



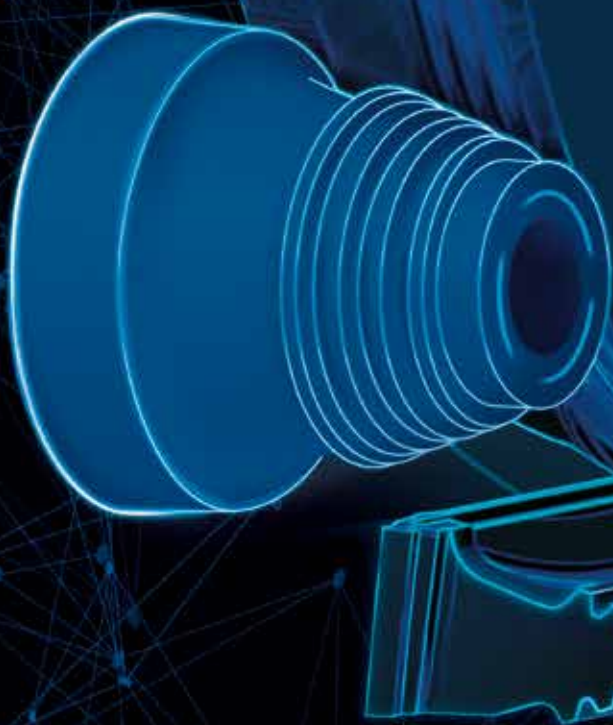
SAINT-GOBAIN

# WINTER



# DRESSING TOOLS

## FOR DRESSING GRINDING WHEELS



## INTRODUCTION

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# OUR CUSTOMER CONNECTION

As a Saint-Gobain brand, our customer-first philosophy, diverse product portfolio and strong global presence are our hallmarks and, we are an important part of a network that spans 45 countries with new locations being added every year. Saint-Gobain Abrasives employ over 16,000 people and is the only manufacturer to offer such a comprehensive range of abrasives and dressing tools in the industry.

For over 160 years, Norton WINTER has been one of the most well respected names in the industry and is synonymous with high quality diamond and cBN grinding products. Our unique combination of unbeatable quality, market leading expertise and outstanding service, are the foundations on which our success is built.

## GLOBAL EXPERTISE

Saint-Gobain is a global top one hundred industrial company and leader in the production of glass, high performance materials and construction products. Saint-Gobain Group has a long and rich history of excellence having been established in 1665. Norton WINTER have been part of the group since 1996, adding a wealth of experience and a huge range of specialist products to an already strong portfolio of brands.

Today, the Saint-Gobain Group invests approximately €400 million per year in research and development and files over 300 patents per year to reinforce its reputation as a global leader of innovation and improvement.

## THE NORTON WINTER BRAND PROMISES:

### MARKET LEADING QUALITY

From day 1, Norton WINTER has stood for quality. From design to delivery, we exact the highest standards at every stage to ensure that we produce only the best products for our customers. Norton WINTER diamond tools are recognised for their exceptional performance and outstanding value for money.

### INNOVATION

To this day, the Norton WINTER philosophy is closely connected to innovation and technical progress. As a pioneer, we have always been, and continue to be, actively invested in the future development of grinding technologies. Take advantage of our team of dedicated R&D scientists at Norton WINTER's purpose-built European Grinding Technology Centre.

### CUSTOM-MADE SOLUTIONS

Over 75% of all Norton WINTER products are developed in close cooperation with our customers. Our product managers and application engineers relish the technological challenge of achieving the best grinding results for our customers. As such, we are happy to provide optimised grinding solutions to meet your specific requirements in a

way that delivers the greatest benefit. At all times our aim is to generate cost savings, improved productivity, reduced down time, and better quality at every stage of your process.

### OUTSTANDING SERVICE

At Norton WINTER we pride ourselves on offering a full service. From finding the perfect product to optimising your processes, we encourage all of our customers to take advantage of our technical expertise and years of industry experience. Our field sales force and customer service department are at your disposal.

### OPERATIONAL EXCELLENCE

As a responsible manufacturer, Norton WINTER continually strives to minimise its negative impact on the environment and upholds industry leading standards of health and safety. Norton WINTER carries international certification to ISA 9001 (Quality Management), ISO 14001 (Environmental Management) and OHSAS 18001 (Health and Safety Management). Additionally, all rotating Norton WINTER tools bear the OSA safety seal (OSA: Organization for the Safety of Abrasives), providing our customers with the highest safety specification in a tool application.

# SUPPORTING SUSTAINABILITY IN THE **ABRASIVES INDUSTRY**



Saint-Gobain is proud to be an active member of SEAM - Sustainable European Abrasive Manufacturers. An initiative from FEPA, the SEAM program guarantees that member organisations from within the abrasive supply chain manufacture and distribute products according to new standards, to support sustainable growth in production and distribution.

The aim is to balance environmental efficiency, production performance and labour safety by meeting a series of requirements related to three pillars: environment, labour and economy.

Saint-Gobain Abrasives is committed to preserving the environment and resources, reducing inequalities and improving daily life for all. It's more than an expectation, making a positive contribution has become a requirement for all our stakeholders. We all have a part to play in ensuring our processes, products and the health and safety of our employees is maintained and allows our industry to operate sustainably now and in the future.

For more information visit [www.nortonabrasives.com](http://www.nortonabrasives.com)





# A CORPORATE PERSPECTIVE

Saint-Gobain Abrasives are reshaping your world by bringing powerful, precise and user-friendly solutions that grind and finish all types of materials.

Our customers require only the smartest designs and highest performance products, that's why innovation and improvement are at the heart of everything we do. Material sciences and technological development are an obsession and the satisfaction of our customers is what drives us in the pursuit of perfections.

## **TRUST NORTON WINTER** ONE BRAND, ONE TECHNOLOGY LEADER

Norton WINTER, the premium brand for diamond and cBN grinding products, is one of the most well established and respected brands in the market. With over 160 years' experience, Norton WINTER offers a performance package designed to generate cost savings through increased productivity, less down time, and better quality.



SAINT-GOBAIN

# WINTER



# YOUR SAFETY IS **OUR PRIORITY**

Your safety is our top priority and we understand that the nature of our customers' work presents inherent risks. To help minimise those risks, all Norton WINTER products are manufactured in accordance with the most rigorous European and International health, safety and environmental regulations.

## THE ORGANISATION FOR THE SAFETY OF ABRASIVES



We are proud to carry the oSa trademark. As a member of the oSa, we are positioned amongst the very best manufacturers with the highest levels of safety. Through a stringent monitoring and audit system year after year, we maintain our reputation as a reliably safe and responsible producer of quality abrasives. We conform to European and International standards, EN12413, EN13236 and EN13743 for bonded, diamond and coated products and ISO 9001, 14001 and OHSAS 18001 for our manufacturing sites. Where possible, always opt for products and suppliers who carry the oSa® trademark to ensure quality products of the highest safety level.

## THE FEDERATION OF EUROPEAN PRODUCERS OF ABRASIVES



As a member of the FEPA association, we stay up-to-date with all technical, legal and scientific regulatory frameworks. Together with oSa, FEPA pursues the objective of supporting both currently attained safety standards and potential future developments.



Saint-Gobain Abrasives



Our products

Consumers

Professionals

Resources

About us

Contact us



# WINTER

## Winter connects with Norton to become one brand... one technology leader

Norton Winter delivers high performance diamond and CBN tools for all precision grinding applications. With custom-made solutions and a comprehensive range of stock products, Norton Winter offers a performance package designed to generate cost savings through increased productivity, less down time, and better quality. Trust Norton Winter.

CLICK BELOW TO VIEW OUR MARKETS



Medical



Bearing & Gear



Tools



Transportation



Electronics



Glass

# DISCOVER MORE FROM OUR EXPERTS AT:

[www.nortonabrasives.com](http://www.nortonabrasives.com)



# WINTER



# SNAPSHOTS OF A LONG HISTORY

In 1847 Ernst Winter established a family-owned company with a simple vision of developing the best ultra-hard crystal tools that money could buy. Today, we still adhere to that vision and throughout our history have gone on to develop a reputation as industry pioneers, trend-setters and technological leaders. We are Norton WINTER.



## Ernst Winter

Goldsmith and diamantaire founded his diamond tool workshop.

1847

## WINTER in Space

Laser reflectors ground with WINTER diamond tools enable the most accurate astronomic and geographic measurements.

1960s

## Norton WINTER

WINTER merges with abrasives giant Norton to form Norton WINTER.

2017

1872

## WINTER in Hamburg

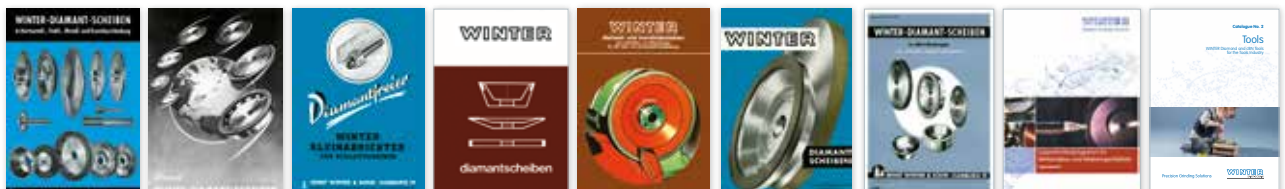
The company establishes its first building in Hamburg.

## Celebrities

Helmut Schmidt (Federal Republic of Germany's former Chancellor) visits WINTER and acts a "diamond maker".



## Posters and Brochures in the course of time







**Success from the beginning**  
Former letterhead and contemporary advertisement of WINTER with images showing medals received at important exhibitions.

**Ernst Winter & Sohn**  
Hamburg-Eimsbüttel  
Diamant-Werkzeug-Fabrik  
Gegründet 1847

Wir empfehlen  
**Steinschreib-Diamanten,**  
hergestellt aus ausgesuchten guten, rissfreien Diamanten und leisten für **dauernd feste Passung**  
schriftlich Garantie

Prämiert mit 3 goldenen Medaillen:  
Hamburg 1889  
Lübeck 1895 — Paris 1895

Weltausstellung Paris 1900  
„Silberne Medaille“,  
Höchste Auszeichnung für  
Diamant-Werkzeuge Gruppe III, Klasse 15.

No. 1 2 3 4 5  
Preis per Stück Mk. 4 6 8 10 12  
(Umtausch gestattet)

*Guarantee*

GOLDENE MEDAILLE: HAMBURGISCHE DEUTSCHE UND INDUSTRIELLE AUSSTELLUNG HAMBURG 1889.  
GOLDENE MEDAILLE: UNIVERSITÄT VON LIPSIA AUSSTELLUNG DER KUNST-UND INDUSTRIE PARIS 1889.  
GOLDENE MEDAILLE: DEUTSCH-NORDDEUTSCHE AUSSTELLUNG LÜBECK 1895.  
WELTAUSSTELLUNG PARIS 1900 HÖCHSTE AUSZEICHNUNG (SILBERNE MEDAILLE) FÜR DIAMANTWERKZEUGE GRUPPE III, KLASSE 15.

HAMBURG-EIMSBÜTTEL den 16. Juli 1911.  
Hamburg 1889.

**ERNST WINTER & SOHN**  
Diamant-Werkzeugfabrik  
Diamant-Schleiferi  
Rohdiamanten.  
Gegründet 1847.

Altena 1869.

Ernst Winter & Sohn's Oporto 1885.

**WINTER**

Diamant-Werkzeug Fabrik  
HAMBURG.

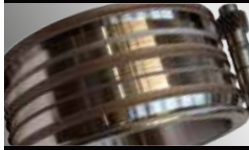
**NORTON**

SAINT-GOBAIN

**WINTER**

# INNOVATIONS

**AEON**



BEST-IN-CLASS PRECISION  
GRINDING

**FLUTE EVO**



FLUTE GRINDING HAS EVOLVED  
IMPROVED FLUTE SURFACE QUALITY

**CARBON  
FORCE**



FORCING THE LIMITS OF  
O.D. GRINDING

**ALLOS**



EXTREME MATERIAL REMOVAL  
MAXIMUM THERMAL CONTROL

**VITRON<sup>7</sup>**



SAVES TIME AND DELIVERS  
MAXIMUM CONSISTENCY

**IDEAL  
PRIME**



IDEAL PRIME

**Xtrimium**



MASTER ALL  
GEAR GRINDING CHALLENGES

**DDS  
CUT**



ACCURATE AND AGGRESSIVE  
DRESSING OF GRINDING WHEELS

YOUR SINGLE SOURCE FOR GLOBAL GRINDING INNOVATIONS



A close-up photograph of a diamond profile roller dresser, showing its cylindrical shape and the fine, concentric grinding marks on its surface. The top edge is polished and reflective.

**NORTON**

SAINT-GOBAIN

**WINTER**

PROFILE DRESSER

# DIAMOND PROFILE ROLLER DRESSERS FOR HIGH PRECISION DRESSING OF GRINDING WHEELS

|                                                 |    |                                                                 |    |
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## PRODUCTION OF UZ PROFILE ROLLER DRESSERS

Rotating profile roller dressers, also known as rotary truers, have similar profile as the workpiece.

These dressing tools are particularly suitable for complex profiles in mass production.

The advantages of profile roller dressers are

- Reduction of dressing costs per workpiece
- Optimized utilization of machine capacity
- Automation of the dressing process
- Repeatable high precision with low workpiece rejects
- Rapid incorporation of complex profiles in the grinding wheel

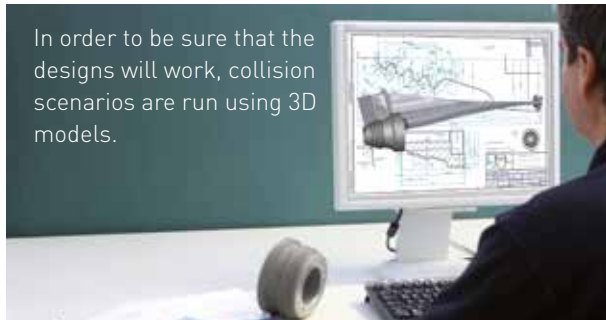




# PRODUCTION OF UZ PROFILEROLLER DRESSERS

## DESIGN: PRECISION FROM THE VERY START!

CAD drawings created in SOLID EDGE® are linked to the programs of the production and measuring machines.



## MANUFACTURING THE FORM RING

Depending on the profile shape, the ring is either CNC turned, or manually plunge turned with a profile tool: the high precision profile is created on the inside diameter of the form ring.



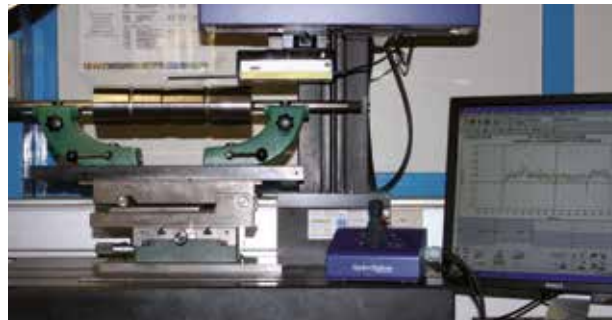
## THE DIAMONDS ARE SECURED TO THE RING IN A GALVANIC BATH.

This key step in the production process requires patience and technical know-how. The correct core for the profile is then inserted and fixed to the diamond/nickel layer using a special material. The form ring is turned off and the bore and contact surfaces are ground.



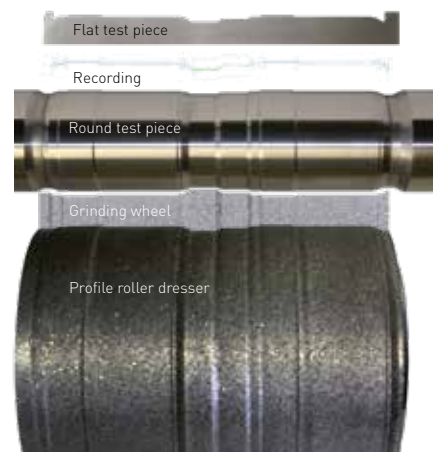
## CREATING THE TEST PIECE

After a grinding wheel has been profiled with the roller dresser, a test piece is ground and inspected: Does the ground test piece meet the requirements? This is where the new roller dresser proves itself for the first time.



## MEASURING THE PROFILE ACCURACY OF THE TEST PIECES

Adherence to workpiece or tool drawing profile is verified on state of the art measuring machines. We work in close cooperation with our discerning customers, agreeing measuring instructions and test protocols with them and discussing their wishes concerning the measuring procedure.



## MOUNTING THE PROFILE ROLLER DRESSER

Sensitivity and a respect for detail: profile roller dressers are manually fitted onto the customer's arbor when requested – a job that we are very happy to do, since keeping to the tightest running tolerance has a crucial effect on the working life of the tool.



