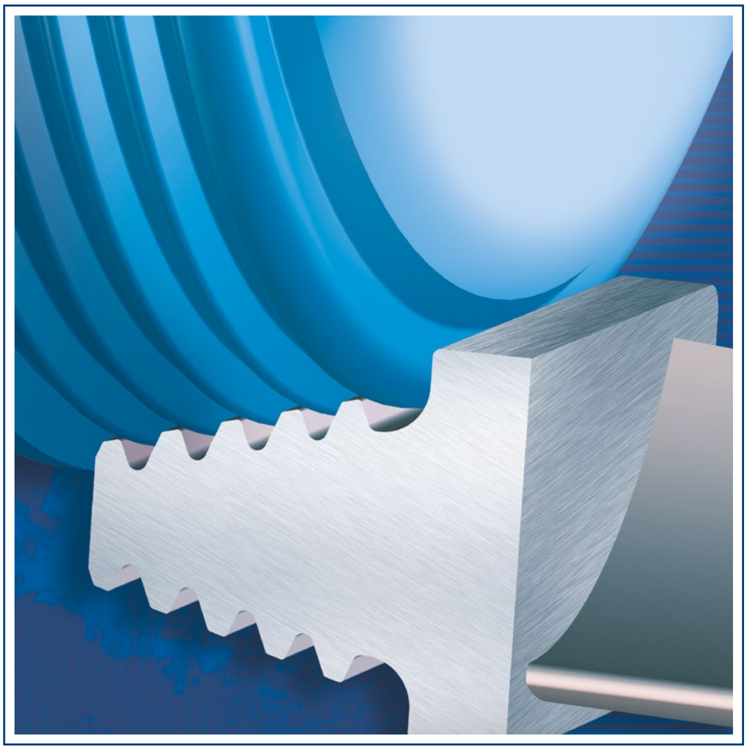
DR. KAISER
precision through diamond

DRESSING OF GRINDING WHEELS

CONTENTS

PROFILE ROLLERS



THE "CLASSIC" PROCESS

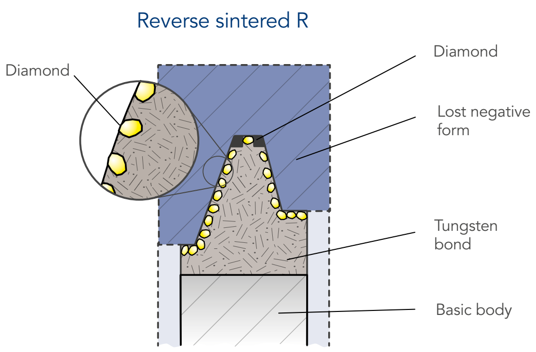
The "classic" method for dressing grinding wheels in all areas of mass production utilizes a single axis plunge roller which incorporates the workpiece geometry. The short dressing times due to radial infeed of the profile roller into the grinding wheel help to achieve a fast and reproducible workpiece output. All conventional and in some special applications, super-abrasive wheels are dressed. In some applications where it is difficult to maintain the correct profile or desired wheel face condition, a continuous dress strategy "CD" may be used.

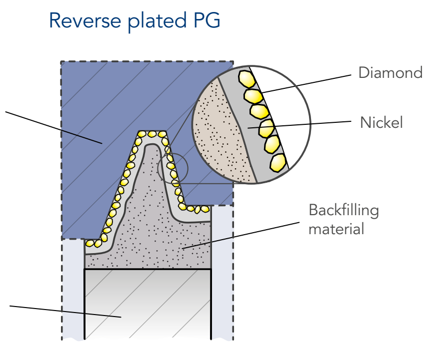
USED IN MANY APPLICATIONS:

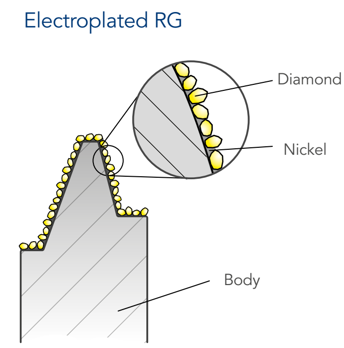
- Threads
- Turbine blades
- Bearing journals
- Bearing races
- Twist-free surfaces
- Engine valves
- Fuel injector components
- Shearing blades
- Gears
- Engine components
- Transmission components
- ...

THE DESIGN VARIANTS

DR. KAISER has mastered various manufacturing techniques throughout the years in order to meet the diverse accuracy and process requirements of their customers. The **sintered profile roller** (R) is preferably supplied in a hand-set diamond design. Additional CVD diamond edge reinforcement is used in high wear areas to ensure maximum service life. Due to the production-related shrinkage of the sintered bond, the diamond surface is ground in most cases to meet the geometric accuracy requirements. Difficult profiles and requirements for the highest accuracies can be produced by using a **reverse plated profile roller** (PG) manufactured using the reverse galvanic process. This process provides a randomly distributed diamond surface and can also utilize CVD reinforcing diamond to increase the service life. **Electroplated profile rollers** (RG) are well suited for pre-profiling and prototyping applications but not generally used for high precision applications.





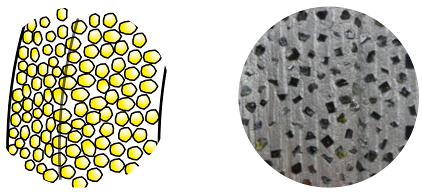


OUR MANUFACTURING PROGRAM

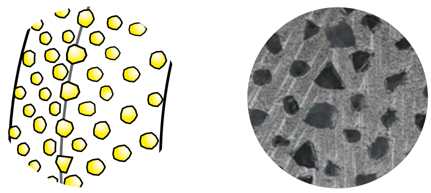
Description	Type	Manufacturing process / Bonding	Diamond type used	
Profile Roller	R	Reverse sintered / tungsten bond	H - Hand-set G - Randomly distributed	C - CVD diamond K - Reinforced
Profile Roller	PG	Reverse plated / nickel bond	H - Hand-set G - Randomly distributed	K - Reinforced
Profile Roller	RG	Electroplated / nickel bond	G - Randomly distributed	C - CVD diamond

DIAMOND SELECTION CRITERIA

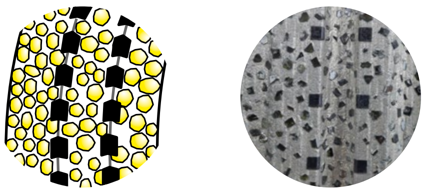
In addition to dressing parameters such as radial infeed, radial infeed speed and dressing speed ratio, the process can be influenced by diamond size, diamond type, diamond setting pattern, grinding technique and the manufacturing process. DR. KAISER's many years of experience insure that the design of the dressing tool will be optimal for the intended application. A targeted reduction of wear is made possible by reinforcing high wear areas with specially selected diamonds or our CVD diamond edge reinforcement.



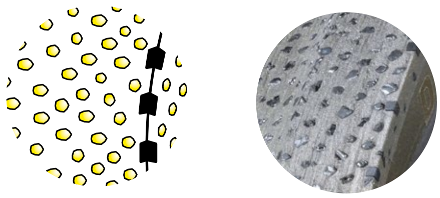
G - Scattered diamond coating



HK - Hand-set diamond setting
with diamond edge reinforcement



GC - Scattered diamond coating
with CVD-diamond edge reinforcement



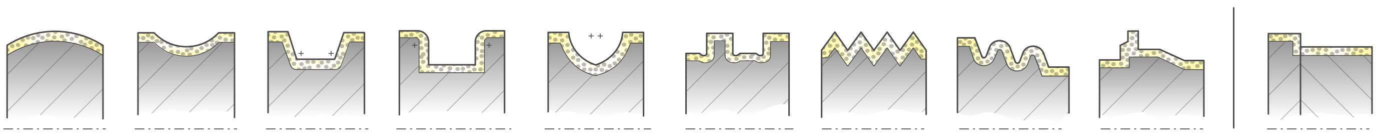
HC - Hand-set diamond setting
with CVD-diamond edge reinforcement

SOME IMPORTANT FORMS

The illustrations show examples of some frequently used shapes and their shape key designation. A wide variety of other shapes are also possible.

