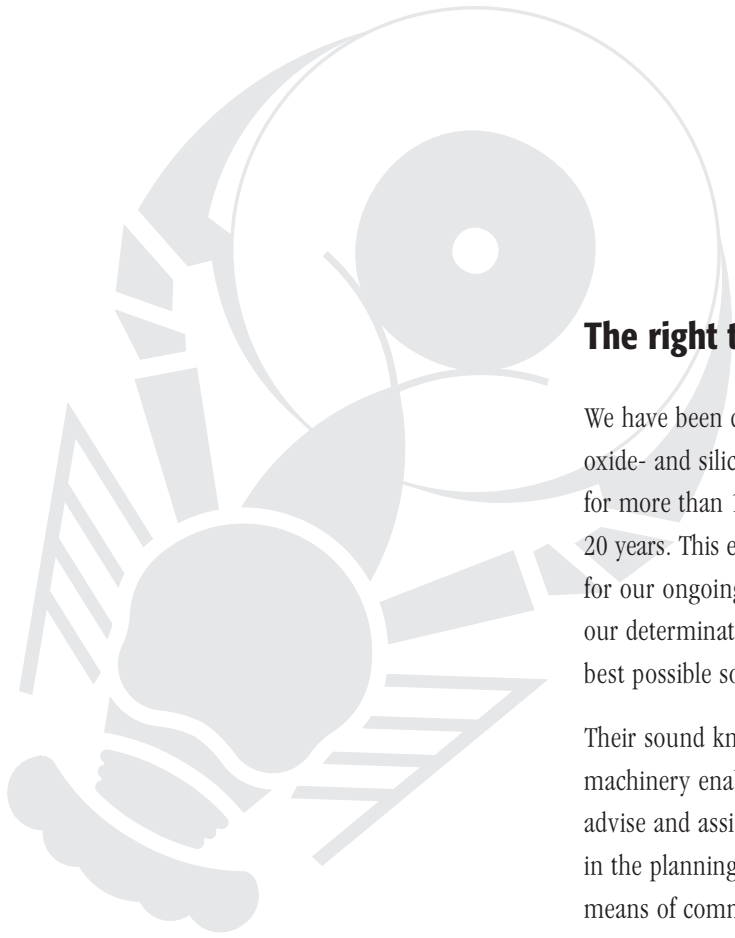
The future is part of our tradition.

Ever since Krebs & Riedel was founded in 1895, new things have always fascinated us. We have often conceived of the unthinkable, and we never automatically consider the first thing to be the best. The aim of providing you with the best tools has always been the driving force behind all the areas of our company. Some say that we pursue that aim too stubbornly and seriously, but we believe that is only natural.

Even in hard times, we do everything to retain our staff, since it is they who guarantee that we can always deliver the perfect tools reliably, punctually and safely.

Nor do we compromise when it comes to advising you. We are there for you from the first phone call onwards, and - of course - long after the wheels have been fitted to your machines.





The right tool for every occasion.

We have been developing and producing aluminium-oxide- and silicon-carbide-based grinding wheels for more than 100 years, and CBN tools for more than 20 years. This experience and vision forms the basis for our ongoing innovation. Our service is driven by our determination to provide you always with the best possible solution for your tasks.

Their sound knowledge of materials, processes and machinery enables our application technicians to advise and assist you with great precision, including in the planning phase. This they do using every means of communication that we and you possess, and at all times.

Unusual cases are a challenge that we particularly relish. If necessary, we will perform testing together with you until we have developed a solution that exactly meets your requirements.

We look forward to hearing from you.



KREBS & RIEDEL *Schleifscheibenfabrik GmbH & Co. KG*
Bremer Strasse 44, 34385 Bad Karlshafen, Germany
Telefon +49(0)56 72 1840, Fax +49(0)5672 184 218
mail@krebs-riedel.de, www.krebs-riedel.de