## PRODUCTION OF UZ PROFILE ROLLER DRESSERS

# USING PROFILE ROLLER DRESSERS

Our greatest claim is that we offer innovative solutions for our customers in the form of optimized high-performance diamond dressing tools – precisely matched to their particular needs and requirements.

Therefore in this chapter you will not find any standard articles available ex stock, but a survey of typical applications and information on feasibility and tolerances.

### CUTTING TOOL INDUSTRY

Shorter process times are a key requirement in the cutting tool industry. Norton WINTER profile roller dressers are the means to high precision and rapid cycle times.



### MEDICAL TECHNOLOGY

High precision grinding and dressing are taken as a matter of course in this industry. It is therefore obvious that Norton WINTER profile roller dressers are used here.

### AUTOMOTIVE & GEAR

Very many engine and drive components require the tightest tolerances – here high quality is combined with large quantities. Norton WINTER profile roller dressers help to meet these demands.





### TURBINE INDUSTRY

Jet engines for aircraft and stationary turbines for electricity generation require exactly the same attention regarding power, good value and safety. You can meet the challenges of your market by using Norton WINTER tools.

### THE ROLLER BEARING INDUSTRY

Since a roller bearing has a large number of different components, a wide variety of demands are made on the dressing tools that are used. Norton WINTER profile roller dressers offer economical, highly precise dressing with excellent results.



### WIND FARMS

Renewable energy is the challenge of the times and will characterize future markets. Continuing demands for higher efficiency require high-quality tools and partners who go all the way into the future with you.

## PRODUCTION OF UZ PROFILE ROLLER DRESSERS

# DIMENSIONS THAT CAN BE PRODUCED

The dimensions and tolerances that can be obtained for different profiles are summarized on the next two pages. As a general rule, Norton WINTER diamond roller dressers have a 3 mm clocking ring on one face and a 1 mm integral spacer on the other face. The measuring cylinder allows the concentricity of the mounted diamond roller dresser to be checked, as it runs to within 0,002 mm concentric to the bore and diamond coating of the roller dresser. The working strip prevents a spacer ring or flange from coming into direct contact with the diamond coating. These features add 4 mm to the width of the diamond roller dresser.

### MINIMUM DEVIATIONS

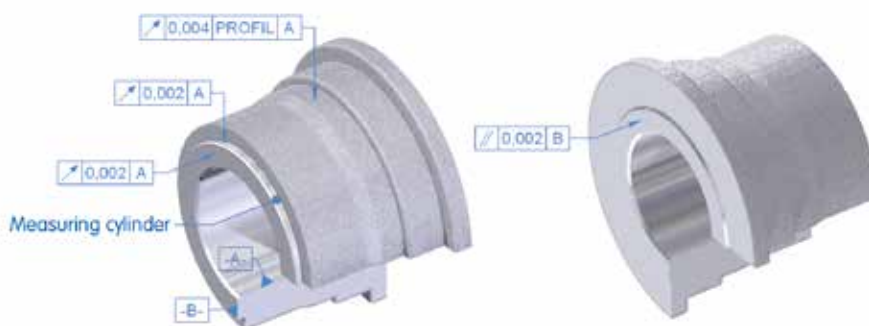


# STANDARD TOLERANCES

### MEASURING SURFACES



### RUNNING TOLERANCES



### INFO

As a basic rule, the diameter of a diamond roller dresser is not dependent on the diameter of the workpiece. What matters is that the profile of the roller matches that of the workpiece.

### INSTALLATION DIMENSIONS OF A ROLLER DRESSER:

width over diamond coating = grinding wheel width +3 ~ +4 mm overall width of the roller dresser = diamond coating width +4 mm

### PLEASE NOTE:

To achieve profile stability, a cylindric extension should be given to the profile edge, if the geometry is concave or tapered.

Free size tolerances to DIN 7168 m



## TYPES **UZ, TS, SG**

| TYPE | MANUFACTURE      | BOND          | GRIT DISTRIBUTION      | GRIT DENSITY       |                                                                                     |
|------|------------------|---------------|------------------------|--------------------|-------------------------------------------------------------------------------------|
| UZ   | Reverse process  | Electroplated | Statistical            | Maximum            |  |
| TS   | Reverse process  | Infiltrated   | Statistical/controlled | Maximum/controlled |  |
| SG   | Positive process | Electroplated | Statistical            | Maximum            |  |

### UZ VERSION

The diamond grit is statistically distributed over the surface of the profile roller dresser. The distance between the grits is determined by the grit size used. The dense coating of diamonds means that the diamond content is greater than in comparable profile roller dressers with manually applied diamonds. The manufacturing process is largely independent of the shape of the profile. Concave radii  $\geq 0,03$  mm and convex radii  $\geq 0,08$  mm are possible.

For use in applications with the most stringent surface and geometry requirements since this type can achieve profile accuracy of  $\geq 0,8$   $\mu$ m.

### TS VERSION

In contrast with the UZ version, the diamonds here can also be set according to a defined pattern.

This requires certain minimum diamond sizes so not all profile shapes are available in this version.

The concentration of the diamond coating can be influenced by changing the distance between the diamonds.

Profile accuracy is achieved by grinding the diamond coating.

Convex and concave radii  $\geq 0,3$  mm are possible.

The diamond coating can be re-machined, depending on its condition.

For use in applications with very stringent surface and geometry requirements; profile accuracy of  $\geq 2$   $\mu$ m can be achieved.

### SG VERSION

The diamond grit is statistically distributed. Convex and concave radii  $\geq 0,5$  mm are possible.

For use on prototypes (short delivery time but limited service life) where the surface and geometry requirements are lower; dimensional accuracy is achieved by grinding the diamond coating.

## FACTORS THAT AFFECT THE SERVICE LIFE OF DIAMOND ROLLER DRESSERS

The main influencing factors include:

- The rigidity of the machine and dressing device
- The runout of the roller dresser and holding fixture
- Suitable cooling during dressing
- Specification of the grinding wheel
- Dressing parameters
- Diamond pattern and grit size
- Type of roller dresser
- Dimensional and form tolerances

## TYPES UZ, TS, SG

# THE EFFECT ON THE GRINDING BEHAVIOUR

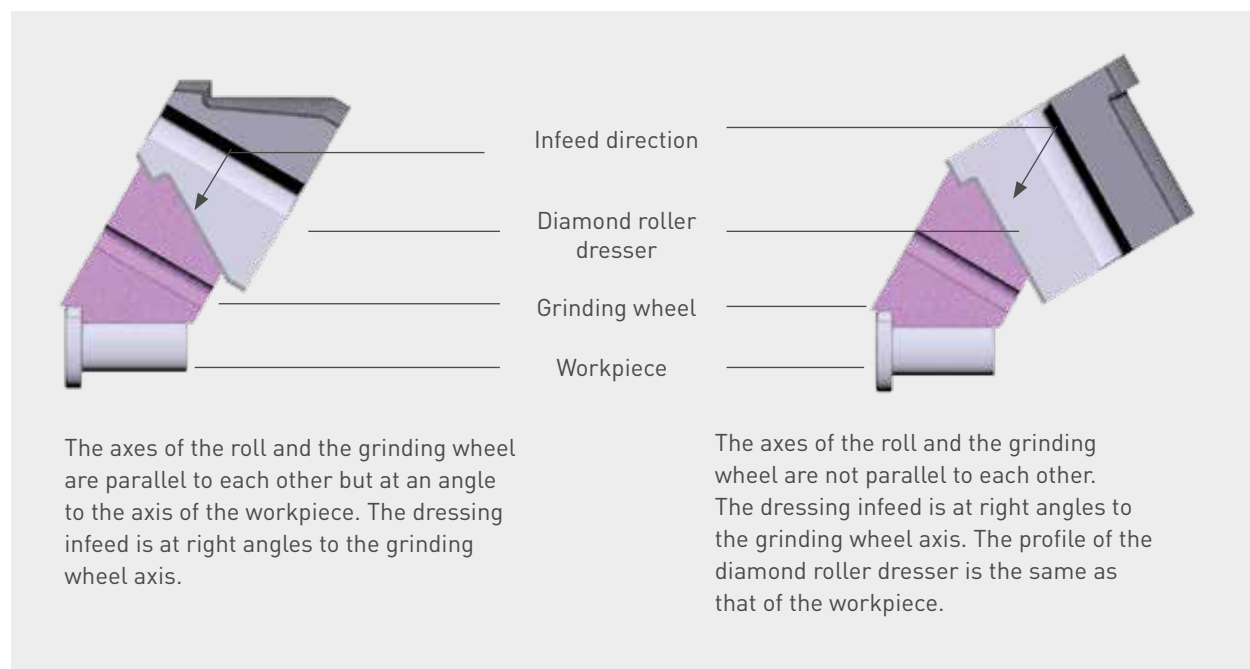
### THE ROLLER DRESSER – GRINDING WHEEL – WORKPIECE ARRANGEMENT

The behaviour of a grinding wheel depends on the structure and sharpness of the grit on the cutting surface and the kinematic cutting parameters as well as length and depth; it is also affected by

- The dressing parameters
- The diamond roller dresser – grinding wheel – workpiece arrangement
- The grit size used.
- The exposure of the diamond grits.

The effective peak-to-valley height is an important feature of grinding wheel topography. As this increases, the cutting performance of the grinding wheel and the surface roughness of the workpiece also increase.

The axial arrangements shown below for angle approach grinding are the most practical. They create a greater effective peak-to-valley height at the flat shoulders. In consequence there is less chance of burning.



The roller dresser/grinding wheel speed ratio  $q_d$ , the dressing infeed per grinding wheel revolution  $f_{rd}$  and the number of spark-out revolutions  $n_s$  (i.e. the number of revolutions of the grinding wheel with no further dressing infeed) have been found to be suitable control parameters for the conditions during dressing that affect the peak-to-valley height. Further information can be found in the chapter entitled 'Dressing parameters'.

## MACHINING CONDITIONS

### DRIVE CAPACITY OF THE DRESSING SPINDLE

For dressing with diamond roller dressers, provision has to be made for relative motion between the roller dresser and the grinding wheel. This relative motion is defined as the difference between the circumferential speeds of the diamond roller dresser and the grinding wheel.

Diamond roller dressers must be mounted on a separate drive in order to generate the relative speed in the circumferential direction. The design of the drive depends on the following variables:

- The specification of the grinding wheel to be dressed
- The specification of the diamond roller dresser
- The dressing infeed
- The speeds that are required
- The type of dressing (uni-directional, counter-directional)

The required spindle drive power is typically 20 W/mm of developed roller dresser contact width. This value applies for dressing a medium-hard grinding wheel with special fused alumina in a vitrified bond.

To obtain a reproducible dressing result, the roller dresser drive must be designed in such a way that the speed ratio between the diamond roller dresser and grinding wheel is constant. If the drives are separate the grinding wheel motor output must be aligned with that of the roller dresser motor. In order to guarantee a constant speed ratio in practice, it may be necessary to install greater drive capacities in the dressing unit than those obtained using the basis of calculation referred to above.

## MACHINE MOUNTING

The static and dynamic rigidity of the dressing system has a crucial influence on the dressing performance. The greatest system rigidity is achieved by installing bearings on both sides of the roller dresser. The high normal forces that occur with profile roller dressers require the roller dresser to have bearings on both sides.

In order to counteract the build-up of circumferential waviness on the grinding wheel during dressing, the dressing unit must possess radial rigidity. When dressing with continuous-path controlled diamond dressing wheels, the normal forces are considerably lower. In this case bearings on one side only (flying bearings) can be considered.

## RUNNING TRUTH AND VIBRATION

Special attention must be given to the geometric runout of the roller dresser and its balance quality. The tolerances for high precision profiles of 0,002 mm must be observed; so the radial and axial run-out of the diamond roller dresser spindle must not exceed 0,002 mm. Because of the rigidity requirements, the largest possible arbor diameter should be selected provided that it is still in proportion to the outer diameter. Bore diameters of Ø 40 to 80 mm are usual in the case of diamond roller dressers.

The required combination of tolerances between the roller dresser bore and the arbor is H3/h2. A fitting allowance of 0,003 to 0,005 mm enables the diamond roller dressers to be mounted and prevents running deviations in the diamond coating.

The most frequent sources of vibration during dressing are rotating imbalances. An important requirement, therefore, is precise balancing of the roller dresser and arbor. The natural frequencies of the dressing system should also be known. Knowing these, it is possible to select the dressing parameters so that the rotation frequencies of the dressing spindle and grinding wheel do not coincide with resonance points in the dressing unit or the overall system.

## COOLING

An adequate cooling system is essential, and coolant must be applied before dressing starts. The coolant flow rate and the pressure should be exactly the same as for grinding. In the case of complex profiles, particularly those with high shoulders, the coolant nozzle must be of a suitable design.

The speed at which the coolant leaves the nozzle should be as close as possible to the circumferential speed of the grinding wheel and the jet of coolant should be directed accurately onto the point of contact.



The coolant nozzle for dressing must be mounted such that fluid is directed at the point of contact between dresser and wheel, in the direction of wheel rotation.

Optimally designed coolant nozzle grants controlled coolant jet

## CONTACT DETECTION

A high-precision dressing spindle is required when diamond profile roller dressers and path controlled form rolls are used to dress vitrified bonded cBN or diamond grinding wheels. A contact detection device monitors the point at which the roller dresser touches the grinding wheel and supervises the complete dressing cycle.

Contactless measurement using structure-borne noise signals which are displayed on the monitor enable dressing to be as economical as possible: this guarantees minimum loss of the grinding wheel layer together with maintenance of the maximum possible chip space.

Minimum material removal during dressing leads to a marked reduction in tooling costs. Continuous control of the dressing and grinding processes is an essential requirement for high process reliability.

For more information about contact detection please refer to chapter „Dressing parameters, contact detection“.

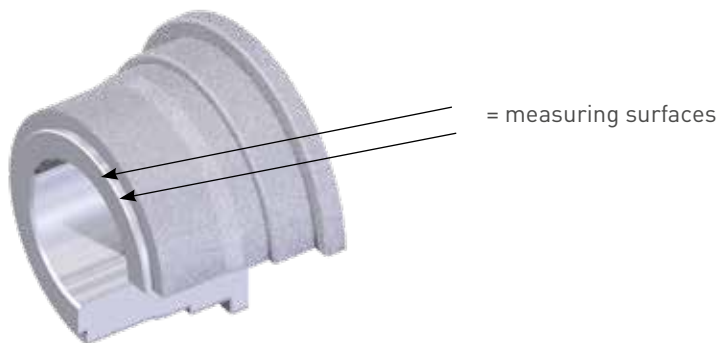
## ASSEMBLY AND REMOVAL OF ROLLER DRESSERS

# ASSEMBLY AND REMOVAL OF ROLLER DRESSERS

1. Norton WINTER diamond roller dressers are manufactured with bore tolerance H3 to ISO Standard.
2. The required tolerance of the holding fixture for the roller dresser is 0 to  $-0,002$  mm.  
The maximum permissible radial and axial running error for the holding fixture is  $0,002$  mm.
3. Absolute cleanliness is essential when mounting the roller dresser on the holding fixture.  
Do not use any lubricants. In order to facilitate assembly it is permissible to heat the roller dressers to no more than  $50\text{ }^{\circ}\text{C}$  in a water bath.  
**Please note:** The arbor may also be cooled. The roller dressers must not be pressed or forced onto the holding fixture.  
Obviously impact tools must not be used under any circumstances.
4. The spacer rings and bushes to be used for assembly must be  $< 0,002$  mm plane parallel.
5. After assembly the radial and axial running of the roller dressers is determined using the measuring cylinder provided for the purpose or on the plane surfaces. Maximum permissible running deviations:

Radial  $0,002$  mm

Axial  $0,002$  mm



6. Before the first dressing operation the position of the dressing coolant nozzle must be checked and adjusted if necessary. Please note: The coolant nozzle for dressing must be mounted in the direction in which the grinding wheel rotates. Dressing without coolant leads to premature destruction of the roller dressers. The design of the coolant nozzle for deep profiles should be adapted to the profile of the roller dresser.
7. When removing diamond roller dressers the roller dresser/arbor unit must be cooled down. Subsequently the roller dresser exclusively may be heated in warm water to  $50\text{ }^{\circ}\text{C}$  maximum.