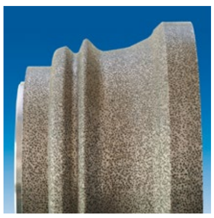
Profile Rollers

Profile Roller Sets

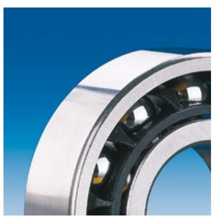


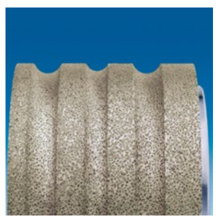
R30 R41 R60 R150 R32 R160 PG170 PG200 R201 R110



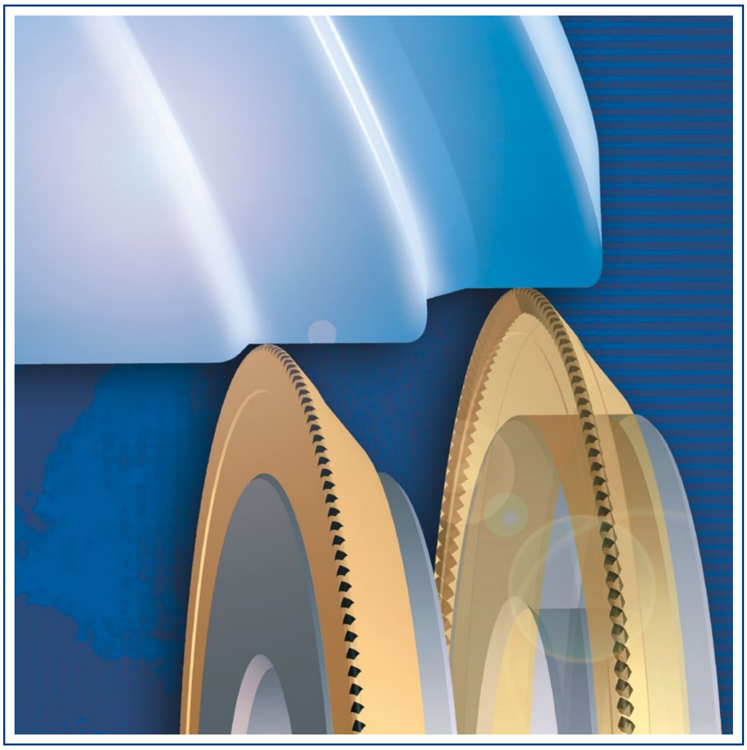








DRESSING DISCS



THE INDIVIDUAL PROCESS

CNC controlled diamond dressing discs are used in all areas of grinding technology, especially for small and medium sized serial production and for prototype applications. Changes to the desired grinding wheel profiles can be easily implemented by using the machine CNC control. This keeps the workpiece related dressing costs low.

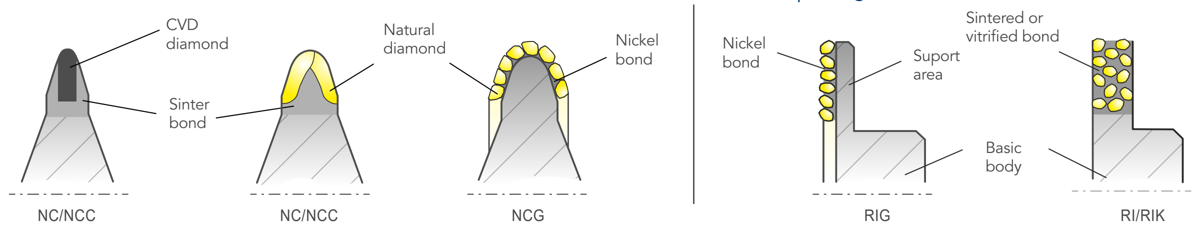
DESIGN VARIANTS

All types of abrasives can be dressed. For conventional grinding wheels, **sintered dressing discs (NC)** utilizing natural and CVD diamond designs are used. **Point crush dressing discs (NCC)** utilize CVD diamond set in a very tight pattern to meet the requirements of super-abrasive grinding wheels. **Electroplated dressing discs (NCG)** are used for special applications, especially for pre-profiling.
Self-sharpening dressing discs (RI, RIG, RIK) are available in various designs for dressing less complex profiles into superabrasive grinding wheels.

VARIATIONS

Stable form

Self-sharpening



STABLE FORM

Description	Type	Manufacturing process / Bonding	Diamond type used	
Dressing Disc	NC	Reverse sintered / tungsten bond	H - Hand-set G - Randomly distributed	C - CVD diamond
Point Crush Dressing Disc	NCC	Reverse sintered / tungsten bond	H - Hand-set G - Randomly distributed	C - CVD diamond
Dressing Disc	NCG	Electroplated / nickel bond	G - Randomly distributed	C - CVD diamond

SELF-SHARPENING

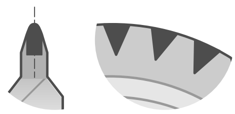
Dressing Disc	RI	Impregnated / tungsten bond	H - Hand-set G - Randomly distributed	C - CVD diamond
Dressing Disc	RIG	Electroplated / nickel bond	G - Randomly distributed	
Dressing Disc	RIK	Impregnated / vitrified bond	G - Randomly distributed	

DIAMOND SELECTION CRITERIA

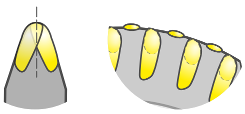
In addition to dressing parameters such as dressing infeed or dressing speed ratio, the process can be specifically influenced by the choice of the manufacturing process, the diamond coating (grit size, setting pattern, diamond type) ant the profile shape (geometry). Increasingly, the demand for small included angles and tip radii (a few 1/100 mm) can only be achieved by using CVD diamond.

RE-LAPPING

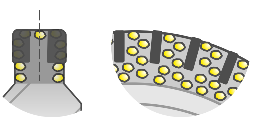
The use of CVD diamond provides diamond dressing discs with the ability to be re-lapped many times, thus significantly reducing their total cost. Due to the geometrically defined shape of the CVD diamond material, the dressing behavior remains very consistent even after many re-lapping operations.