# TROUBLESHOOTING

| SYMPTOM                                                 | NOTES                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Machine generates increased noise when dressing      | Imbalance or radial runout of the diamond roller dresser or grinding wheel, or excessive dressing forces.                                                                                                                                                                                                       |
| 1,1. Constant dressing noise                            | a) Correct imbalances and/or runout<br>b) Change direction of rotation from uni-directional to counter-directional<br>c) Reduce dressing feed                                                                                                                                                                   |
| 1,2. Louder at the start, then gradually fading         | Arrangement is not rigid enough<br>Reduce dressing forces (see 1,1)                                                                                                                                                                                                                                             |
| 2. Workpiece profile deviates from target               | a) Grinding wheel too soft: Grinding wheel profile collapses<br>b) Grinding wheel too hard: excessive grinding pressure                                                                                                                                                                                         |
| 3. Workpiece shows chatter marks                        | Machine vibrations caused by:<br>a) Inadequate bearing arrangement for the grinding spindle or holding fixture<br>b) Inadequate rigidity of the machine or dressing unit<br>c) Insufficient dressing spindle driving power<br>d) Radial runout of the diamond roller dresser is too high                        |
| 4. Deviating width dimension at slots or ribs           | a) Axial play in the grinding spindle or holding fixture bearings<br>b) Diamond roller dresser has axial run out                                                                                                                                                                                                |
| 5. Burn marks on workpiece                              | a) Insufficient coolant supply (pressure, flow rate or nozzle position)<br>b) Unsuitable grinding wheel structure and hardness<br>c) Unsuitable workpiece – grinding wheel – diamond roller dresser arrangement<br>d) Spark-out time too long, dressing feed too short<br>e) Unsuitable speed ratio qd selected |
| 6. Increased surface waviness and peak-to-valley height | a) Worn diamond coating on roller dresser<br>b) Contaminated coolant<br>c) Insufficient sparking out time when grinding                                                                                                                                                                                         |

**FOR PROFILE ROLLER DRESSERS**

24 / NORTON WINTER DRESSING TOOLS



**NORTON**

SAINT-GOBAIN

**WINTER**

DRESSING TOOLS

# DRESSING TOOLS FOR THE MACHINING OF GEAR TEETH

|                                                                                      |    |
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| Continuous gear generation grinding                                                  | 27 |
| Bevel grinding                                                                       | 29 |
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| External cylindrical grinding, bore grinding and top-and- bottom grinding operations | 31 |
| <b>CHECKLIST FOR THE MANUFACTURE OF A NEW DRESSING TOOL FOR GRINDING WORMS</b>       | 32 |

High precision dressing tools are essential for accurate profiling and sharpening of grinding worms, profile grinding wheels and bevel grinding wheels. They determine the quality of the finished gears.

Norton WINTER rotary diamond dressing tools for gear generation are matched to individual needs and specifications. Therefore in this chapter you will not find any standard articles available ex stock, but a survey of

- Rotary single- and twin-taper dressers with plain roller dressers
- Full-profile roller dressers for small modules
- Roller dresser sets
- Dressers for profile grinding
- Dressers for bevel grinding



# DRESSING TOOLS

## CONTINUOUS GENERATING GRINDING



### SINGLE-TAPER DRESSING WHEELS (HP)

- Excellent, highly versatile tool design
- Dressing wheels are used in pairs, each with its own powered dressing spindle
- Dressing wheels can be independently angled and the optimum positioning of the dressing tools guarantees the highest gear quality
- The pitch of the grinding worm can be adjusted by changing the distance between the dressing wheels
- The profile depth of the grinding worm can be individually selected
- Can be used across different modules, if required
- Tooth root grinding can be integrated using additional design features
- Tools can be regenerated by regrinding or replating the body



### TWIN-TAPER DRESSING WHEELS AND CHAMFERING ROLLS (HP OR VU)

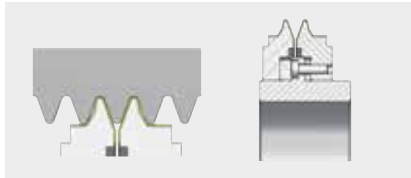
- A very good tool design where tooth root machining is required
- For small modules ( $< 1,5$ ) we recommend the use of reverse electroplated profile roller dressers
- For larger modules ( $> 1,5$ ) we recommend the use of positive electroplated profile roller dressers
- Both these dressing tools can be used with separately powered working spindles
- The positioning of the individual tools can be individually adjusted, but their design is dependent on the workpiece
- Positive electroplated (HP) tools can be regenerated by regrinding or replating the body

## CONTINUOUS GENERATING GRINDING



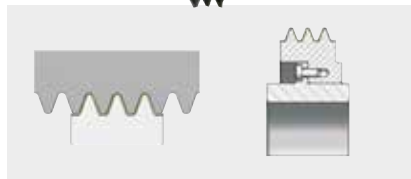
### ROLLER DRESSER SETS FOR SINGLE-PASS DRESSING (HP)

- A very good tool design where tooth root machining is required
- Various roller dresser set configurations are available to optimize dressing paths and therefore allow shorter dressing times
- Dressing set designs are specific to each workpiece and are used on individually powered working spindles
- Proven rapid setup and tool change times
- Tools can be regenerated by regrinding or replating the body



### FULL PROFILE ROLLER DRESSERS (VU)

- An excellent tool design with low setup requirements
- Particularly suitable for module ranges  $< 1,5$
- The full profile roller dresser is basically used as an individual tool on a powered dressing spindle
- For single-pass and multi-pass dressing
- The design of each tool is specific to that of the workpiece
- Tooth root grinding is normally used
- Tools cannot be regenerated by regrinding or replating the body



## BEVEL GRINDING



NORTON WINTER brand, Saint-Gobain has an optimally matched product range for grinding spiral and hypoid bevel gears.

For grinding bevel gears, Klingelnberg and Gleason-Pfauter machines are typically used and we can provide the dressers assembled to new adapters, or assemble to used adapters.

We also provide the relaping service, please contact us for further information.

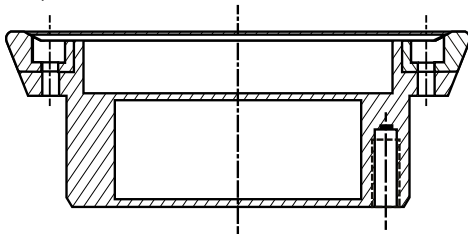
With grinding cups and the corresponding rotary dressing tools, Saint-Gobain offers a comprehensive grinding process solution:

- Vitrified bonded Norton WINTER cBN grinding cup wheels
- NORTON grinding cup wheels made from special fused alumina or sintered corundum
- Rotary Norton WINTER dressing tools matched to the grinding cups.

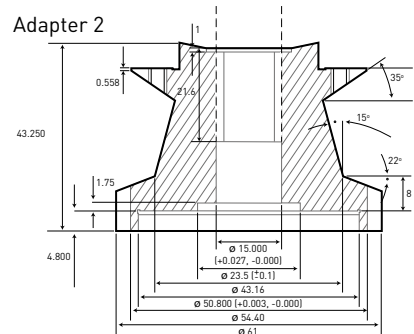
## BEVEL

| DESIGN CODE | D      | RADIUS | CLEARANCE<br>ANGLE | H    | ADAPTER | GRIT    | ORDER<br>NUMBER |
|-------------|--------|--------|--------------------|------|---------|---------|-----------------|
| V9TS71P     | 71,93  | 2,54   | 10°                | 50,8 | 2       | CVD     | 66260187301     |
| V2TS71P     | 75     | 1,0    | 3°                 | 40   | 1       | CVD     | 66260122721     |
| V2TS71P     | 75     | 1,0    | 5°                 | 40   | 1       | CVD     | 66260142906     |
| V3TS71P     | 100    | 0,95   | 5°                 | 40   | -       | CVD     | 66260162228     |
| TS71P       | 143,51 | 2,54   | 6°                 | 50,8 | 2       | Diamond | 7958796008      |

Adapter 1



Adapter 2



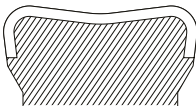
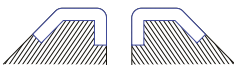
## PROFILE GRINDING

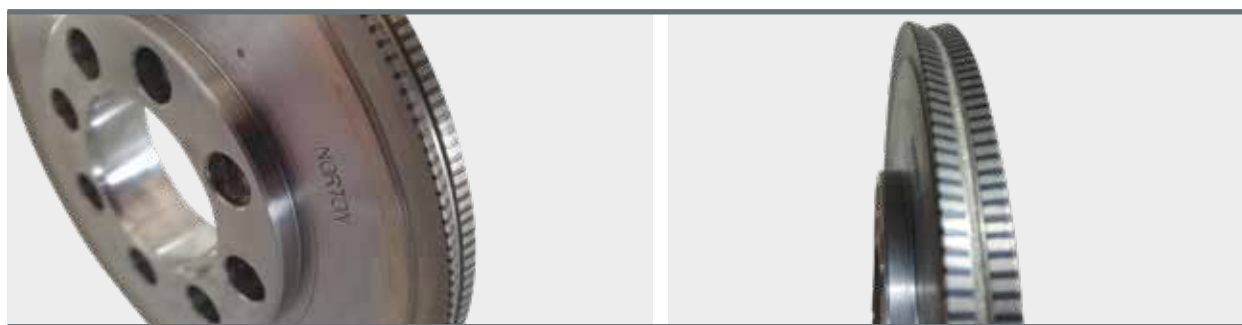


Profile grinding forms the exact shape of the gear teeth.

The wheel runs between two opposing teeth to grind both surfaces at the same time. This is known as discontinuous grinding and is used on large contact areas.

## DRESSER FOR PROFILE GRINDING

|                                                                                     | DESIGN<br>CODE | D   | RADIUS | CLEARANCE<br>ANGLE | H           | WIDTH      | GRIT | ORDER<br>NUMBER | COMMENT              |
|-------------------------------------------------------------------------------------|----------------|-----|--------|--------------------|-------------|------------|------|-----------------|----------------------|
| TYPE 1                                                                              |                |     |        |                    |             |            |      |                 |                      |
|    | V5TS71P        | 160 | 1,0    | 5°                 | 52          | 36         | CVD  | 66260166015     | -                    |
| TS30N                                                                               |                |     |        |                    |             |            |      |                 |                      |
|  | V1TS71P        | 160 | 1,6    | -                  | 12<br>Taper | 12         | Grit | 66260177391     | -                    |
|                                                                                     | V1TS71P        | 186 | 0,5    | -                  | 80          | 25         | CVD  | 66260180326     | -                    |
| TYPE 2                                                                              |                |     |        |                    |             |            |      |                 |                      |
|  | V1TS71S        | 120 | 1,5    | 5°                 | 35          | 26 (Dt) 47 | Grit | 66260166017     | Set of 2<br>dressers |
|                                                                                     | V1TS71P        | 230 | 0,8    | 2°                 | 175         | 10 (Dt) 22 | Grit | 66260189586     | Single dresser       |



# COMPLETE SOLUTIONS

## EXTERNAL CYLINDRICAL GRINDING, BORE GRINDING AND TOP-AND-BOTTOM GRINDING OPERATIONS

The best solutions for these applications are

- NORTON conventional grinding tools and wheels
- Norton WINTER electroplated or vitrified bonded diamond/cBN grinding wheels
- Norton WINTER diamond dressing tools.





## CHECKLIST

## FOR THE MANUFACTURE OF A NEW DRESSING TOOL FOR GRINDING WORMS

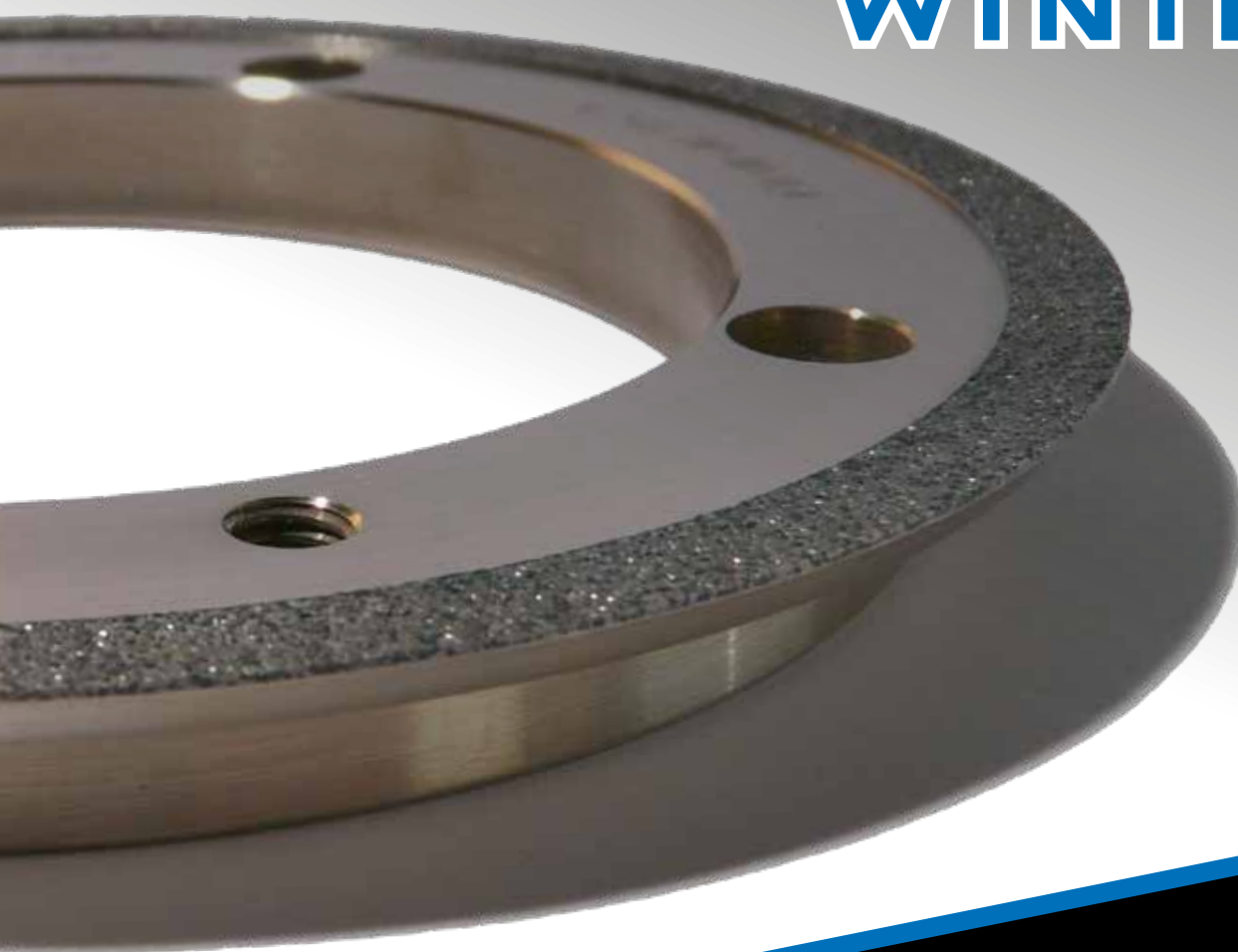
|                                              |                                                                                                                                                     |                                       |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>CUSTOMER / CUSTOMER NO.:</b>              |                                                                                                                                                     |                                       |
| <b>MACHINE / DRESSER:</b>                    |                                                                                                                                                     |                                       |
| <b>DESIGN DATA:</b>                          | <input type="checkbox"/> Workpiece drawing/diagrams with tolerances and flank assignment shown – by post or email (.dxf, .dwg, .pdf or .tif format) |                                       |
|                                              | <input type="checkbox"/> Diagram of flank lines and profile modifications with all data and tolerances for traction flank and thrust flank          |                                       |
|                                              | <input type="checkbox"/> Traction flank and thrust flank assignment on the tool specified where profile modification differs on each flank          |                                       |
|                                              | Profile crowning                                                                                                                                    | $C_h =$                               |
|                                              | Profile angle deviation                                                                                                                             | $fH_o =$                              |
|                                              | Tip relief                                                                                                                                          | $C_a =$                               |
|                                              | Tip relief start diameter                                                                                                                           | $d_{ca} =$                            |
|                                              | Crowning                                                                                                                                            | $C_b =$                               |
|                                              | Tooth trace angle deviation                                                                                                                         | $fH_{\beta} =$                        |
|                                              | <input type="checkbox"/> Tooth root is ground                                                                                                       |                                       |
|                                              | Tool tip radius                                                                                                                                     | $roh_{tp} =$                          |
|                                              | and/or Fillet radius                                                                                                                                | $r_f =$                               |
|                                              | <input type="checkbox"/> Tool tip height                                                                                                            | $h_{ap} =$                            |
|                                              | <input type="checkbox"/> Drawing requested for approval                                                                                             |                                       |
| <b>GEAR DATA:</b>                            | Normal module                                                                                                                                       | $m_n =$                               |
|                                              | Number of teeth                                                                                                                                     | $z =$                                 |
|                                              | Pressure angle                                                                                                                                      | $\alpha_n =$                          |
|                                              | Helix angle and direction                                                                                                                           | $\beta =$                             |
|                                              | Tip diameter                                                                                                                                        | $d_a =$                               |
|                                              | Root diameter                                                                                                                                       | $d_f =$                               |
|                                              | Usable tip circle diameter                                                                                                                          | $d_{Na} =$                            |
|                                              | Usable root circle diameter                                                                                                                         | $d_{Nf} =$                            |
|                                              | Surface quality required                                                                                                                            | $R_a/R_z =$                           |
|                                              | Diametric two-ball/two-roller measurement                                                                                                           | $M_{dk}/M_{dr} =$                     |
|                                              | Measuring ball $\emptyset$ and/or measuring roller                                                                                                  | $D_M =$                               |
|                                              | or Base tangent length                                                                                                                              | $W_k =$                               |
|                                              | Number of measuring teeth                                                                                                                           | $k =$                                 |
|                                              | or Normal tooth thickness                                                                                                                           | $S_n =$                               |
| <b>CORRECTION UNDERTAKEN ON THE MACHINE:</b> | Pressure angle                                                                                                                                      | $\alpha_n =$                          |
|                                              | Module                                                                                                                                              | $m =$                                 |
| <b>GRINDING WORM:</b>                        | Dimensions                                                                                                                                          | <input type="checkbox"/> ` Right-hand |
|                                              | Number of threads                                                                                                                                   | <input type="checkbox"/> ` Left-hand  |
|                                              | Specification used at the time                                                                                                                      |                                       |



**NORTON**

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**WINTER**



CNC DRESSING  
DISCS

# CNC DRESSING DISCS

|                                             |    |                                                                               |    |
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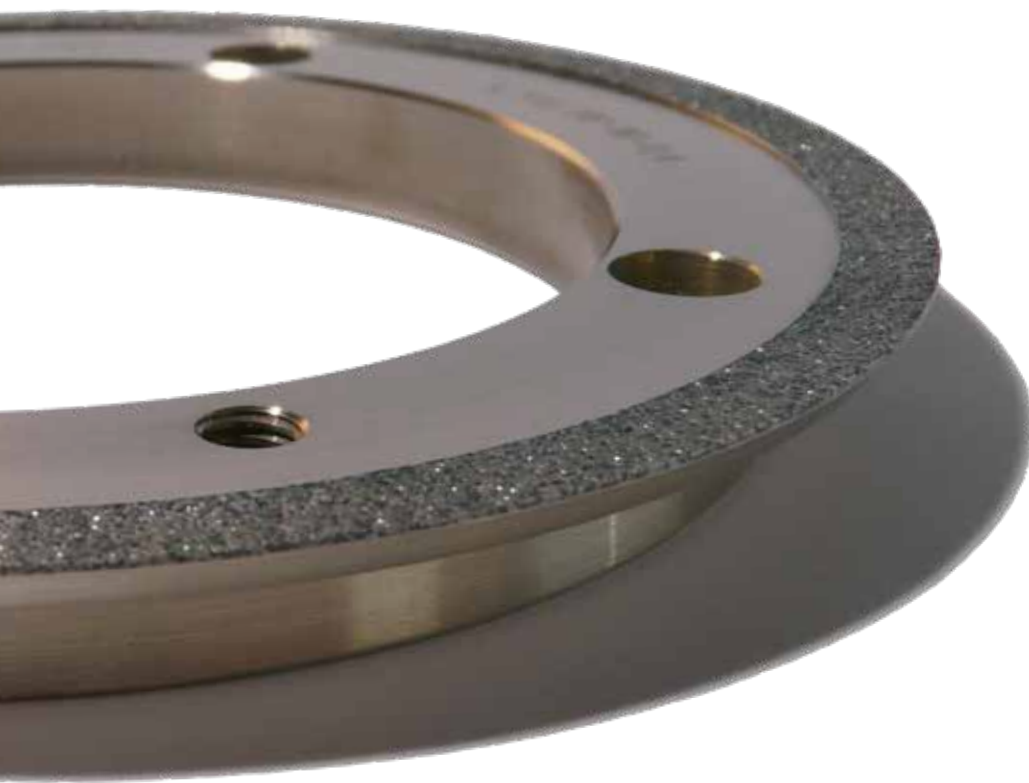
## CNC DRESSING DISCS

Contour controlled dressing tools enable complex grinding wheel profiles to be dressed as well as simple cylindrical grinding wheels of differing widths.

In addition it is possible, by specifying the dressing tool and selecting the individual dressing parameters, to influence the dressing result and thereby the quality of the workpiece.

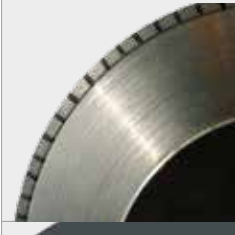
The advantages of contour controlled dressing discs are

- A versatile dressing tool
- Design is not specific to individual workpieces
- Constant effective dressing width
- Automation of the dressing process
- Reproducible high precision with low workpiece rejects



# MANUFACTURING PROCESS

## TYPES OF ROTARY CNC DRESSING DISCS

|                                                                                     | TYPE                      | MANUFACTURE      | BOND          | GRIT DISTRIBUTION         | GRIT DENSITY          |
|-------------------------------------------------------------------------------------|---------------------------|------------------|---------------|---------------------------|-----------------------|
|    | SG                        | Positive process | Electroplated | Statistical               | Maximum               |
|    | TS                        | Reverse process  | Infiltrated   | Controlled or statistical | Controlled or maximum |
|   | PCD/CVD/MCD               | Reverse process  | Infiltrated   | Controlled                | Controlled            |
|  | SD                        | Positive process | Sintered      | Statistical               | Controlled            |
|  | DDS<br>DDSpplus<br>DDScut | Positive process | Sintered      | Controlled                | Controlled            |

# SG DRESSING DISCS

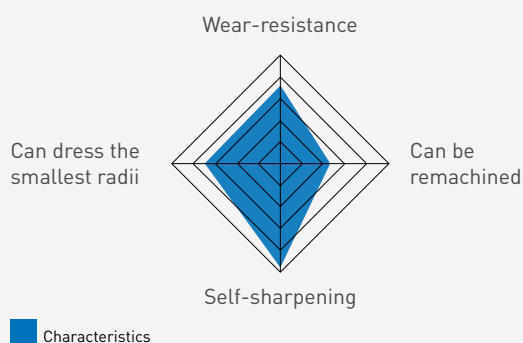
## GENERAL

Positive electroplated SG dressing discs have been established in the market for many years. They are characterized by a single layer of diamonds arranged radially and therefore have a constant effective dressing width  $b_d$ . Versions are available in either steel or bronze bodies.

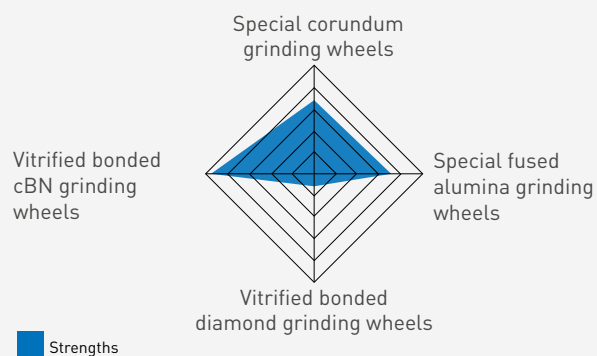
## APPLICATIONS:

- Dressing vitrified bonded cBN grinding wheels
- Dressing all conventional grinding wheels

### DRESSING DISC CHARACTERISTICS



### RECOMMENDED USE

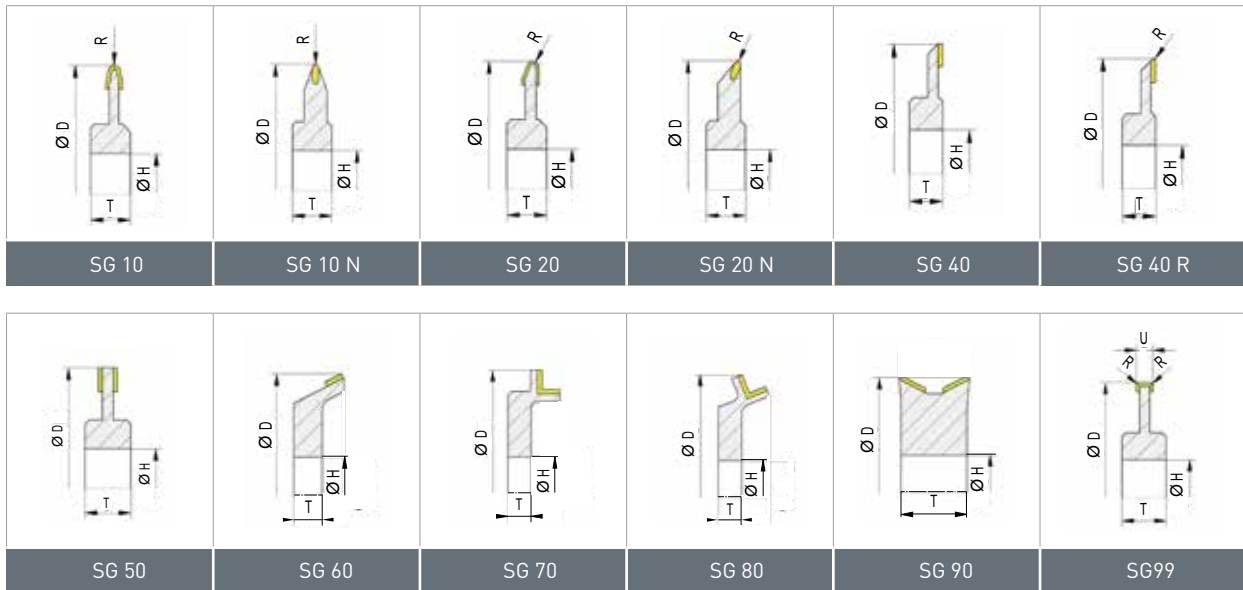


## ADVANTAGES:

- Statistical diamond distribution gives maximum diamond concentration
- Exceptional running truth accuracy achieved through the finish of the diamond coating
- Constant diamond layer widths due to single-layer of diamond particles
- Minimum radius  $R = 0,10$  mm depending on diamond grit
- Wide variety of versions can be supplied for all dressing applications and machines
- Standard dressing discs can be supplied from stock
- Max. outer diameter 340 mm, H3 bore



SOME OF OUR DESIGNS:



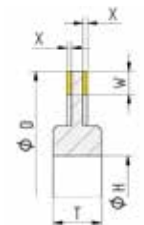
## SG DRESSING DISCS

### SG 40



| DESIGN CODE                                                                                                        | D   | X   | W | T     | H  | BORE TOLERANCE | GRIT SIZE | BODY   | ORDER NUMBER              | COMMENT            |
|--------------------------------------------------------------------------------------------------------------------|-----|-----|---|-------|----|----------------|-----------|--------|---------------------------|--------------------|
| 300SG71P                                                                                                           | 100 | 0,6 | 5 | 12    | 40 | H3             | D602      | Steel  | 60157697961               |                    |
| <b>MACHINE:</b> e.g. Studer <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels  |     |     |   |       |    |                |           |        |                           |                    |
| SG71P                                                                                                              | 110 | 0,8 | 5 | 10,85 | 75 | H3             | D852      | Bronze | 66260129200               | -                  |
| <b>MACHINE:</b> e.g. Junker <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels  |     |     |   |       |    |                |           |        |                           |                    |
| 306SG71P                                                                                                           | 120 | 0,4 | 5 | 19    | 52 | H3             | D426      | Steel  | 66260347760               | Case-hardened bore |
| <b>MACHINE:</b> e.g. Landis <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels  |     |     |   |       |    |                |           |        |                           |                    |
| 1SG71P                                                                                                             | 140 | 0,6 | 5 | 12    | 50 | H3             | D602      | Bronze | 66260334649               | -                  |
| <b>MACHINE:</b> e.g. Schaudt <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels |     |     |   |       |    |                |           |        |                           |                    |
| 302SG71P                                                                                                           | 140 | 0,6 | 5 | 12    | 50 | H3             | D602      | Steel  | 69014159716               | Hardened body      |
| <b>MACHINE:</b> e.g. Schaudt <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels |     |     |   |       |    |                |           |        |                           |                    |
| 303SG71P                                                                                                           | 150 | 0,4 | 5 | 19    | 52 | H3             | D426      | Steel  | 66260355740 <sup>1)</sup> | Case-hardened bore |
| <b>MACHINE:</b> e.g. Landis <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels  |     |     |   |       |    |                |           |        |                           |                    |

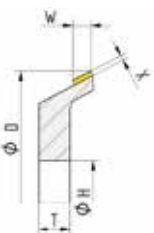
### SG 50



| DESIGN CODE                                                                                                       | D   | 2.X | W  | T  | H  | BORE TOLERANCE | GRIT SIZE | BODY  | ORDER NUMBER | COMMENT            |
|-------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|----|----------------|-----------|-------|--------------|--------------------|
| 4SG71P                                                                                                            | 120 | 1   | 5  | 19 | 52 | H3             | D501      | Steel | 66260132792  | -                  |
| <b>MACHINE:</b> e.g. Junker <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels |     |     |    |    |    |                |           |       |              |                    |
| SG71P                                                                                                             | 150 | 1,2 | 10 | 50 | 56 | H3             | D602      | Steel | 66260132775  | Case-hardened bore |
| <b>MACHINE:</b> e.g. Naxos <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels  |     |     |    |    |    |                |           |       |              |                    |

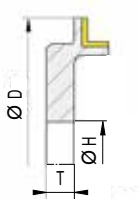
## CNC DRESSING DISCS

### SG 60



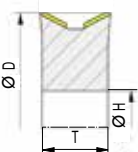
| DESIGN CODE                                                                                                       | D     | X   | W | T  | H  | BORE TOLERANCE | GRIT SIZE | BODY   | ORDER NUMBER | COMMENT            |
|-------------------------------------------------------------------------------------------------------------------|-------|-----|---|----|----|----------------|-----------|--------|--------------|--------------------|
| SG71P                                                                                                             | 110,8 | 0,8 | 8 | 10 | 75 | H3             | D852      | Steel  | 66260127188  | Case-hardened bore |
| <b>MACHINE:</b> e.g. Junker <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels |       |     |   |    |    |                |           |        |              |                    |
| 300SG71P                                                                                                          | 110   | 0,8 | 5 | 26 | 75 | H3             | D852      | Bronze | 66260166361  | -                  |
| <b>MACHINE:</b> e.g. Junker <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels |       |     |   |    |    |                |           |        |              |                    |

### SG 70



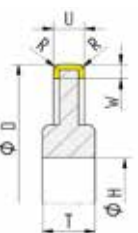
| DESIGN CODE                                                                                                       | D   | X   | W | T | H  | BORE TOLERANCE | GRIT SIZE | BODY   | ORDER NUMBER | COMMENT |
|-------------------------------------------------------------------------------------------------------------------|-----|-----|---|---|----|----------------|-----------|--------|--------------|---------|
| 300SG71P                                                                                                          | 195 | 1,0 | 5 | 8 | 75 | H3             | D1001     | Bronze | 66260179693  |         |
| <b>MACHINE:</b> e.g. Junker <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels |     |     |   |   |    |                |           |        |              |         |

### SG 90



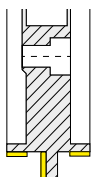
| DESIGN CODE                                                                                                        | D   | X   | W | T  | H   | BORE TOLERANCE | GRIT SIZE | BODY  | ORDER NUMBER | COMMENT |
|--------------------------------------------------------------------------------------------------------------------|-----|-----|---|----|-----|----------------|-----------|-------|--------------|---------|
| 300SG71P                                                                                                           | 235 | 0,6 | 7 | 25 | 112 | H3             | D602      | Steel | 66260192488  |         |
| <b>MACHINE:</b> e.g. Danobat <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels |     |     |   |    |     |                |           |       |              |         |

### SG 99



| DESIGN CODE                                                                            | D   | U | W | T  | H  | BORE TOLERANCE | GRIT SIZE | BODY  | ORDER NUMBER | COMMENT                      |
|----------------------------------------------------------------------------------------|-----|---|---|----|----|----------------|-----------|-------|--------------|------------------------------|
| SG71P                                                                                  | 173 | 3 | 3 | 16 | 50 | H3             | D602      | Steel | 66260131884  | R = 0,3 / $\nabla 3^\circ$ * |
| <b>MACHINE:</b> e.g. Schaudt <b>APPLICATION:</b> Dressing conventional grinding wheels |     |   |   |    |    |                |           |       |              |                              |
| * This refers to the conicity of the outer diameter                                    |     |   |   |    |    |                |           |       |              |                              |

### SG 100



| DESIGN CODE                                                                                                        | D   | X   | W  | T  | H  | BORE TOLERANCE | GRIT SIZE | BODY   | ORDER NUMBER | COMMENT |
|--------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|----|----------------|-----------|--------|--------------|---------|
| 300SG71P                                                                                                           | 120 | 0,8 | 5  | 13 | 40 | H3             | D852      | Steel  | 66260203069  |         |
| <b>MACHINE:</b> e.g. Danobat <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels |     |     |    |    |    |                |           |        |              |         |
| 300SG71P                                                                                                           | 180 | 1,0 | 5* | 8  | 75 | H3             | D1001     | Bronze | 66260180442  |         |
| <b>MACHINE:</b> e.g. Junker <b>APPLICATION:</b> Dressing of conventional and vitrified bonded cBN grinding wheels  |     |     |    |    |    |                |           |        |              |         |

# TS DRESSING DISCS

## GENERAL

Infiltrated dressing discs are characterized by high wear resistance and consist of a single-layer diamond coating.