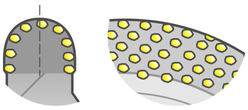
C - CVD diamond, hand-set



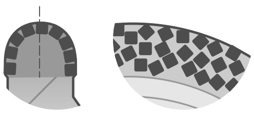
H - Natural diamond, hand-set



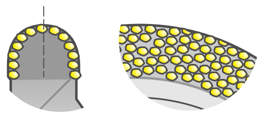
CG - Mixed diamond coating



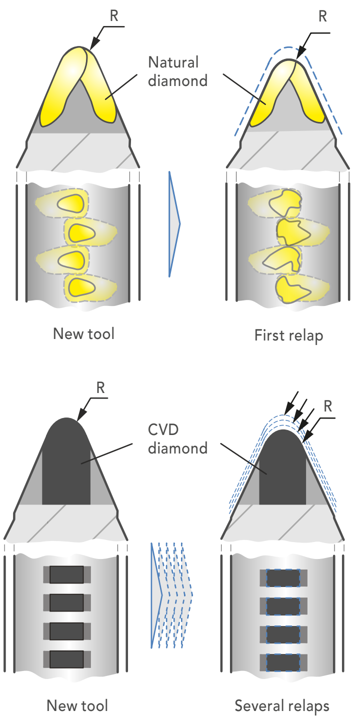
H - Diamond, hand-set



GC - CVD diamond,
randomly distributed

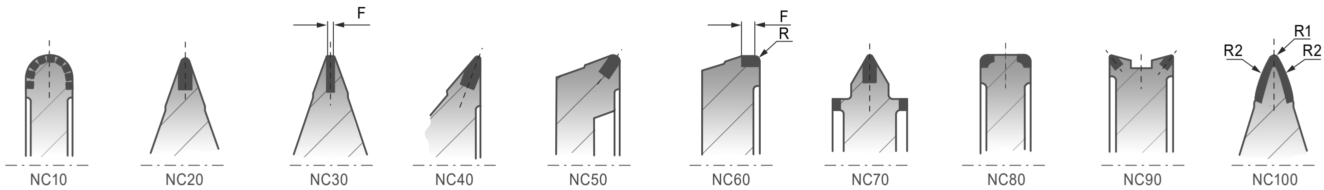


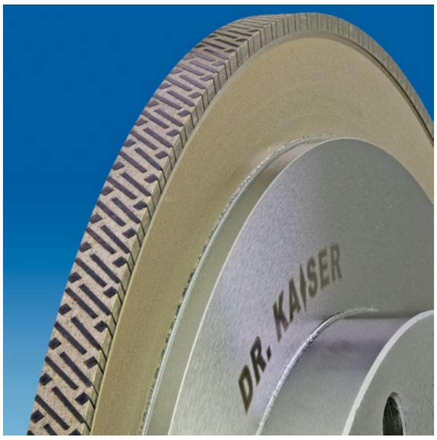
G - Diamond, randomly distributed



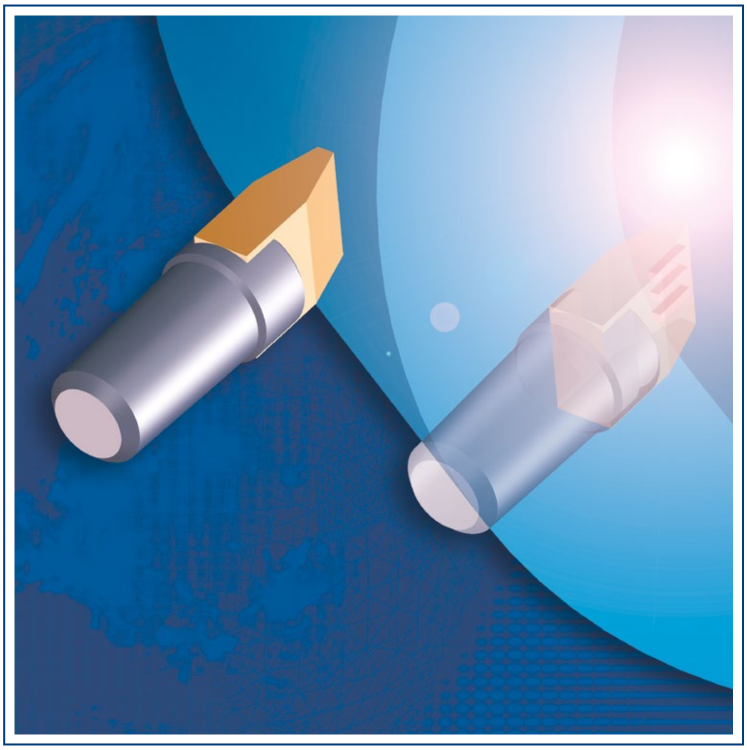
IMPORTANT STANDARDS

The illustrations show examples of standard shapes. A wide variety of other geometric shapes is also possible.





STATIONARY DRESSING TOOLS



THE BEST SURFACE FINISHES

Stationary dressing tools are utilized on all types of grinding machines and, of course, do not require the use of a dressing spindle mechanism. This makes them a cost effective alternative to diamond dressing discs. They are suitable for many applications whether it be for internal grinding utilizing small wheels or for external cylindrical grinding of crankshafts or camshafts. They can be used for simple straight dressing applications or, for complex, CNC controlled profile dressing. The consistent quality and variety of available shapes of synthetic MCD and CVD diamond materials, opens up a wide range of possibilities in tool technology with excellent tool life.
Due to the geometrically defined shapes available with CVD and MCD form plates, our tools can be re-lapped many times to enable precise profile dressing over a longer period of time.

STABLE FORM

Description	Type	Manufacturing process / Bonding	Diamond type used
Outer Diameter Dresser • Profile Dresser • Shoulder Dresser • Radius Dresser	AF AFP AFS AFR	Tungsten or carbide bond	C - CVD diamond M - MCD
Single-Point Dresser	EA	Tungsten or carbide bond	C - CVD diamond M - MCD H - Hand-set
Triangle Dresser	Z	Carbide diamond composite	C - CVD diamond P - PCD

SELF-SHARPENING

Needle Dresser	NF	Tungsten or carbide bond	H - Hand-set
Multi-Point Dresser	KF	Tungsten or carbide bond	G - Randomly distributed
Multi-Point Cartridge	VP	Tungsten or carbide bond	G - Randomly distributed

WEARABLE

Indexable Dresser	AR	Tungsten or carbide bond	C - CVD diamond M - MCD H - Hand-set

RIGID AND EFFECTIVE

PROFILE DRESSER

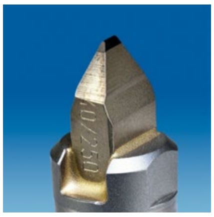
Special profiles can be "lapped" into our dressers for use on "angle-head" grinding applications. This allows for an optimal dresser design. Please ask our experts.

INTERNALLY COOLED

The direct supply of coolant to the dressing zone optimally dissipates the process heat generated and protects the diamonds from overheating. The system is also suitable for complex profiles and unfavorable mounting situations.

RADIUS DRESSER

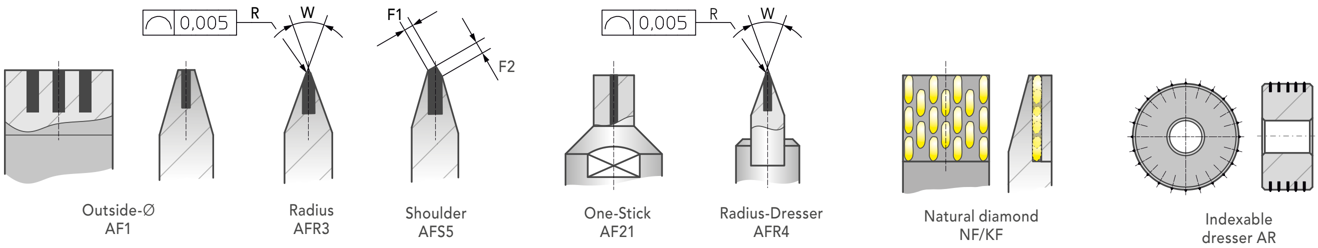
The radius dresser is available in various configurations with a uniform diamond volume. For special applications, the use of smaller or larger CVD diamond material is possible. MCD is particularly suitable for hard and very abrasive grinding wheels. The effective hardness can be influenced by the setting pattern/style.

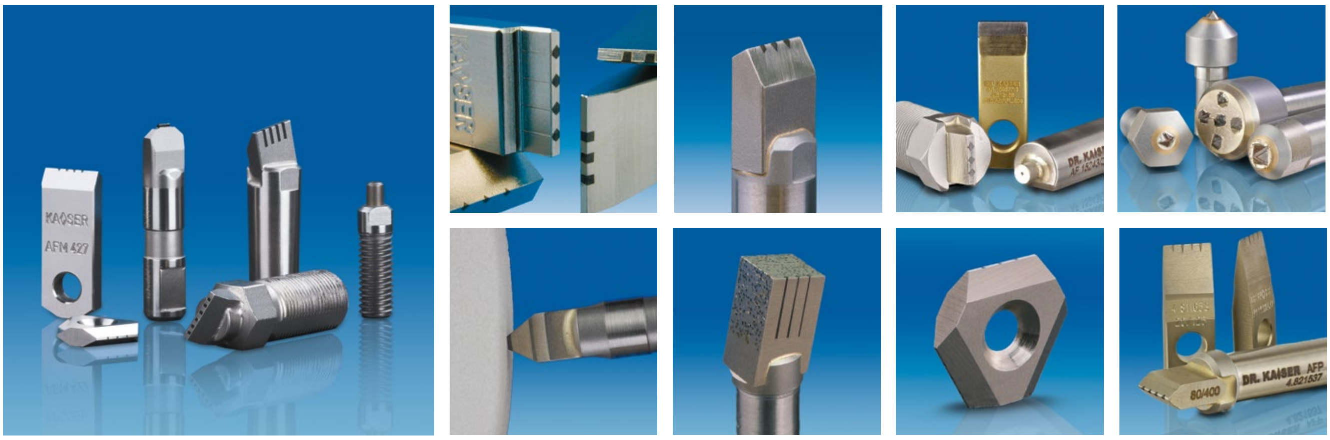


TRIANGULAR PLATES

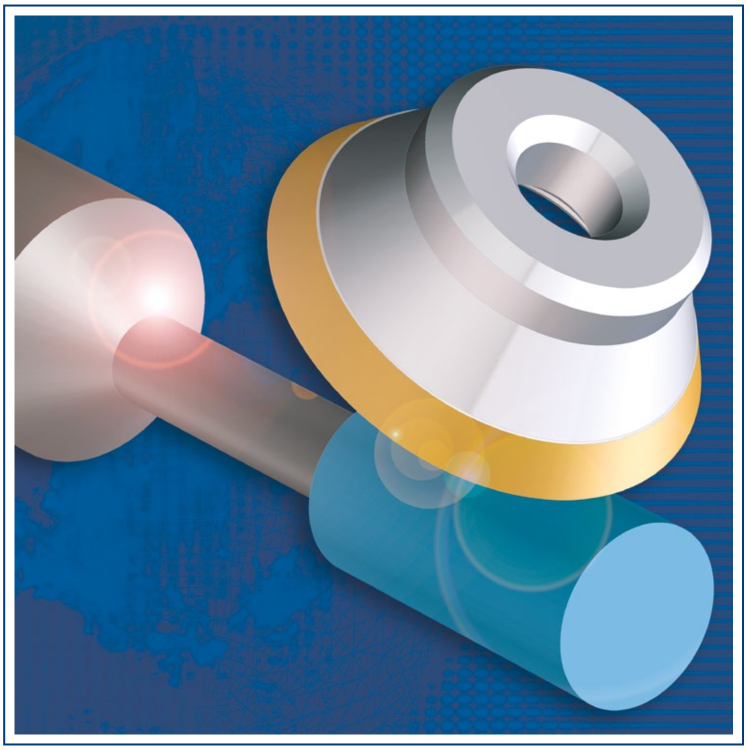
Triangular plates utilizing CVD or PCD diamond with or without a mounting pin are available. They can be clamped into a cylindrical or conical tool holder. The clamping system can be designed according to your requirements.