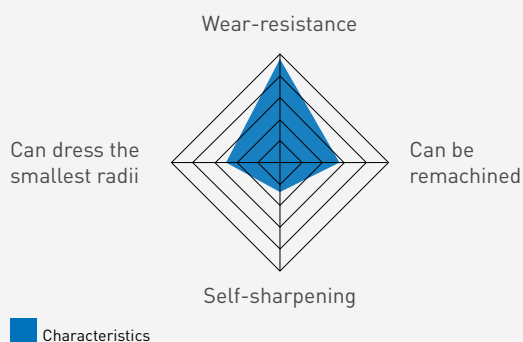
Edge reinforcements can be used to increase the wear resistance.

## APPLICATIONS:

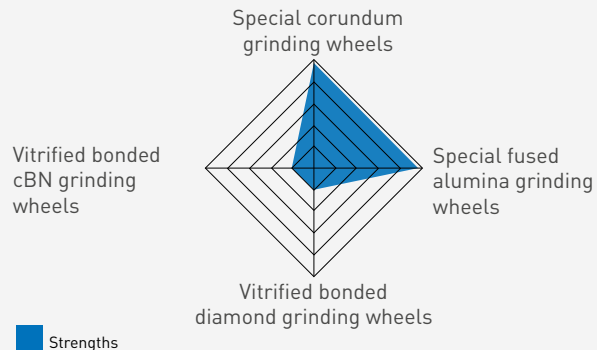
- Dressing all conventional grinding wheels



## DRESSING DISC CHARACTERISTICS



## RECOMMENDED USE

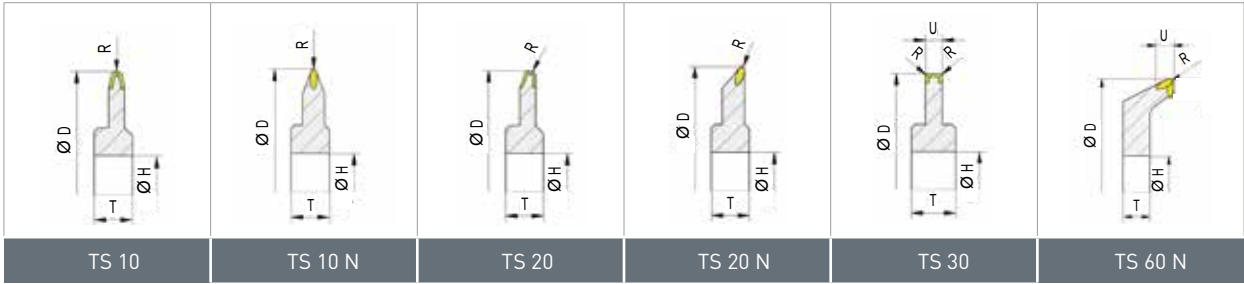


## ADVANTAGES:

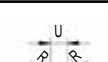
- Both random and controlled diamond concentration
- Extremely high accuracy as the diamond coating is ground
- Individually selected diamonds reinforce small radii
- Radii of less than  $R = 0,4$  mm have needle diamonds
- Minimum radius  $R = 0,1$  mm for an internal angle of  $30^\circ$
- Minimum coating thickness  $B = 2$  mm with minimum edge radius  $R = 0,2$  mm
- Max. outer diameter 340 mm, H3 bore

## TS DRESSING DISCS

### SOME OF OUR DESIGNS:



## TS DRESSING DISCS

| TS 30 | DESIGN CODE                                                                                         | D     | U  | X   | T   | H  | BORE TOLERANCE | GRIT SIZE | BODY  | ORDER NUMBER | COMMENT                               |
|-------|-----------------------------------------------------------------------------------------------------|-------|----|-----|-----|----|----------------|-----------|-------|--------------|---------------------------------------|
|       |                    | TS71Z | 65 | 8   | 0,8 | 8  | 43             | H3        | D852  | Steel        | 66260382820                           |
|       | MACHINE: e.g. Giustina APPLICATION: Dressing conventional grinding wheels                           |       |    |     |     |    |                |           |       |              |                                       |
|       | 2TS71P                                                                                              | 85    | 10 | 0,8 | 13  | 15 | H3             | D1001     | Steel | 66260381629  | Cylindrical statistical chamfer 1x20° |
|       | MACHINE: e.g. Junker APPLICATION: Dressing of conventional and vitrified bonded cBN grinding wheels |       |    |     |     |    |                |           |       |              |                                       |

All dimensions in mm

Delivery time approx. 8 weeks



# PCD/CVD/MCD DRESSING DISCS

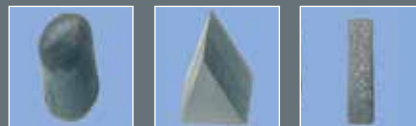
## GENERAL

Infiltrated versions of CNC dressing discs, with PCD, CVD or MCD rods are particularly suitable for dressing very small radii.

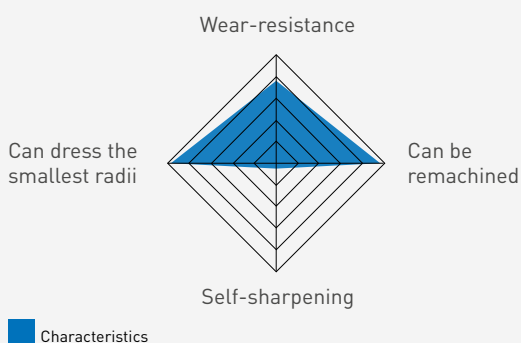
The design enables the dressing discs to be reworked a number of times.

## APPLICATIONS:

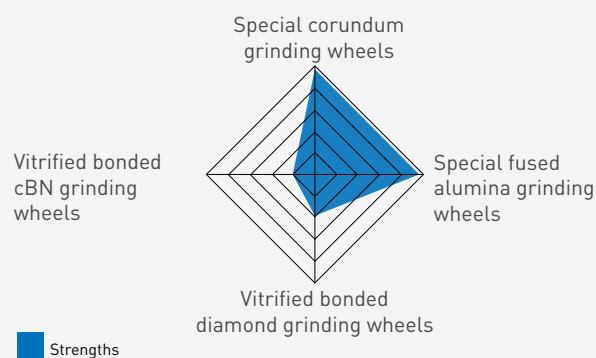
- PCD for dressing grinding wheels with special fused alumina
- CVD or MCD for dressing grinding wheels with sintered corundum (TG/SG/XG etc.)



## DRESSING DISC CHARACTERISTICS



## RECOMMENDED USE



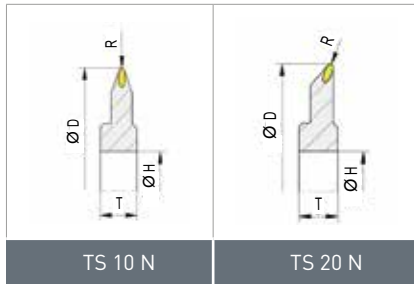
## ADVANTAGES:

- Controlled concentration
- Extremely high accuracy as the diamond coating is ground
- Can be reprofiled many times
- Minimum radius with an internal angle:
  - R = 0,05 mm for a minimum angle of 35°
  - R = 0,10 mm for a minimum angle of 25°
- Minimum layer thickness and corner radius for cylindrical version:
  - B = 0,5 mm
  - R = 0,05 mm
- Max. outer diameter 340 mm, H3 bore



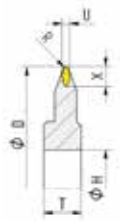
## PCD/CVD/MCD DRESSING DISCS

### SOME OF OUR DESIGNS:



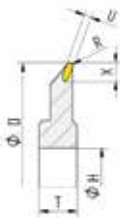
## CVD DRESSING DISCS

### TS 10 N



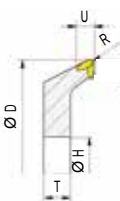
| DESIGN CODE                                                                                    | D   | U    | X   | T  | H  | BORE TOLERANCE | GRIT SIZE | BODY  | ORDER NUMBER | COMMENT                 |
|------------------------------------------------------------------------------------------------|-----|------|-----|----|----|----------------|-----------|-------|--------------|-------------------------|
| YTS71P                                                                                         | 100 | 0,71 | 1,5 | 12 | 40 | H3             | CVD       | Steel | 60157698362  | R = 0,10 $\pm 40^\circ$ |
| <b>MACHINE:</b> e.g. Studer <b>APPLICATION:</b> Dressing conventional grinding wheels          |     |      |     |    |    |                |           |       |              |                         |
| V3TS71P                                                                                        | 150 | 0,71 | 1,5 | 16 | 52 | H3             | CVD       | Steel | 66260189171  | R = 0,40 $\pm 26^\circ$ |
| <b>MACHINE:</b> e.g. Schaudt Mikrosa <b>APPLICATION:</b> Dressing conventional grinding wheels |     |      |     |    |    |                |           |       |              |                         |

### TS 20 N



| DESIGN CODE                                                                           | D   | U    | X   | T  | H  | BORE TOLERANCE | GRIT SIZE | BODY  | ORDER NUMBER              | COMMENT                 |
|---------------------------------------------------------------------------------------|-----|------|-----|----|----|----------------|-----------|-------|---------------------------|-------------------------|
| YTS71P                                                                                | 100 | 0,67 | 1,5 | 12 | 40 | H3             | CVD       | Steel | 60157698367 <sup>1)</sup> | R = 0,25 $\pm 40^\circ$ |
| YTS71P                                                                                | 100 | 1,07 | 1,5 | 12 | 40 | H3             | CVD       | Steel | 60157698368               | R = 0,50 $\pm 40^\circ$ |
| YTS71P                                                                                | 120 | 0,67 | 1,5 | 12 | 40 | H3             | CVD       | Steel | 60157698370               | R = 0,25 $\pm 40^\circ$ |
| YTS71P                                                                                | 120 | 1,07 | 1,5 | 12 | 40 | H3             | CVD       | Steel | 60157698369               | R = 0,50 $\pm 40^\circ$ |
| <b>MACHINE:</b> e.g. Studer <b>APPLICATION:</b> Dressing conventional grinding wheels |     |      |     |    |    |                |           |       |                           |                         |

### TS 60 N



| DESIGN CODE                                                                            | D   | U    | X   | T  | H  | BORE TOLERANCE | GRIT SIZE | BODY  | ORDER NUMBER | COMMENT                                          |
|----------------------------------------------------------------------------------------|-----|------|-----|----|----|----------------|-----------|-------|--------------|--------------------------------------------------|
| V4TS71P                                                                                | 160 | 0,67 | 1,5 | 10 | 52 | H3             | CVD       | Steel | 66260174551  | R = 0,40 $\pm 60^\circ$<br>(for example Danobat) |
| <b>MACHINE:</b> e.g. Danobat <b>APPLICATION:</b> Dressing conventional grinding wheels |     |      |     |    |    |                |           |       |              |                                                  |

All dimensions in mm

<sup>1)</sup> Available ex stock

# SD DRESSING DISCS

## GENERAL

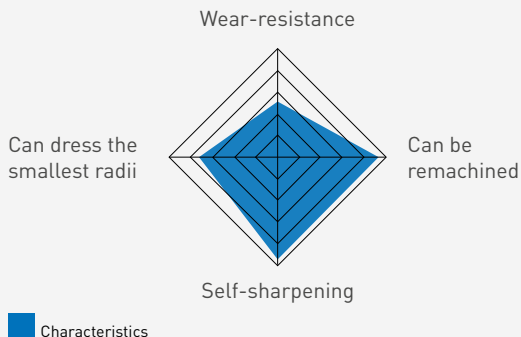
The metal-bonded SD dressing disc consists of a multi-layer coating that can be reground and sharpened many times.

These dressing discs are highly suitable for centreless cylindrical process applications with very fine surface requirements and for pre-profiling operation like worm grinding with the advantage that we can adjust the pressure angle and tip width for more flexibility

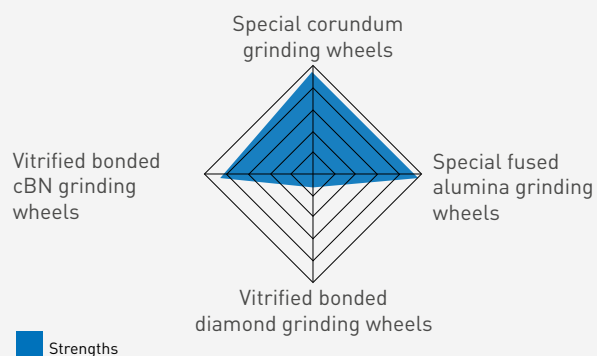
## APPLICATIONS:

- Dressing vitrified bonded cBN grinding wheels
- Dressing all conventional grinding wheels

## DRESSING DISC CHARACTERISTICS



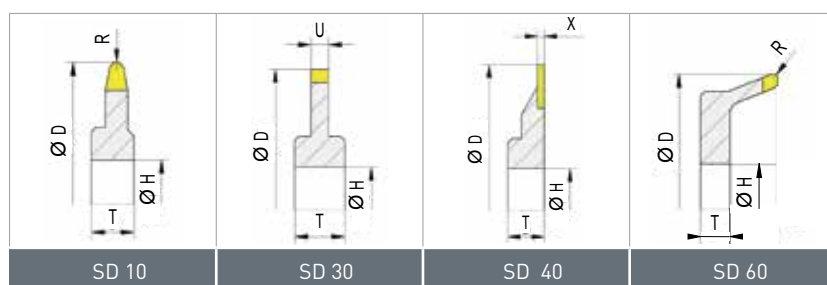
## RECOMMENDED USE



## ADVANTAGES:

- Statistical diamond distribution
- Controlled diamond concentration
- Extremely high accuracy as the diamond layer is ground
- Wide variety of versions for all dressing applications and machines
- Constant effective dressing width  $b_d$  depending on the design
- Can be reprofiled and sharpened many times
- Multi-layer coating
  - Minimum layer width 0,8 mm (cylindrical only)
  - Max. outer diameter 150 mm
  - Max. usable coating thickness 10 mme

## SOME OF OUR DESIGNS:



# DDS DRESSING DISCS

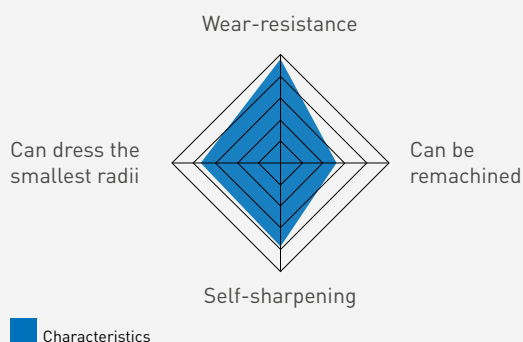
## GENERAL

The Norton WINTER DDS (Diamond Dressing System) dressing disc enables high-precision CNC dressing of vitrified bonded diamond and cBN grinding wheels. It has a constant profile bearing ratio thanks to patented diamond distribution and concentration and consists of a patterned single layer of sintered diamonds that is clamped into a twopiece body. This type of construction gives it extreme flexibility during the dressing of a variety of different profiles in a single working pass. This requires a grinding machine with a CNC dressing spindle and a contact detection system (e.g. Dittel).

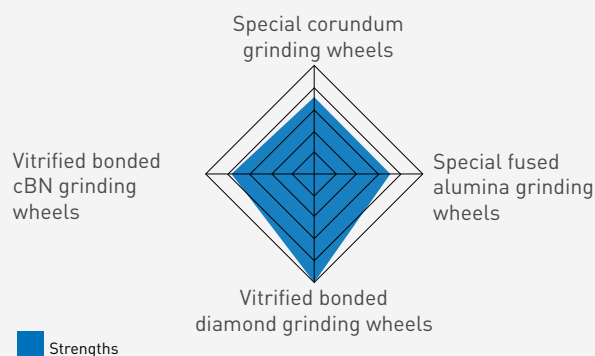
## APPLICATIONS:

- Dressing vitrified bonded diamond grinding wheels and cBN grinding wheels directly on the production machine

### DRESSING DISC CHARACTERISTICS



### RECOMMENDED USE

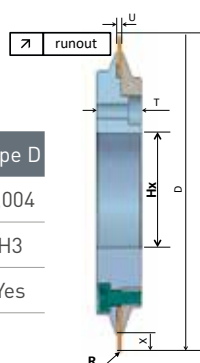


## ADVANTAGES:

- Controlled concentration of diamonds
- Extremely high accuracy as the diamond layer is ground
- Free standing diamond layer, so dressing of concave and convex profiles is possible
- Constant layer width
- Dressing of vitrified bonded diamond grinding wheels
- Diameters from 90 mm – 225 mm
- Layer widths from 0,8 mm – 1,2 mm
- Radii depending on layer width 0,4 mm – 0,6 mm

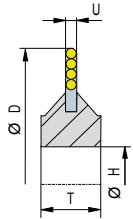
## VERSIONS OF STANDARD SHAPES

|                | Type A | Type B | Type C | Type D |
|----------------|--------|--------|--------|--------|
| OD runout      | 0,01   | 0,01   | 0,01   | 0,004  |
| Bore tolerance | H5     | H5     | H3     | H3     |
| Radius         | No     | Yes    | No     | Yes    |



The DDS dressing disc has a patterned single-layer sintered diamond coating that is clamped into a two-part steel body.