VARIATIONS (EXAMPLES)



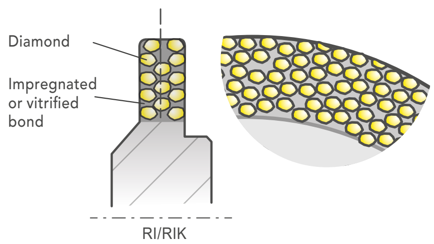


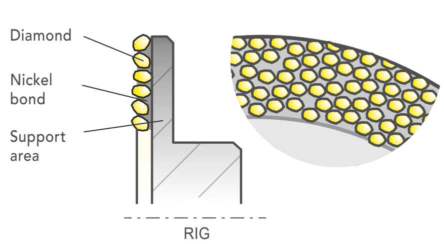
DRESSING OF CBN WHEELS



HARD AGAINST HARDER

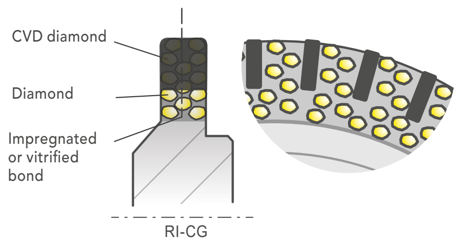
Vitrified CBN and Diamond grinding wheels are the most effective "dressable" products for production grinding applications. The extreme hardness of these abrasives can prove to be a challenge for diamond dressing tools. **Self sharpening dressing tools** with a diamond section made of diamond mesh and a powdered metal bond system are particularly suited to this difficult application. These tools provide a long service life and very consistent dressing behavior. The onset of wear during the dressing process constantly produces new diamond cutting edges, which not only enables the dressing of extremely hard grinding wheels, but also makes the grinding process effective and very economical. Both simple and complex dressing and grinding operations can be performed with optimally designed dressing/grinding wheel systems.
For very high accuracy requirements, tools which utilize mesh diamond and a powdered metal bond system can also be provided with additional edge reinforcement made of CVD diamond. In some cases, "NC" type dressers utilizing CVD diamond can also be used.

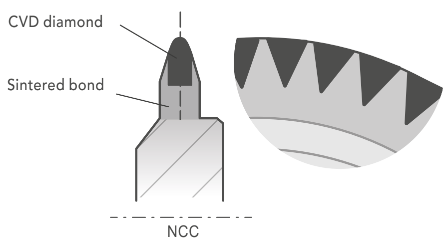




SELF-SHARPENING

Description	Type	Manufacturing process / Bonding	Diamond type used	
Dressing Disc	RI	Infiltrated / tungsten bond	G - Randomly distributed H - Hand-set	C - CVD diamond
Dressing Disc	RIK	Infiltrated / vitrified bond	G - Randomly distributed	
Dressing Disc	RIG	Electroplated single layer / nickel bond	G - Randomly distributed	





STABLE FORM

Point-Crush Dressing Disc	NCC	Reverse sintered / tungsten bond	G - Randomly distributed H - Hand-set	C - CVD diamond

A TOUGH CHALLENGE

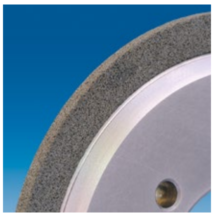
INFILTRATED OR SINGLE-LAYER

Sintered tools with an impregnated diamond section (RI) can be "fine tuned" to a specific dressing application by adjusting the diamond specification, grain concentration, coating width, bond properties and porosity. Impregnated diamond sections are very stable and can be manufactured with a minimum width of 0.6 mm without "supporting" the diamond section with a steel rib. This also makes profile dressing possible.

Electroplated, single-layer tools (RIG) in a hard nickel bond are very durable and efficient. The dressing behavior can be adapted to the process by introducing different diamond types and sizes and controlling the plating depth. The supporting body, which can be made of steel or brass, must have the ability to be "ground away" during the dressing process.

REINFORCED FOR EXTRA DURABILITY

The combination of an impregnated diamond section along with CVD diamond rods (RI-GC) opens up new possibilities for dressing. The wear of the dresser is limited by the CVD edge reinforcement, but without impairing the dressing ability of the tool. As these tools have very good edge stability, they allow the production of fine and highly accurate profiles.

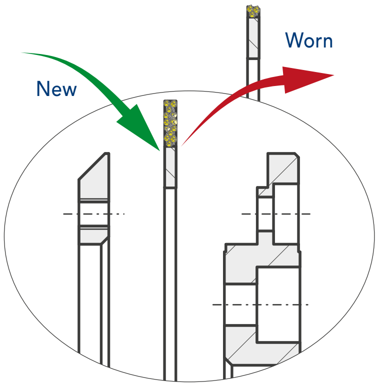


Impregnated tools with vitrified bond (RIK) are particularly suitable for soft dressing of very small grinding wheels and fine or delicate grinding wheel profiles.

SUSTAINABLE WITH FAST CHANGEOVER

With the sustainable ECO clamping system, a worn RI diamond section can be replaced in a 72 hour "exchange" service. This reduces tooling and stocking costs.

A clever system with many advantages !

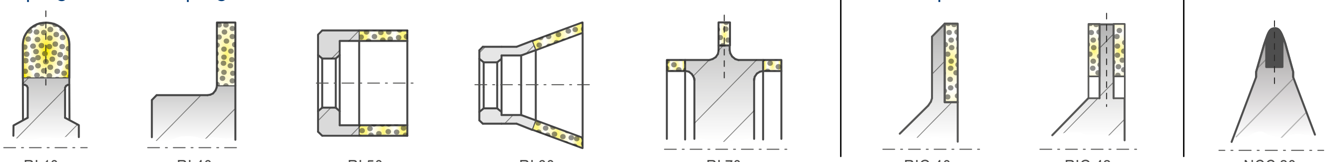


SUSTAINABLE CLAMPING SYSTEM

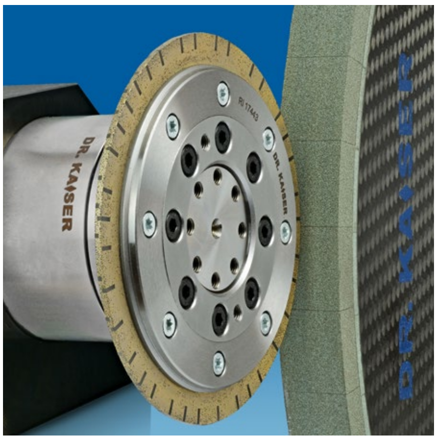
STANDARD TOOLS

Pictured below are typical dresser configurations. Custom designs are also available.

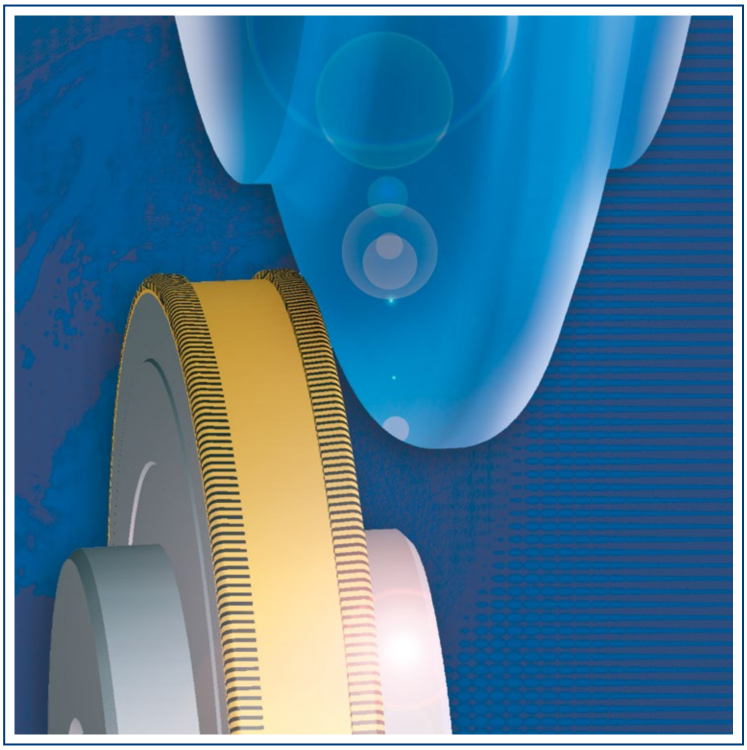
Impregnated and impregnated with CVD diamond reinforcement | Electroplated | Stable form



RI 10 | RI 40 | RI 50 | RI 60 | RI 70 | RIG 40 | RIG 42 | NCC 20



DR. KAISER
präzision durch diamant



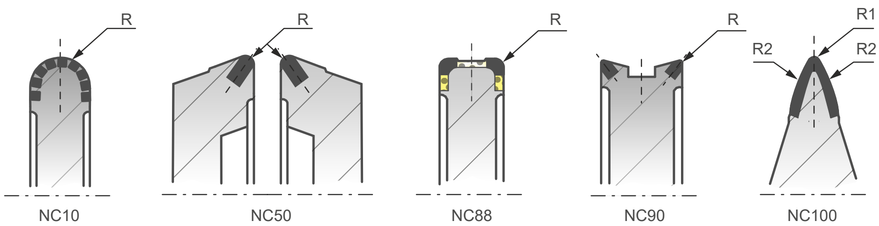
SINGLE TOOTH GEAR GRINDING

Since gear grinding is usually one of the last processes in gear production, rotary diamond dressers have to combine long life along with the ability to provide the correct wheel profile to produce accurate tooth geometries and the best quality of surface finish.
DR. KAISER has introduced a number of diamond dresser innovations such as CVD edge reinforcement to meet the steadily increasing demands on the dressing tool.