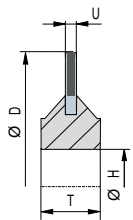


| DESIGN CODE | D   | U   | T  | H  | BORE TOLERANCE | GRIT SIZE | TYPE | ORDER NUMBER              | COMMENT |
|-------------|-----|-----|----|----|----------------|-----------|------|---------------------------|---------|
| 2DS71P      | 80  | 1   | 15 | 40 | H5             | D1001     | A    | 7958752894                | -       |
| 11DS71P     | 100 | 1   | 12 | 40 | H3             | D1001     | C    | 7958709949                | -       |
| 301DS71P    | 110 | 1   | 15 | 40 | H5             | D1001     | B    | 66260152509               | R 0,5   |
| 300DS71P    | 120 | 1   | 15 | 40 | H5             | D1001     | B    | 69014194133 <sup>1)</sup> | R 0,5   |
| 10DS71P     | 150 | 1   | 15 | 52 | H5             | D1001     | B    | 66260155154               | R 0,5   |
| 300DS71P    | 225 | 1,4 | 24 | 72 | H5             | D14-16    | B    | 7958790339                | R 0,7   |

**MACHINE:** Various **APPLICATION:** Dressing conventional grinding wheels and vitrified bonded diamond and cBN grinding wheels

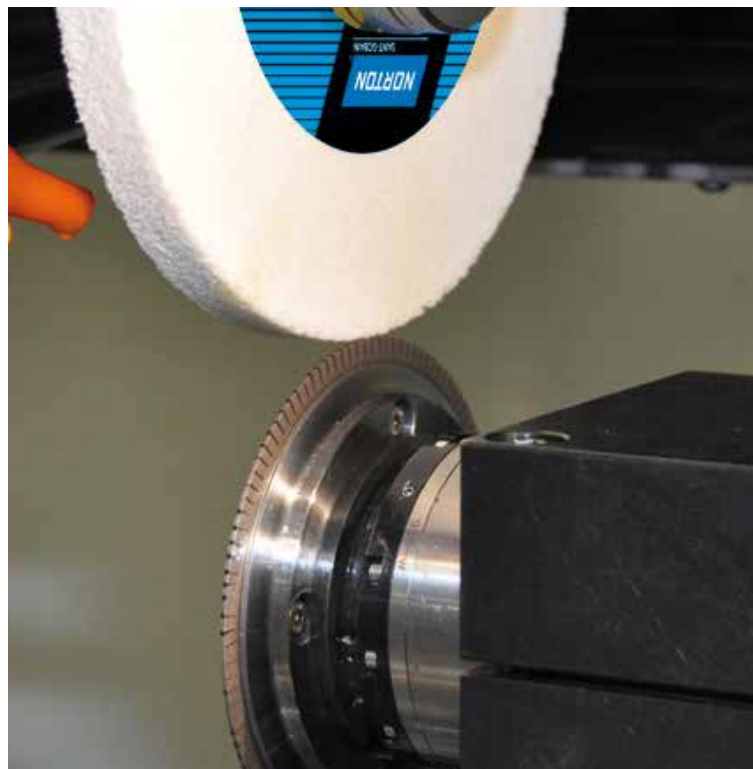


DDS Plus is a perfect combination of accurately positioned CVD logs and a metal bond providing a self-sharpening effect for dressing bonded wheels made of sintered grains.



| DESIGN CODE | D   | U   | T  | H  | BORE TOLERANCE | GRIT SIZE | TYPE | ORDER NUMBER | COMMENT     |
|-------------|-----|-----|----|----|----------------|-----------|------|--------------|-------------|
| 301DS71P    | 90  | 1,5 | 12 | 15 | H3             | CVD       | D    | 66260211729  | R 0,75      |
| 300DS71P    | 100 | 1   | 15 | 40 | H5             | CVD       | A    | 66260176572  |             |
| 300DS71P    | 120 | 1   | 15 | 40 | H5             | CVD       | A    | 7958785591   |             |
| 300DS71P    | 120 | 2,2 | 12 | 52 | H5             | CVD       | A    | 66260135562  | with 5 cuts |
| 301DS71P    | 152 | 1   | 15 | 52 | H5             | CVD       | A    | 66260187366  |             |

**MACHINE:** Various **APPLICATION:** Dressing conventional grinding wheels and special operations using cBN vitrified bonded wheels



# PCD/CVD/MCD DRESSING DISCS



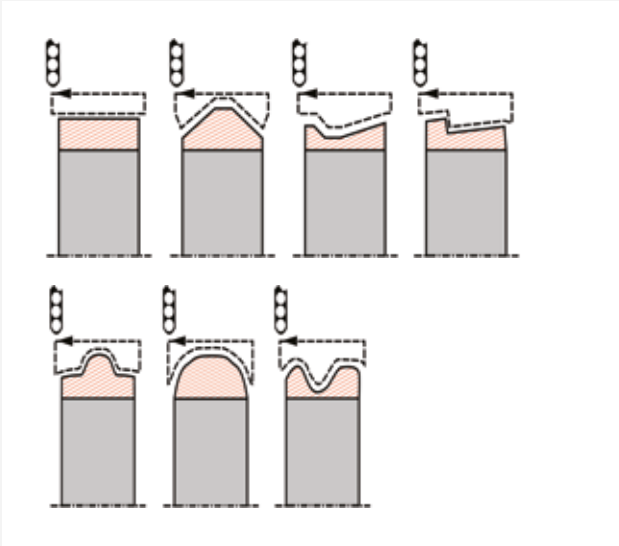
DDS Cut is a continued development of the original DDS, specifically for dressing diamond or cBN grinding wheels with a vitrified or resin bond. Thanks to its radial cuts on the diamond layer, DDS Cut provides more aggressive behaviour, generating a rougher surface on the grinding wheel, reducing the grinding forces and chances of burns on the work piece.

|                                                                                                                                        | DESIGN CODE | D   | U   | T    | H   | BORE TOLERANCE | GRIT SIZE | TYPE | ORDER NUMBER | COMMENT |
|----------------------------------------------------------------------------------------------------------------------------------------|-------------|-----|-----|------|-----|----------------|-----------|------|--------------|---------|
|                                                                                                                                        | 15DS71P     | 100 | 1   | 12   | 40  | H5             | D1001     | A    | 66260167339  |         |
|                                                                                                                                        | 35DS71P     | 120 | 1   | 15   | 40  | H5             | D1001     | B    | 7958755643   | R 0,5   |
|                                                                                                                                        | 5DS71P      | 120 | 1,2 | 15   | 52  | H5             | D1181     | A    | 7958757479   |         |
|                                                                                                                                        | 301DS71P    | 140 | 1,1 | 12,5 | 75  | H3             | D1181     | D    | 66260211283  | R 1,0   |
|                                                                                                                                        | 304DS71P    | 150 | 1   | 15   | 52  | H3             | D1001     | C    | 66260171958  |         |
|                                                                                                                                        | 300DS71P    | 170 | 1,2 | 12   | 75  | H3             | D1181     | C    | 66260126091  |         |
|                                                                                                                                        | 4DS71P      | 225 | 1,2 | 12   | 127 | H3             | D1181     | C    | 66260149375  |         |
| <b>MACHINE:</b> Various <b>APPLICATION:</b> Dressing conventional grinding wheels and vitrified bonded diamond and cBN grinding wheels |             |     |     |      |     |                |           |      |              |         |



## PROFILE EXAMPLES

With this new dressing system a broad range of different profiles can be created in a single working step



# ADVANTAGES OF CNC DRESSING OF DIAMOND GRINDING WHEELS WITH DDS DRESSING DISCS

## Precision dressing on the production machine

- Improved profile accuracy
- Very simple to automate
- Dressing at grinding speeds

## No need to remove the grinding wheel

- Reduced down times
- High-precision axial and radial running truth of the grinding wheel
- Improved workpiece quality

## Reproducible grinding wheel topography, improved process control

## SAMPLE APPLICATIONS

### PEEL GRINDING

| MACHINE PARAMETERS  |                                                                   |
|---------------------|-------------------------------------------------------------------|
| MACHINE             | STUDER S32 cylindrical grinding machine                           |
| COOLANT             | Emulsion                                                          |
| WORKPIECE           | Carbide K10                                                       |
| GRINDING PARAMETERS |                                                                   |
| GRINDING WHEEL      | 1VG 3A1-500-5-4,5<br>D126 V+ 2046 J1SC C150 E                     |
| CUTTING SPEED       | $v_c = 75 \text{ m/s}$                                            |
| AXIAL FEED          | $v_{fa} = 40 \text{ mm/min}$                                      |
| INFEEED             | $a_e = 0,2 \text{ mm}$                                            |
| DRESSING PARAMETERS |                                                                   |
| DRESSING TOOL       | Norton WINTER DDS dressing disc                                   |
| DRESSING CUT        | $a_{ed} = 4 \times 2 \text{ } \mu\text{m}$                        |
| SPEED RATIO         | $q_d = 0,7$ Counter-directional                                   |
| OVERLAP RATIO       | $U_d = 4$                                                         |
| RESULTS             |                                                                   |
| SURFACE FINISH      | $R_a = 0,17 \text{ } \mu\text{m}$ at $v_{fa} = 5 \text{ mm/min}$  |
|                     | $R_a = 0,74 \text{ } \mu\text{m}$ at $v_{fa} = 40 \text{ mm/min}$ |



### FORM GRINDING

| MACHINE PARAMETERS  |                                            |
|---------------------|--------------------------------------------|
| MACHINE             | SCHÜTTE WU 305 tool grinding machine       |
| COOLANT             | Sintogrand fluid (Oelheld)                 |
| WORKPIECE           | Bio-ceramics                               |
| GRINDING PARAMETERS |                                            |
| GRINDING WHEEL      | 99VG 700-15 / D64<br>D64 V+ 2046 J1SC C150 |
| CUTTING SPEED       | $v_c = 60 \text{ m/s}$                     |
| TRANSVERSE INFEEED  | $a_e = 0,2 \text{ mm}$                     |
| ALLOWANCE           | $a_{e \text{ tot}} = 1 \text{ mm}$         |
| DRESSING PARAMETERS |                                            |
| DRESSING TOOL       | Norton WINTER DDS dressing disc            |
| DRESSING CUT        | $a_{ed} = 2 \text{ } \mu\text{m}$          |
| SPEED RATIO         | $q_d = 0,3$                                |
| OVERLAP RATIO       | $U_d = 3-9$                                |
| RESULTS             |                                            |
| SURFACE FINISH      | $R_z \leq 3 \text{ } \mu\text{m}$          |

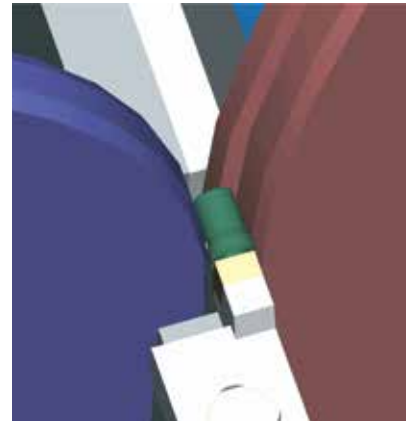




## SAMPLE APPLICATIONS WITH DDS DRESSING DISCS

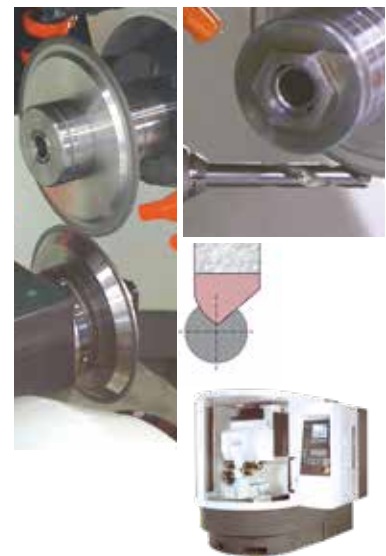
### CENTRELESS GRINDING

| MACHINE PARAMETERS  |                                                       |
|---------------------|-------------------------------------------------------|
| MACHINE             | SCHAUDT MIKROSA KRONOS S cylindrical grinding machine |
| COOLANT             | Emulsion                                              |
| WORKPIECE           | $\text{Si}_3\text{N}_4$                               |
| GRINDING PARAMETERS |                                                       |
| GRINDING WHEEL      | VG 3A1-400-15                                         |
|                     | D46 V+ 2046 J1SC C100                                 |
| CUTTING SPEED       | $v_c = 120 \text{ m/s}$                               |
| ALLOWANCE:          | $a_{e \text{ tot}} = 0,7 \text{ mm}$                  |
| DRESSING PARAMETERS |                                                       |
| DRESSING TOOL       | Norton WINTER DDS dressing disc                       |
| DRESSING CUT        | $a_{ed} = 3 \mu\text{m}$                              |
| CUTTING SPEED       | $v_{cd} = 40 \text{ m/s}$                             |
| SPEED RATIO         | $q_d = 0,4$                                           |
| RESULTS             |                                                       |
| SURFACE ROUGHNESS   | $R_z = 2,02 \mu\text{m}$                              |
| DIAMETER TOLERANCE  | $D \pm 2 \mu\text{m}$                                 |
|                     | No measurable wear after 400 workpieces               |



### DRILL FLUTE GRINDING

| MACHINE PARAMETERS    |                                                                                                     |
|-----------------------|-----------------------------------------------------------------------------------------------------|
| MACHINE               | WALTER Helitronic Power                                                                             |
| COOLANT               | Sintogrand fluid [Oelheld]                                                                          |
| WORKPIECE             | Carbide K10                                                                                         |
| GRINDING PARAMETERS   |                                                                                                     |
| GRINDING WHEEL        | 99VG 700-125-10                                                                                     |
|                       | D76 V+ 3438 J1SC C100                                                                               |
| CUTTING SPEED         | $v_c = 18-44 \text{ m/s}$                                                                           |
| FEED                  | $v_f = \text{up to } 200 \text{ mm/min}$                                                            |
| ALLOWANCE             | $a_e = 3,5 \text{ mm}$                                                                              |
| MATERIAL REMOVAL RATE | $Q'_{wmax} = 8,75 \text{ mm}^3/(\text{mm} \cdot \text{s})$                                          |
| DRESSING PARAMETERS   |                                                                                                     |
| DRESSING TOOL         | Norton WINTER DDS dressing disc                                                                     |
| DRESSING CUT          | $a_{ed} = 3 \mu\text{m}$                                                                            |
| CUTTING SPEED         | $v_{cd} = 18 \text{ m/s}$                                                                           |
| SPEED RATIO           | $q_d = 0,7$                                                                                         |
| OVERLAP RATIO         | $U_d = 3$                                                                                           |
| RESULTS               |                                                                                                     |
|                       | Markedly improved surface roughness and chipping compared with resin-bonded diamond grinding wheels |



## EXTERNAL CYLINDRICAL PLUNGE GRINDING

| MACHINE PARAMETERS                                                             |                                             |
|--------------------------------------------------------------------------------|---------------------------------------------|
| MACHINE                                                                        | STUDER S32 CNC cylindrical grinding machine |
| COOLANT                                                                        | Emulsion                                    |
| WORKPIECE                                                                      | Carbide K10                                 |
| GRINDING PARAMETERS                                                            |                                             |
| GRINDING WHEEL                                                                 | 99VG 700-400-5                              |
|                                                                                | D91 V+ 2046 J1SC C125 E                     |
| CUTTING SPEED                                                                  | $v_c = 40 \text{ m/s}$                      |
| FEED                                                                           | $v_{fr} = 4 \text{ mm/min}$                 |
| ALLOWANCE                                                                      | $a_e = 3,5 \text{ mm, radial}$              |
| DRESSING PARAMETERS                                                            |                                             |
| DRESSING TOOL                                                                  | Norton WINTER DDS dressing disc             |
| DRESSING CUT                                                                   | $a_{ed} = 3 \mu\text{m}$                    |
| SPEED RATIO                                                                    | $q_d = 0,7$                                 |
| OVERLAP RATIO                                                                  | $U_d = 7$                                   |
| RESULT                                                                         |                                             |
| Good profile accuracy, very good dimensional accuracy and low roughness values |                                             |



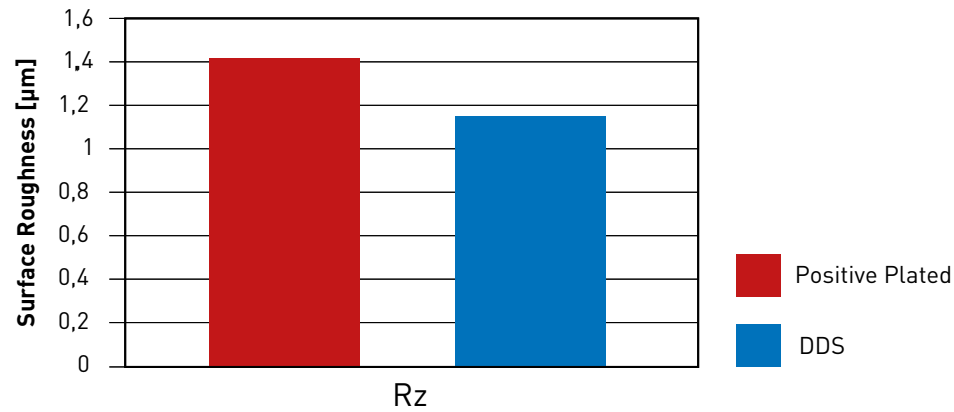
## SURFACE PROFILE GRINDING

| MACHINE PARAMETERS                                                             |                                       |
|--------------------------------------------------------------------------------|---------------------------------------|
| MACHINE                                                                        | BLOHM MT 408 surface grinding machine |
| COOLANT                                                                        | Rotorol (Oelheld)                     |
| WORKPIECE                                                                      | SiC                                   |
| GRINDING PARAMETERS                                                            |                                       |
| GRINDING WHEEL                                                                 | 99VG 700-400-15                       |
|                                                                                | D46 V+ 2046 J1SC C100                 |
| CUTTING SPEED                                                                  | $v_c = 45 \text{ m/s}$                |
| ALLOWANCE                                                                      | $a_e = 0,3 \text{ mm}$                |
| DRESSING PARAMETERS                                                            |                                       |
| DRESSING TOOL                                                                  | Norton WINTER DDS dressing disc       |
| CUTTING SPEED                                                                  | $v_{cd} = 35 \text{ m/s}$             |
| DRESSING CUT                                                                   | $a_{ed} = 2 \mu\text{m}$              |
| SPEED RATIO                                                                    | $q_d = 0,4$                           |
| OVERLAP RATIO                                                                  | $U_d = 2$                             |
| RESULTS                                                                        |                                       |
| Good profile accuracy, very good dimensional accuracy and low roughness values |                                       |



## CASE STUDIES OF DDS DRESSING DISCS

### DDS-ROLLER DRESSER <-> POSITIVE PLATED ROLLER DRESSER



### BASIC DATA

|                      |                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------|
| MACHINE:             | SCHAUDT MIKROSA KRONOS S<br>cylindrical grinding machine                                     |
| MATERIAL:            | Emulsion                                                                                     |
| GRINDING WHEEL SPEC: | V+ 2646Ø 400 mm, D64 C100 (diamond vitrified wheel)<br>Norton WINTER DDS Ø 120 mm, D 1181 µm |

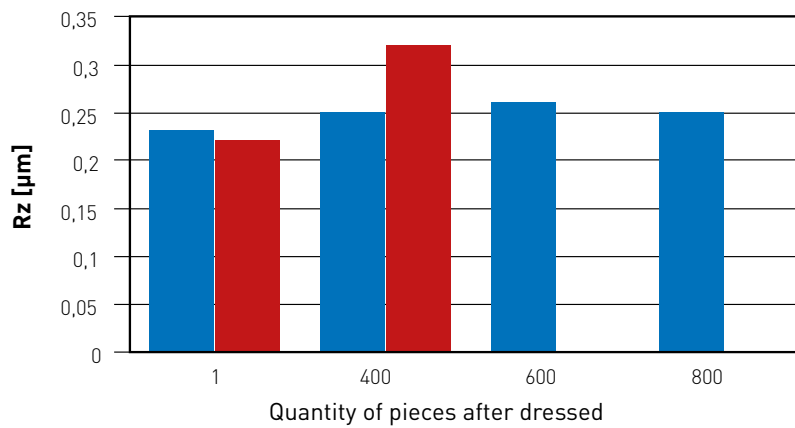
### GRINDING PARAMETERS

|                 |                            |
|-----------------|----------------------------|
| STOCK REMOVAL:  | 0,5 mm                     |
| INFEEED:        | $v_f = 0,4 \text{ mm/min}$ |
| GRINDING SPEED: | $v_c = 70 \text{ m/s}$     |

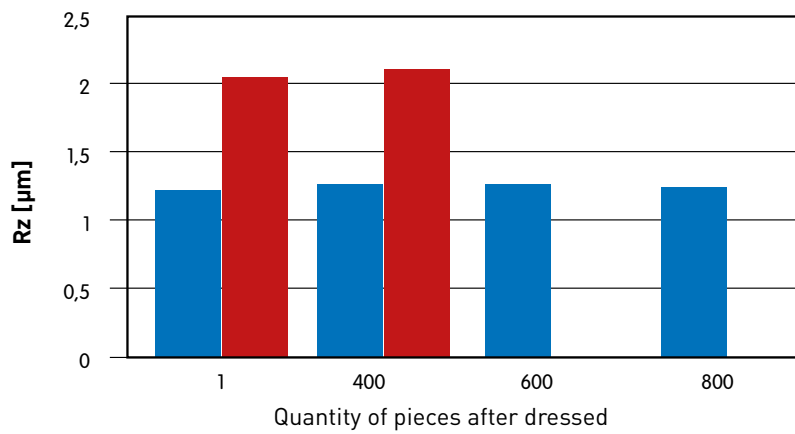
### DRESSING PARAMETER

|                    |                           |
|--------------------|---------------------------|
| UNIDIRECTIONAL     |                           |
| GRIND WHEEL SPEED: | $v_{cd} = 40 \text{ m/s}$ |
| SPEED FACTOR:      | $q_d = 0,63$              |
| INFEEED:           | $a_{ed} = 3 \text{ µm}$   |
| OVERLAP FACTOR:    | $U_d = 2$                 |

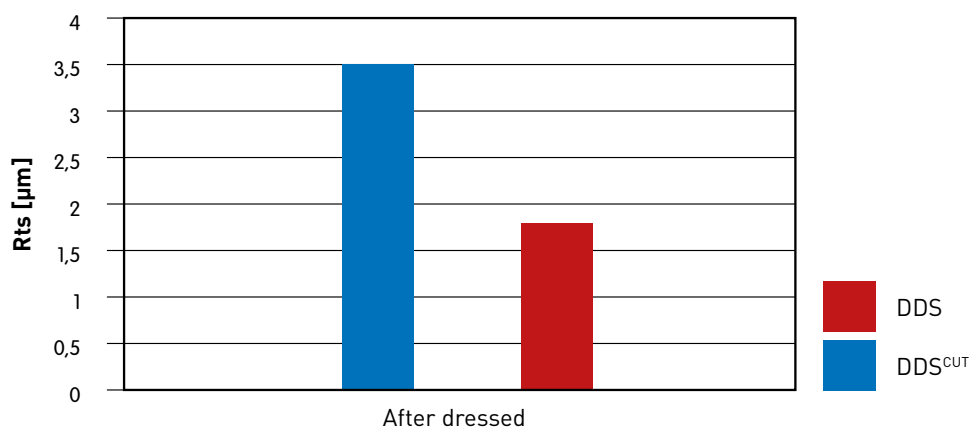
# NORTON WINTER DDS <-> NORTON WINTER DDS<sup>CUT</sup>



## ROUNDNESS



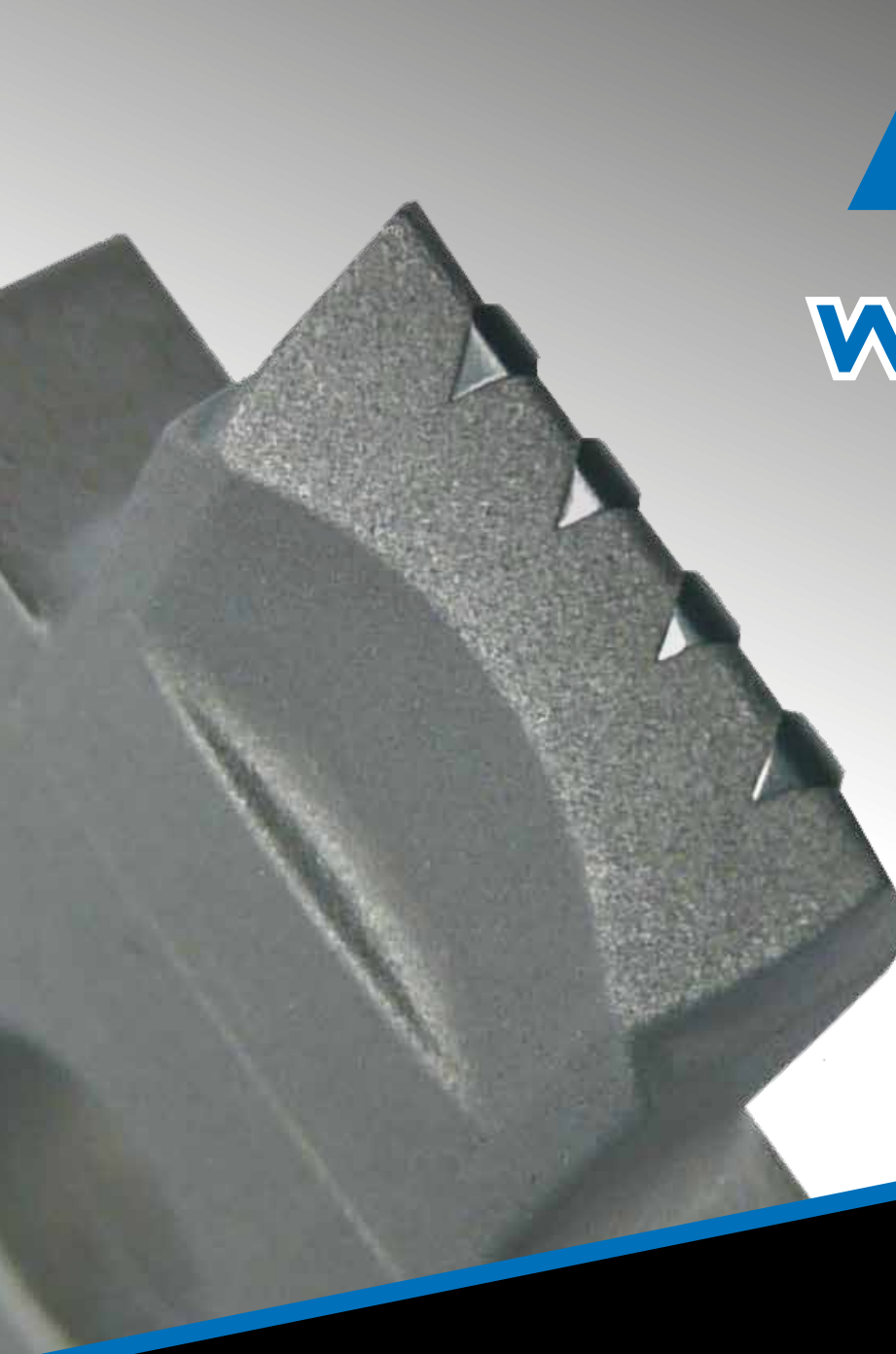
## GRINDING WHEEL ACTIVE ROUGHNESS



# CHECKLIST

## FOR DRESSING DISCS

|                          |                                                              |
|--------------------------|--------------------------------------------------------------|
| CUSTOMER / CUSTOMER NO.: |                                                              |
| MACHINE:                 |                                                              |
| DESIGN DATA:             | Machine type:                                                |
|                          | Maximum acceptable dressing disc diameter (mm):              |
| CURRENT DRESSING TOOL:   |                                                              |
| DRESSING UNIT:           | Arbor diameter (mm):                                         |
|                          | Arbor length (mm):                                           |
| WORKPIECE:               | Workpiece drawing:                                           |
|                          | Surface finish desired:                                      |
|                          | Grinding allowance (mm / Ø):                                 |
| GRINDING WHEEL:          | Specification:                                               |
|                          | Dimensions                                                   |
| PARAMETERS:              | Profile or straight dressing:                                |
|                          | Grinding wheel circumferential speed (m/s) or speed (rpm):   |
|                          | Circumferential speed of dressing disc (m/s) or speed (rpm): |
|                          | Counter-directional (GGL) / uni-directional dressing (GL):   |
|                          | Radial infeed per dressing pass ( $a_{ed}$ ):                |
|                          | Axial dressing feed ( $f_{ad}$ ):                            |



**NORTON**

SAINT-GOBAIN

**WINTER**

STATIONARY  
DRESSING TOOLS

# STATIONARY DRESSING TOOLS

## INFORMATION ON CHOOSING YOUR TOOL

### DIAMOND FLIESEN® TOOLS

Ti-Tan & Furioso: The new generation of particularly wear-resistant diamond Fliesen® Tools

Examples of dressers for quick reference

D25 MCD needle blade dressers

D30 CVD needle blade

D35 CVD needle blade

Needle blade with natural diamond

Standard blade with diamond grit

Toolholders and shanks for diamond Fliesen® Tools

### SINGLE POINT DRESSERS

D12 single point dressers with MCD needles

D30 single point dressers with CVD needles

D53 single point diamond dressers with PCD plates

|    |                                             |    |
|----|---------------------------------------------|----|
| 54 | Profile diamond ground                      | 68 |
| 55 | Single-point dressers with natural diamonds | 70 |
| 55 | Rondist rotatable tools with diamond or CVD | 72 |
|    | PCD and CVD insert dressers                 | 73 |

## TOOLHOLDERS AND SHANKS FOR COMMON MACHINE TYPES 75

|    |                                               |    |
|----|-----------------------------------------------|----|
| 56 | <b>MULTI-POINT DRESSERS</b>                   | 78 |
| 57 | D21 multi-point dressers with natural diamond | 78 |
| 59 | Igel® multi-point dressers                    | 79 |
| 60 | Pro-dress® multi-point dressers               | 81 |
| 61 |                                               |    |
| 62 |                                               |    |
| 64 |                                               |    |

|    |                                                                                                  |    |
|----|--------------------------------------------------------------------------------------------------|----|
| 65 | <b>TECHNICAL NOTES</b>                                                                           | 83 |
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| 66 |                                                                                                  |    |
| 67 |                                                                                                  |    |

|  |                                                                                   |    |
|--|-----------------------------------------------------------------------------------|----|
|  | <b>NORTON WINTER PRECISION TECHNOLOGY CHECKLIST FOR STATIONARY DRESSING TOOLS</b> | 88 |
|--|-----------------------------------------------------------------------------------|----|



## STATIONARY DRESSING TOOLS

Dressing grinding wheels is an essential step without which high quality results cannot be achieved. There are as many different dressing tools as there are grinding tasks. Stationary dressing tools with single-grit and cluster diamonds, Fliesen® dressers with natural or synthetic diamond needles, or grits are suitable for every grinding application.



## DIAMOND FLIESEN® TOOLS

Diamond Fliesen® tools are universal tools for profile dressing and straight dressing operations. Whether they have natural or synthetic diamonds, or whether they are produced as a needle blade or grit blade tool, their consistent performance over the whole of their working life is simply amazing. Information on toolholders for diamond Fliesen® tools is given in the section on "Toolholders and shanks for diamond Fliesen® tools". A separate section of this chapter deals with shank versions for popular machine toolholders (e.g. MT1).

## TI-TAN & FURIOSO: THE NEW GENERATION OF PARTICULARLY WEAR-RESISTANT DIAMOND FLIESEN® TOOLS

Ti-Tan has been developed for Altos, Altos IPX, sintered and extruded aluminas etc.  
Furioso has been developed for Quantum, SG, TG, XG, ES and special aluminas.