TOOTH BY TOOTH – SPACE BY SPACE

The diamond dressing disc is the most important tool in single tooth profile grinding. The dresser must have high form stability in the radius section of the dresser and produce an aggressive dressing performance, therefore natural diamond construction is substituted more frequently by CVD diamond technique. The latest developments in CVD diamond production have produced diamonds with high hardness which can be geometrically shaped by laser cutting.
Besides a consistent and aggressive dressing action, these tools can be re-lapped several times which reduces dressing costs versus natural diamond dressers.

IMPORTANT STANDARDS



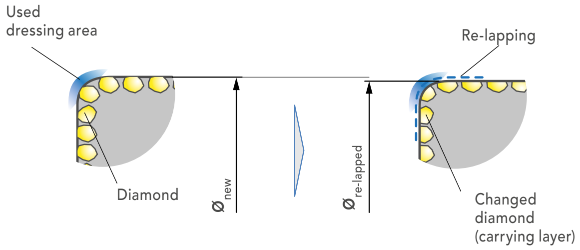
DIAMOND DRESSING DISCS FOR GEAR GRINDING

Description	Type	Manufacturing process / Bonding	Diamond type used	
Dressing Disc	NC	Reverse sintered / tungsten bond	H - Hand-set G - Randomly distributed	C - CVD diamond
Point Crush Dressing Disc	NCC	Reverse sintered / tungsten bond	H - Hand-set G - Randomly distributed	C - CVD diamond
Dressing Disc	NCG	Electroplated / nickel bond	G - Randomly distributed	

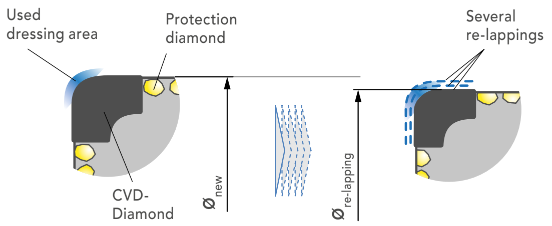
RE-LAPPING

The CVD diamond coating enables the dressers to be re-lapped many times and thus significantly reduces the total costs of the tools. Due to the geometrically defined shape of the CVD diamond form plates, the dressing behavior remains almost constant even after re-lapping many times.

Diamond Dressing Disc

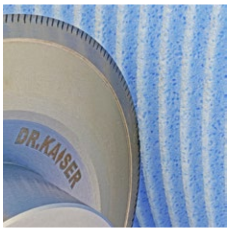


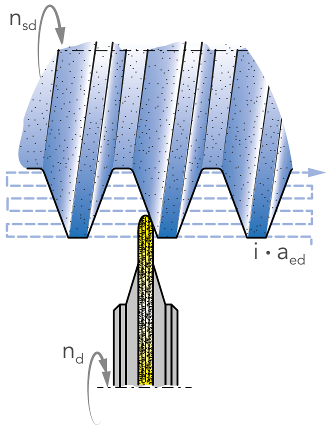
CVD Diamond Dressing Disc



FLEXIBLE DRESSING OF WORM WHEELS

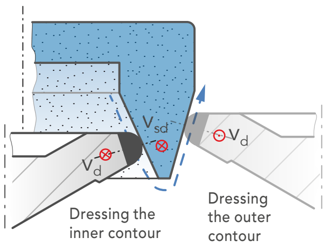
Flexible CNC dressing can be used for dressing worm wheels for small lot or prototype production. We use CVD diamond in order to produce dressing tools with the required radius to form even the smallest modules in worm wheels with the highest accuracy.

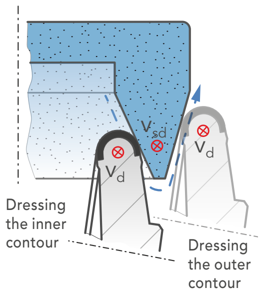


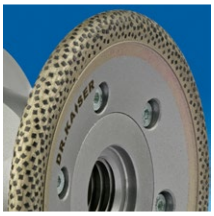


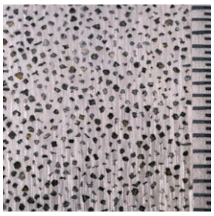
THE BOW IS IMPORTANT

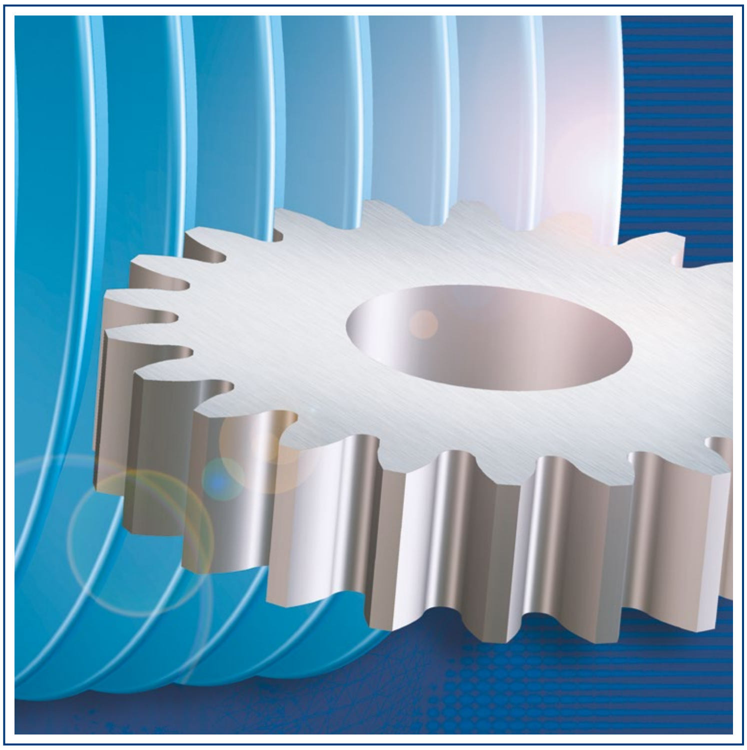
Bevel gear grinding requires a rotary dresser capable of dressing a grinding wheel in both perpendicular and parallel axes.
Diamond dressers with CVD diamond are replacing natural diamond dressers as the most cost-effective dressing solution. CVD diamond dressers can be re-lapped multiple times and give a better and more consistent part finish.









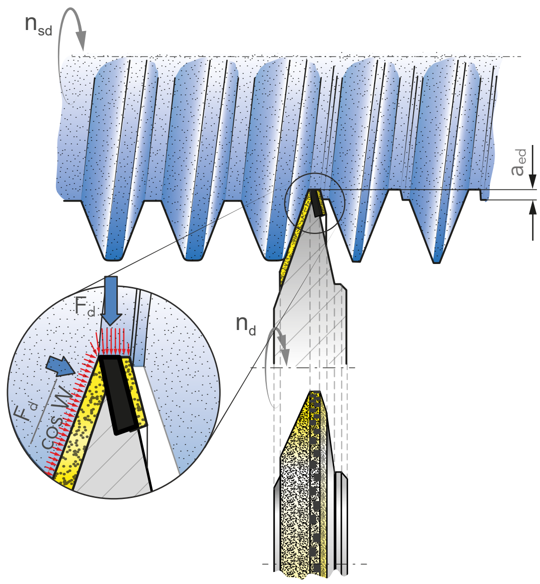


SMALL GEARS

The generating method of gear grinding is one of the most efficient processes for long-run production. Electroplated gear tools with long tool life are used for this process because of their aggressive dressing behavior. Innovative and continuous development of gear dresser manufacturing processes guarantees to deliver process optimized dressing solutions for all machine systems. DR. KAISER delivers these gear dresser solutions to customers all over the world.

CVD DIAMOND PROTECTION – THE ONLY WAY TO PROTECT THE OD

DR. KAISER introduced CVD diamond edge reinforcement in the field of electroplated dressing tools in the 1990's and has continuously developed it further. The outer diameter of the tapered tools is thus reliably protected against erosion wear, resulting in longer service lives. The **electroplated positive dressing tools (RGF, RGM)** can be re-lapped according to your requirements and replated several times. The edge reinforcement by CVD diamonds can also be applied to the **reverse plated multi-rib tool systems (PGM)**. For small modules, **sintered dressing discs (RF)** in CVD diamond design can be used.

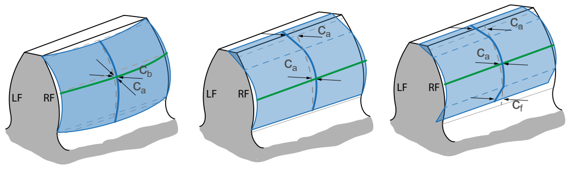


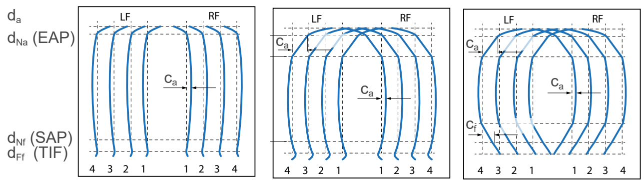
PROFILE ROLLERS FOR GENERATING GEAR GRINDING

Description	Type	Manufacturing process / Bonding	Diamond type used		Remark
Dressing Disc or Set of Dressing Discs	RGF	Electroplated single layer / nickel bond	G - Randomly distributed	C - CVD diamond	For one-start dressing and different modules
Dressing Roller Assembly	RGM	Electroplated single layer / nickel bond	G - Randomly distributed	C - CVD diamond	For one-start dressing with fixed modules
Multi-rib Roller	PGM	Reverse plated / nickel bond	G - Randomly distributed	C - CVD diamond	For multi-start dressing
Dressing Disc or Set of Dressing Discs	RF	Reverse sintered / tungsten bond	H - Hand-set G - Randomly distributed	C - CVD diamond	In special cases
Profile Roller	RG	Electroplated single layer / nickel bond	G - Randomly distributed	C - CVD diamond	Double cone version for pre-profiling

PROFILE ACCURACY IS THE KEY

The tooth flank profile is transferred to the grinding worm by the dressing process. Crowning and tip and root relief of the gears are therefore connected to the dressing tool. The calculation must be carried out by a mathematical rolling simulation before the tools are manufactured.
For profile roller sets, the design in the tooth root area must be taken into consideration. It depends upon whether you want to realize a "hobbed" protuberance, a defined tooth root transition radius or a defined ground tooth root.
Header and root relief can be produced as straight lines and also as tangential transitions or even multi-step to crowning. In the case of helical gears, entanglement effects affect the profile shape of the dresser and are taken into account accordingly in the design.
The gear specialists at DR. KAISER calculate the geometry for your dressing tools according to your gear drawing specifications using their own simulation software.

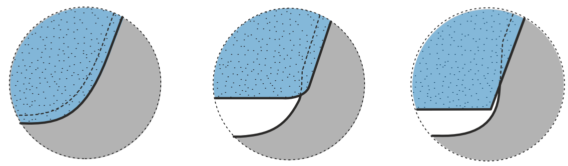




Profile crowning

Profile crowning and tip relief

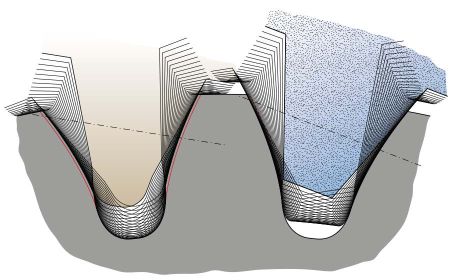
Profile crowning with tip and root relief



Tooth root machining

Transition radius

Protuberance milling



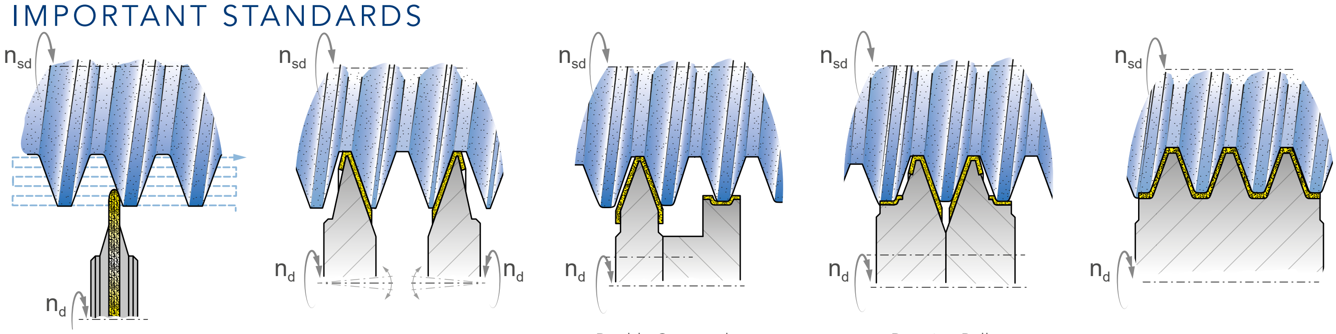
Hobbing simulation

Simulation gear grinding

DRESSING TOOLS FOR GEAR ROOTS

CVD diamond head dressing plates, dressing strips or tip radius rollers are used to create a defined tip radius on the grinding worm. Our gear wheel experts take over the design of the radius and angle geometry for your special application.

IMPORTANT STANDARDS



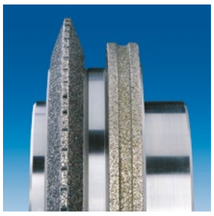
Dressing Disc

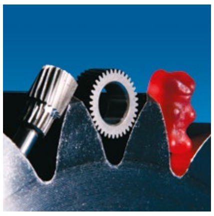
Set of Dressing Discs

Double Cone and OD Dresser

Dressing Roller Assembly

Multi-rib Roller

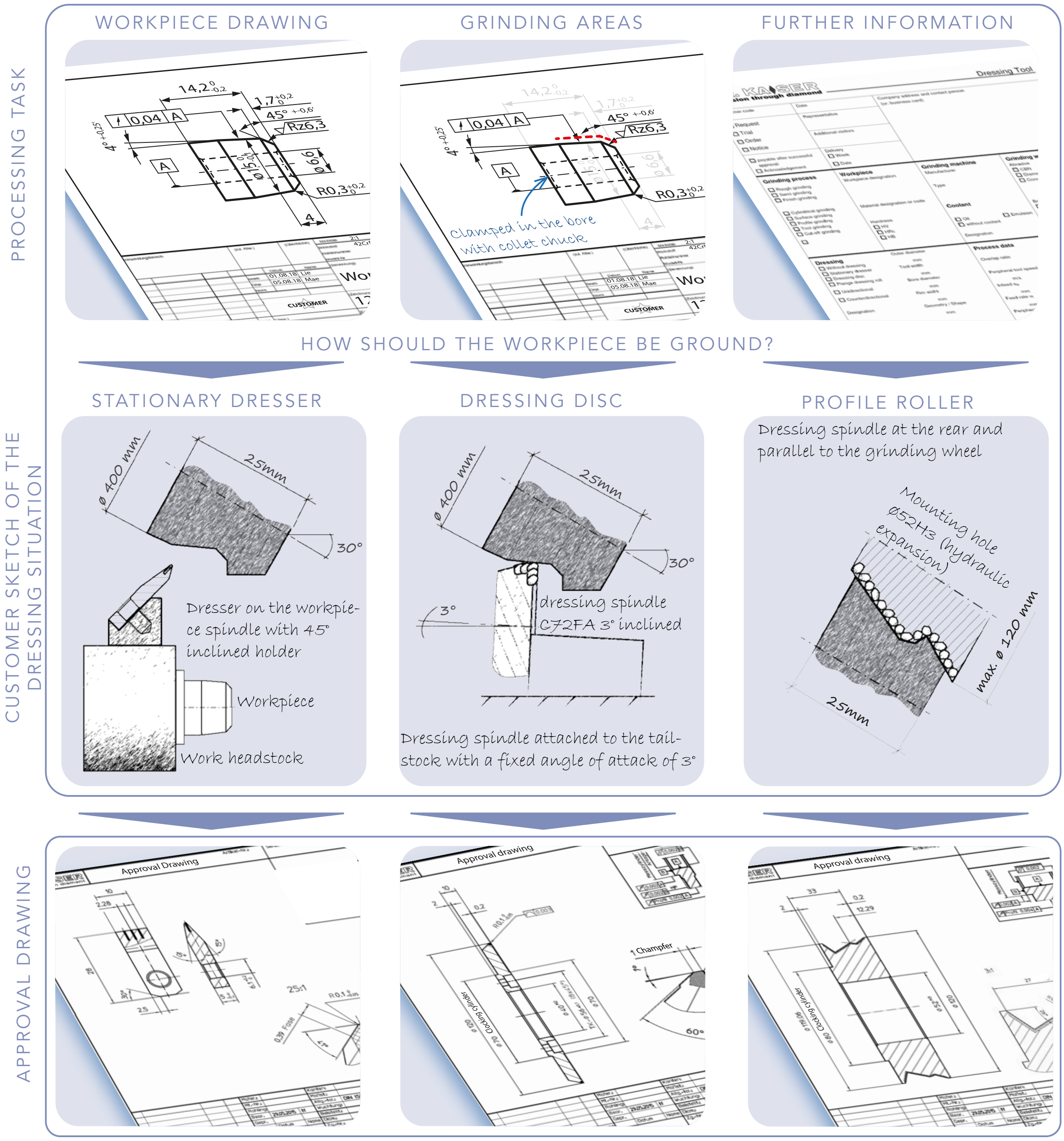




FROM THE WORKPIECE DRAWING TO THE DRESSING TOOL

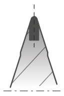
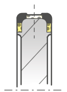
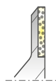
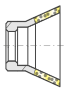
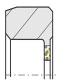
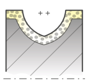
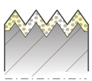
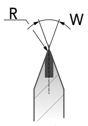
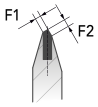
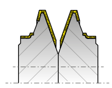
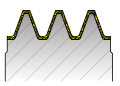
Each machine has its own special feature - each customer has his own wealth of experience - each dressing tool has its own special task. For a process-optimized design of a dressing tool by DR. KAISER, many basic conditions are important, which you should discuss in advance with our technical sales department and design engineers:

- **Workpiece drawing** with general information on the workpiece (material, hardness, ...),
- Details of the **grinding area** with the necessary tolerances,
- The **grinding tool used**, cooling lubricant conditions and other important data are entered in a design data sheet.
- A **sketch of the grinding and dressing situation** is very helpful for an optimum design of the dressing process.
- For all new projects you will receive an **approval drawing** from our designers on the basis of this data
- Only then will the **production of your dressing** tool begin.



DR. KAISER FORM KEY

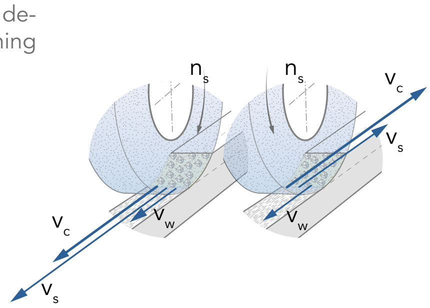
The multitude of precision applications of customers and machine manufacturers requires a large number of variations of dressing tools. In the 1980's, Dr. Michael Kaiser introduced a classification system for dressing tools for standardization purposes, which is constantly being further developed: the "form key". This makes it possible to describe the essential geometric elements of a tool even without a drawing. A system that has proven to be very successful. For use, it is of course necessary to know the classified form of the tool according to the DR. KAISER standard - but after a short time, every tool with its essential geometric elements and its diamond coating can be described with a "speaking" key.

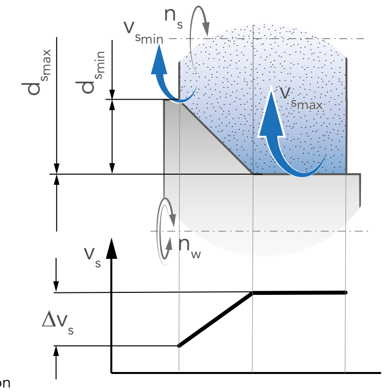
Examples for different product groups	DR. KAISER - Type and shape See corresponding descriptions in the brochure	Diamond selection See corresponding notes in the tables	Description of the main geometry of the tool Specific information on the application (outside diameter, radius, chamfer, angle, diamond-coated width, height, geometrical information,...)	Bore diameter Indication in mm, if available	Overall width and mounting Specification in mm, pitch circle (TK) if available
Dressing Disc					
	NC20	C	150-R0,5-W30	52	30-TK
	NC88	CG	130-10-1,5-R0,5	40	16-TK
Dressing Disc for CBN					
	RIG40	G	140-10	50	12-TK
	RI60	G	18-1-6	7	15-W20
	RIG90	G	42-0,5-2,5	52	8
Profile Roller					
	R222	GK	125-30-12-R10	52	40
	Note: the geometry of profile rollers is sometimes very complex, so that the research key description is partly product-specific.				
	PG171	G	100-32-1,38-51	52	35
Stationary Dresser					
	AFR33	C	R0,5-W40		33-10
	AFS53	C	AW30		33-10
Dressing Tools for Gear Grinding					
	RGM523	GC	M2,8-W20-R350-1,2-W0°20‘	52	TK
	PGM521	G	M1,35-W20-R350	52	TK

IMPORTANT FORMULAS FOR THE PRACTICE

CUTTING SPEED

For wheels, the peripheral speed v_s is dependent on the profile height, so that the cutting speed v_c depends on the workpiece speed v_w and the machining direction (synchronous or opposed grinding).





$$v_s = \pi \cdot d_s \cdot n_s \quad \leftrightarrow \quad n_s = \frac{v_s}{\pi \cdot d_s}$$

Workshop formula:

$$n_s = \frac{v_s \text{ (in m/s)} \cdot 1000 \cdot 60}{\pi \cdot d_s \text{ (in mm)}} \quad \text{(in U/min)}$$

$$v_s = \frac{\pi \cdot d_s \text{ (in mm)} \cdot n_s \text{ (in U/min)}}{1000 \cdot 60} \quad \text{(in m/s)}$$

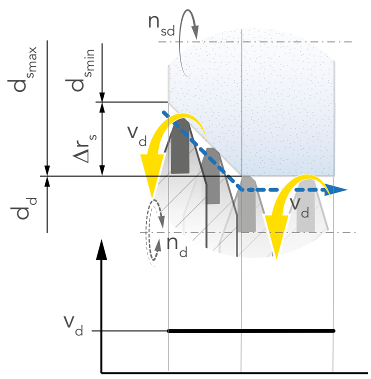
$$v_c = v_s \pm v_w \quad \text{in (m/s)}$$

+ Same direction
– Counter direction

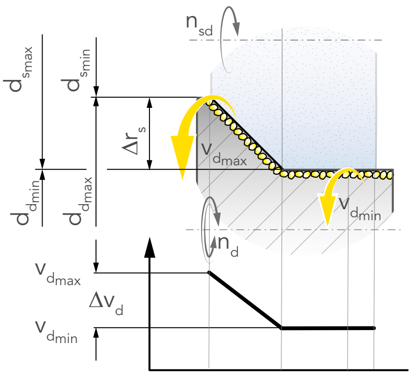
DRESSING SPEED

When dressing with a **dressing discs**, the peripheral speed v_d is only dependent on the speed n_d and the tool diameter d_d. In the case of **profile rollers**, different peripheral speeds at the tool result depending on the profile height.

Dressing disc



Profile roller



$$v_d = \pi \cdot d_d \cdot n_d \quad \leftrightarrow \quad n_d = \frac{v_d}{\pi \cdot d_d}$$

Workshop formula:

$$n_d = \frac{v_d \text{ (in m/s)} \cdot 1000 \cdot 60}{\pi \cdot d_d \text{ (in mm)}} \quad \text{(in U/min)}$$

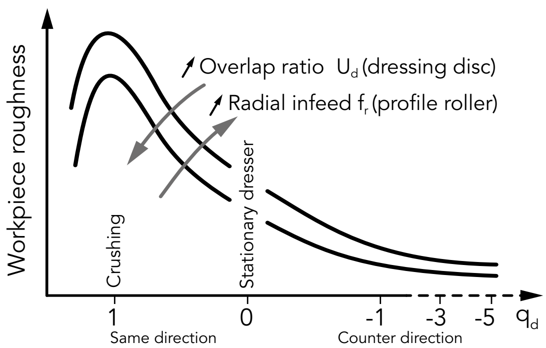
$$v_d = \frac{\pi \cdot d_d \text{ (in mm)} \cdot n_d \text{ (in U/min)}}{1000 \cdot 60} \quad \text{(in m/s)}$$

SPEED RATIO

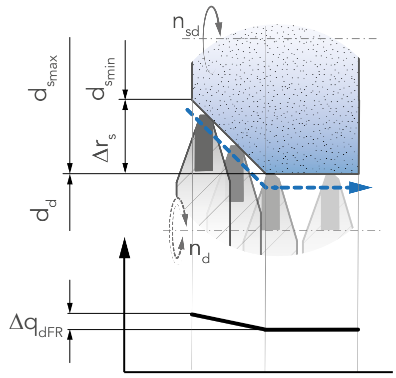
When dressing profile grinding wheels, there are different speed ratios depending on the profile height. When dressing with a profile roller, these are considerably greater than when dressing with a form roller. Counter-rotating dressing generally always results in better surfaces on the workpiece.

$$q_d = \frac{v_d}{v_{sd}} = \frac{d_d \cdot n_d}{d_s \cdot n_{sd}} \quad (\text{in } \div)$$

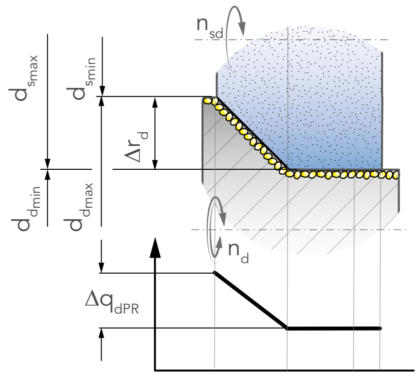
+ Same direction
– Counter direction



Dressing disc



Profile roller



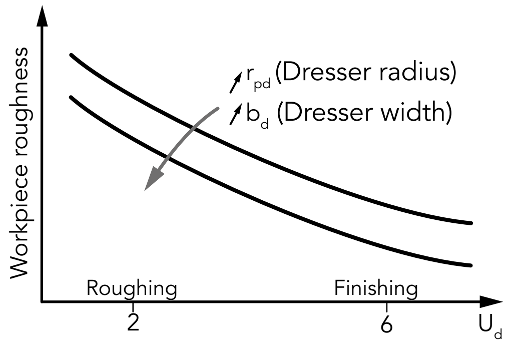
$$\Delta q_{d_{FR}} = \frac{n_d}{n_{sd}} \cdot \left(\frac{d_d}{d_{smin}} - \frac{d_d}{d_{smax}} \right)$$

$$\Delta q_{d_{PR}} = \frac{n_d}{n_{sd}} \cdot \left(\frac{d_{dmax}}{d_{smin}} - \frac{d_{dmin}}{d_{smax}} \right)$$

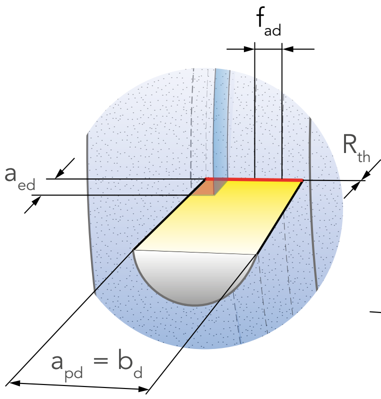
DRESSING COVERAGE RATIO

U_d can be used with stationary and rotating dressers (form rollers). The axial feed f_{ad} is always smaller than the dresser width a_{pd}. When dressing with a radius, the dressing width is calculated by the auxiliary variable b_d. If the radius changes due to wear, the effective width and thus the degree of coverage is also changed! With straight dressers "the dresser rolls over the grinding wheel several times. With radius dressers, the dresser and grinding wheel are only ever in contact once (red line). A greater degree of overlap generally leads to better workpiece roughness.

$$U_d = \frac{a_{pd}}{f_{ad}} = \frac{a_{pd}}{(v_{fad}/n_{sd})} = \frac{a_{pd} \cdot n_{sd}}{v_{fad}}$$



Straight dresser

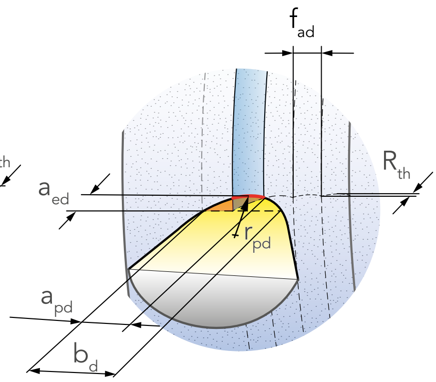


$$a_{pd} = b_d$$

$$U_d = \frac{a_{pd}}{f_{ad}} = \frac{a_{pd} \cdot n_{sd}}{v_{fad}}$$

$$v_{fad} = n_{sd} \cdot \frac{a_{pd}}{U_d}$$

Radius dresser



$$b_d = \sqrt{8 \cdot r_{pd} \cdot a_{ed}} \qquad a_{pd} = \frac{f_{ad} + b_d}{2}$$

$$U_d = \frac{a_{pd}}{f_{ad}} = \frac{\sqrt{2 \cdot r_{pd} \cdot a_{ed}}}{f_{ad}} + \frac{1}{2}$$

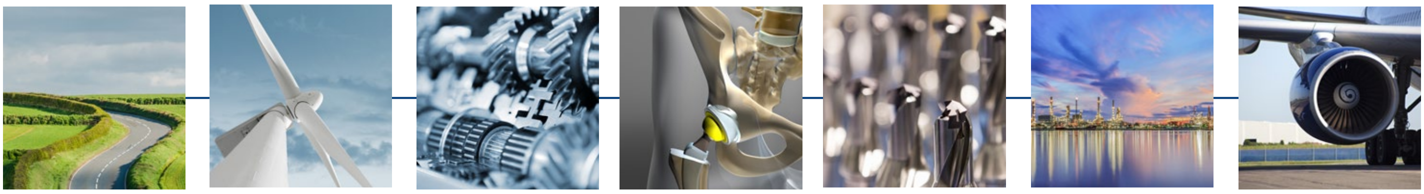
$$f_{ad} = \frac{\sqrt{2 \cdot r_{pd} \cdot a_{ed}}}{U_d - 0{,}5}$$

$$v_{fad} = n_{sd} \cdot \frac{\sqrt{2 \cdot r_{pd} \cdot a_{ed}}}{U_d - 0{,}5}$$

GUIDE VALUES FOR STEEL PROCESSING (Standard applications)

		Grinding wheels: Conventional	CBN
Grinding wheel peripheral speed v_s:		25...50 m/s	45...120 m/s
Grinding speed ratio q_s:	Roughing (OD/ID/Pendulum grinding):	40...60	
	OD/ID finishing	60...90	
	Fine finishing (OD/ID):	90...120	
	Deep grinding (surface grinding):	1500...42000	
Removal rate Q'_w:	Roughing:	1...4 (ID-grinding 1...1,5)	3...8
	Finishing:	0,3...1,5	0,5...3
	Fine finishing:	0,1...0,3	0,1...0,5
	Firing:	3...10 Workpiece rotations (strokes)	
Grinding wheel overlap U_s:	Longitud. grinding:	3 (Roughing) .... 6 (Fine finishing)	
Infeed a_e:	Longitud. grinding:	0,01 mm .... 0,001 mm	0,05 ... 0,005 mm
Tangential feed rate v_{fa}:	Longitud. grinding:	1000 mm/min ... 500 mm/min (Standard values, depending on b_s, n_s)	
Radial feed rate v_{fr}:	Plunge grinding:	0,05 .... 0,2 mm/min	0,1...2 mm/min
Wear ratio G:		3...30	400...10000
Dressing cut a_{ed}:	Disc/Stat. dres.:	ca. 10 x 0,01...0,02...0,04 mm (pay attention to $a_{ed\alpha}$!)	ca. 5-10 x 0,002...0,005 mm (pay attention to $a_{ed\alpha}$!)
Radial dressing feed f_{rd}:	Profile roller:	0,1 ... 0,8 µm/rev.	try to avoid
Dressing speed ratio q_d:		Counter direction: -0,3 ... -0,8 (better roughness) Same direction: 0,3 ... 0,8 (easy cutting wheel structure)	
Overlap ratio U_d:	Roughing:	2...3	
	Normal grinding:	3...4	
	Finishing:	4...6	
	Fine finishing:	6...8	

OUR FIELDS OF ACTIVITY



EVERYTHING FROM
A SINGLE SOURCE:

DRESSING DISCS

DRESSING ROLLERS

STATIONARY DRESSING TOOLS

CVD DIAMOND DRESSING TECHNOLOGY

DRESSING SYSTEMS FOR VITRIFIED
CBN GRINDING WHEELS

DRESSING TOOLS FOR GEAR GRINDING

DRESSING SPINDLE SYSTEMS

CBN AND DIAMOND GRINDING WHEELS

PCD AND PCBN CUTTING TOOLS

PCD AND CVD DIAMOND WEAR
PROTECTION COMPONENTS

APPLICATION ENGINEERING

SEMINARS AND TRAINING

DR. KAISER
präzision durch diamant

DR. KAISER DIAMANTWERKZEUGE
GmbH & Co. KG

Am Wasserturm 33 G · 29223 Celle
Germany · Tel. +49 5141 9386 0
info@drkaiser.de · www.drkaiser.de