Norton  
WINTER  
**Ti-Tan**

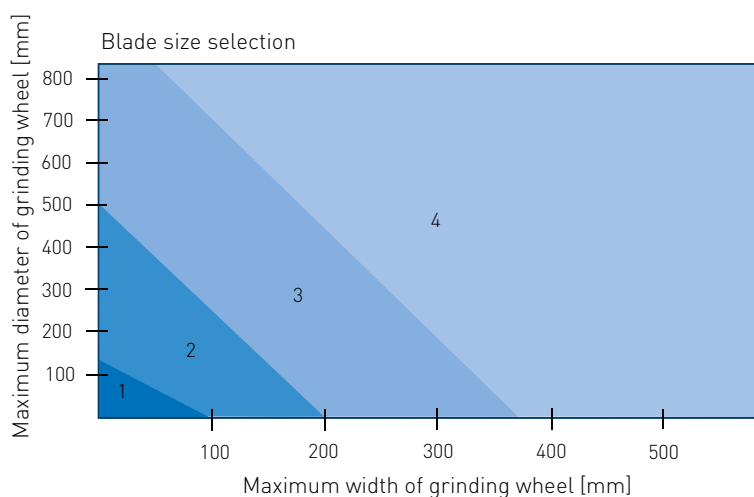


Norton  
WINTER  
**FURIOSO**

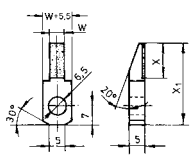
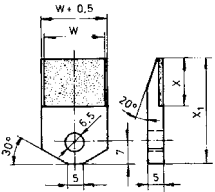
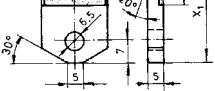
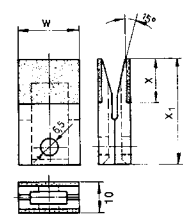
### SELECTING THE RIGHT BLADE TOOL

We have made it easy for you to select the most suitable blade dresser:

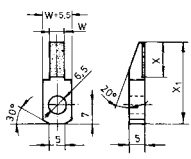
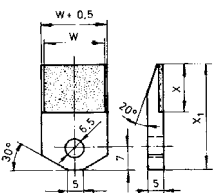
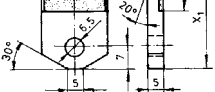
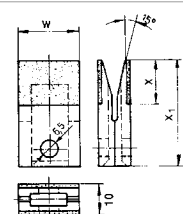
- Simply choose the appropriate blade size from the diagram according to the width and diameter of your grinding wheel.
- Then choose the best blade tool from the table below.



## DIAMOND FLIESEN® TOOLS

|                                                                                    | BLADE<br>SIZE | GRINDING WHEEL<br>GRIT SIZE [mesh] | SPECIFICATION    | ORDER<br>NUMBER           |
|------------------------------------------------------------------------------------|---------------|------------------------------------|------------------|---------------------------|
| FOR ALTOS, ALTOS IPX, SINTERED AND EXTRUDED ALUMINAS                               |               |                                    |                  |                           |
|   | 1             | 120-180                            | FRS 75 Ti-Tan    | 69014122959               |
|                                                                                    |               | 80-120                             | FRS 90 Ti-Tan    | 69014122960               |
|                                                                                    |               | 54-80                              | FRS 115 Ti-Tan   | 69014122965               |
|                                                                                    |               | 36-54                              | FRS 140 Ti-Tan   | 69014122970               |
|   | 2             | 120-180                            | FBS 75 Ti-Tan    | 69014122972               |
|                                                                                    |               | 80-120                             | FBS 90 Ti-Tan    | 69014122974               |
|                                                                                    |               | 54-80                              | FBS 115 Ti-Tan   | 69014122975               |
|                                                                                    |               | 36-54                              | FBS 140 Ti-Tan   | 69014122979               |
|   | 3             | 120-180                            | FAS 75 Ti-Tan    | 69014122981               |
|                                                                                    |               | 80-120                             | FAS 90 Ti-Tan    | 69014122983 <sup>1)</sup> |
|                                                                                    |               | 54-80                              | FAS 115 Ti-Tan   | 69014122987 <sup>1)</sup> |
|                                                                                    |               | 36-54                              | FAS 140 Ti-Tan   | 69014122989               |
|  | 4             | 120-180                            | 1TFAS 75 Ti-Tan  | 69014122991               |
|                                                                                    |               | 80-120                             | 1TFAS 90 Ti-Tan  | 69014122993               |
|                                                                                    |               | 54-80                              | 1TFAS 115 Ti-Tan | 69014122994               |
|                                                                                    |               | 36-54                              | 1TFAS 140 Ti-Tan | 69014122995               |

### FOR QUANTUM, VORTEX, SG, TG, XG, ES, SINTERED ALUMINAS

|                                                                                     |   |         |                   |                           |
|-------------------------------------------------------------------------------------|---|---------|-------------------|---------------------------|
|  | 1 | 120-180 | FRS 75 Furioso    | 69014122937               |
|                                                                                     |   | 80-120  | FRS 90 Furioso    | 69014122939               |
|                                                                                     |   | 54-80   | FRS 115 Furioso   | 69014122940               |
|                                                                                     |   | 36-54   | FRS 140 Furioso   | 69014122941               |
|  | 2 | 120-180 | FBS 75 Furioso    | 69014122944               |
|                                                                                     |   | 80-120  | FBS 90 Furioso    | 69014122946               |
|                                                                                     |   | 54-80   | FBS 115 Furioso   | 69014122947               |
|                                                                                     |   | 36-54   | FBS 140 Furioso   | 69014122948               |
|  | 3 | 120-180 | FAS 75 Furioso    | 69014122950 <sup>1)</sup> |
|                                                                                     |   | 80-120  | FAS 90 Furioso    | 60157693885 <sup>1)</sup> |
|                                                                                     |   | 54-80   | FAS 115 Furioso   | 60157690579 <sup>1)</sup> |
|                                                                                     |   | 36-54   | FAS 140 Furioso   | 69014122952               |
|  | 4 | 120-180 | 1TFAS 75 Furioso  | 69014122953               |
|                                                                                     |   | 80-120  | 1TFAS 90 Furioso  | 69014122954               |
|                                                                                     |   | 54-80   | 1TFAS 115 Furioso | 69014122955               |
|                                                                                     |   | 36-54   | 1TFAS 140 Furioso | 69014122956               |

<sup>1)</sup> Available ex stock

### EXPLANATION OF THE SPECIFICATION

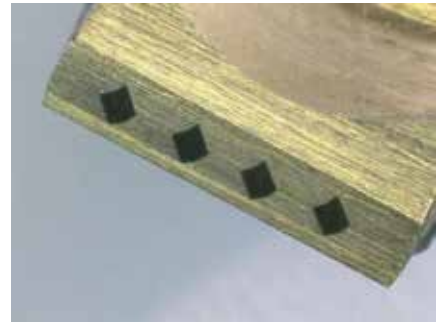
| DESIGNATION                       | WIDTH | EFFECTIVE LENGTH | TOTAL LENGTH |
|-----------------------------------|-------|------------------|--------------|
| 1 FRS                             | 5     | 12               | 28           |
| 2 FBS                             | 10    | 15               | 33           |
| 3 FAS                             | 20    | 15               | 33           |
| 4 Twin blade with cooling channel |       |                  |              |
| 1TFAS                             | 20    | 15               | 35           |

| DESIGNATION | FEPA  |
|-------------|-------|
| 75          | D501  |
| 90          | D711  |
| 115         | D1001 |
| 140         | D1181 |

All dimensions in mm

## D25 MCD NEEDLE BLADE DRESSERS

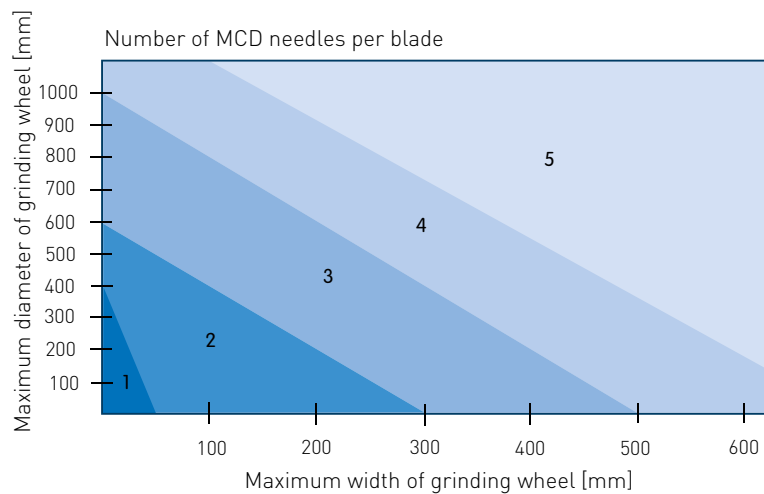
Preferably for profiling, but also for the straight dressing of hard grinding wheels, sintered alumina and silicon carbide grinding wheels. For straight plunge dressing we recommend the version with the hard material in the centre; for angular plunge dressing the off centred (OC) arrangement is suitable.



### SELECTING THE RIGHT BLADE TOOL

We have made it easy for you to select the most suitable blade dresser:

- Simply choose the appropriate blade size from the diagram according to the width and diameter of your grinding wheel.
- Then choose the best blade tool from the table below.



## D25 STANDARD RANGE (CENTRED VERSION)

|  | NUMBER OF NEEDLES | GRINDING WHEEL GRIT SIZE [mesh] | DESIGNATION | EFFECTIVE CUTTING WIDTH: T | WIDTH AT TIP: B | ORDER NUMBER              |
|--|-------------------|---------------------------------|-------------|----------------------------|-----------------|---------------------------|
|  | 1                 | 80-120                          | 2565 / 1    | 0,8                        | 4,0             | 66260348671               |
|  |                   | 60                              | 2585 / 1    | 1,1                        | 4,0             | 66260348174               |
|  |                   | 46                              | 25115 / 1   | 1,5                        | 4,0             | 66260346380               |
|  | 2                 | 80-120                          | 2565 / 2    | 0,8                        | 6,0             | 66260139870               |
|  |                   | 60                              | 2585 / 2    | 1,1                        | 6,0             | 66260134397               |
|  |                   | 46                              | 25115 / 2   | 1,5                        | 6,0             | 66260339334               |
|  | 3                 | 80-120                          | 2565 / 3    | 0,8                        | 8,0             | 66260138695 <sup>1)</sup> |
|  |                   | 60                              | 2585 / 3    | 1,1                        | 8,0             | 66260139398               |
|  |                   | 46                              | 25115 / 3   | 1,5                        | 8,0             | 66260139601               |
|  | 4                 | 80-120                          | 2565 / 4    | 0,8                        | 10,0            | 66260137996 <sup>1)</sup> |
|  |                   | 60                              | 2585 / 4    | 1,1                        | 10,0            | 66260392047 <sup>1)</sup> |
|  |                   | 46                              | 25115 / 4   | 1,5                        | 10,0            | 66260138202               |
|  | 5                 | 80-120                          | 2565 / 5    | 0,8                        | 10,0            | 66260378376               |
|  |                   | 60                              | 2585 / 5    | 1,1                        | 10,0            | 66260372054               |
|  |                   | 46                              | 25115 / 5   | 1,5                        | 10,0            | 69014128154               |

All dimensions in mm

<sup>1)</sup> Available ex stock

Minimum order quantity for articles not in stock: 4 item, delivery: 4 weeks

All dimensions in mm

## D25 STANDARD RANGE (OFF-CENTRED VERSION, OC)

|  | NUMBER<br>OF NEEDLES | GRINDING WHEEL<br>GRIT SIZE [mesh] | DESIGNATION    | EFFECTIVE<br>CUTTING<br>WIDTH: T | WIDTH<br>AT TIP: B | ORDER<br>NUMBER           |
|--|----------------------|------------------------------------|----------------|----------------------------------|--------------------|---------------------------|
|  | 1                    | 80-120                             | 2565 - OC / 1  | 0,8                              | 4,0                | 66260349073               |
|  |                      | 60                                 | 2585 - OC / 1  | 1,1                              | 4,0                | 66260345676               |
|  |                      | 46                                 | 25115 - OC / 1 | 1,5                              | 4,0                | 66260344382               |
|  | 2                    | 80-120                             | 2565 - OC / 2  | 0,8                              | 6,0                | 66260344134               |
|  |                      | 60                                 | 2585 - OC / 2  | 1,1                              | 6,0                | 66260138314               |
|  |                      | 46                                 | 25115 - OC / 2 | 1,5                              | 6,0                | 66260139317               |
|  | 3                    | 80-120                             | 2565 - OC / 3  | 0,8                              | 8,0                | 66260135912 <sup>1)</sup> |
|  |                      | 60                                 | 2585 - OC / 3  | 1,1                              | 8,0                | 66260342479               |
|  |                      | 46                                 | 25115 - OC / 3 | 1,5                              | 8,0                | 66260137318               |
|  | 4                    | 80-120                             | 2565 - OC / 4  | 0,8                              | 10,0               | 66260392033 <sup>1)</sup> |
|  |                      | 60                                 | 2585 - OC / 4  | 1,1                              | 10,0               | 66260137616 <sup>1)</sup> |
|  |                      | 46                                 | 25115 - OC / 4 | 1,5                              | 10,0               | 66260137319               |
|  | 5                    | 80-120                             | 2565 - OC / 5  | 0,8                              | 10,0               | 69014128155               |
|  |                      | 60                                 | 2585 - OC / 5  | 1,1                              | 10,0               | 69014128156               |
|  |                      | 46                                 | 25115 - OC / 5 | 1,5                              | 10,0               | 69014128157               |

All dimensions in mm

<sup>1)</sup> Available ex stock

Minimum order quantity for articles not in stock: 4 item, delivery: 4 weeks

## D25 RADIUS AND ANGLE PREGRINDING

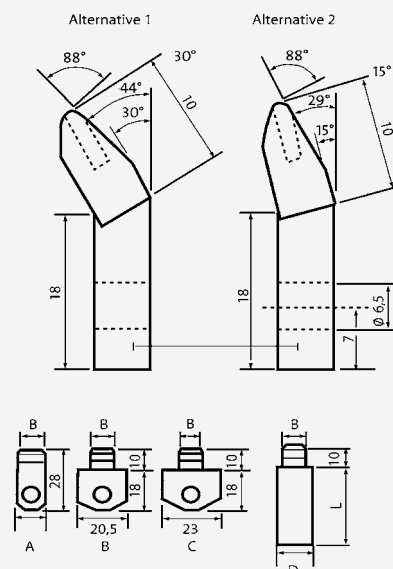
D25, D30 and D35 diamond Fliesen® tools are available with the diamond radius and angle preground.

The advantages of pre-polishing are

- Reduction of the work needed to change the tool as it takes less time to match the dresser to the profile of the grinding wheel,
- Adherence to profile directly after tooling change, even for high precision profiles with a radius of only 0,125 mm.

Information on toolholders for diamond Fliesen® tools is given in the section on 'Toolholders and shanks for diamond tools'. A separate section of this chapter deals with shank versions for popular machine toolholders (e.g. MT1).

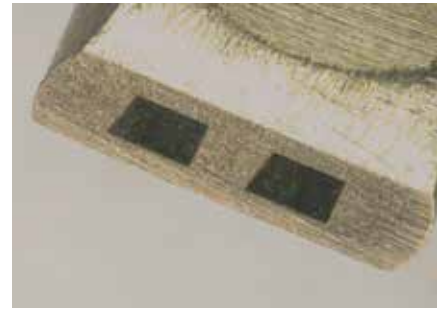
## EXAMPLE OF SPECIAL BLADE TOOLS WITH PRE-POLISHED PROFILE



All dimensions in mm

## D30 CVD NEEDLE BLADE

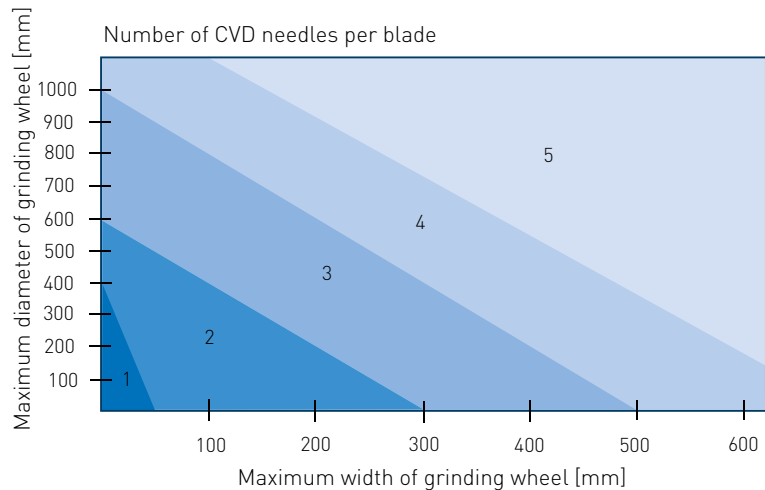
Because the CVD diamond material is centred, this blade is the first choice for high precision straight dressing of alumina, special fused alumina and sintered alumina grinding wheels. A highly durable tool with straight CVD needle inserts.



### SELECTING THE RIGHT BLADE TOOL

We have made it easy for you to select the most suitable blade dresser:

- Simply choose the appropriate blade size from the diagram according to the width and diameter of your grinding wheel.
- Then choose the best blade tool from the table below.



## D30 STANDARD RANGE

|  | NUMBER OF NEEDLES | GRINDING WHEEL GRIT SIZE [mesh] | DESIGNATION | EFFECTIVE CUTTING WIDTH: T | WIDTH AT TIP: B | ORDER NUMBER              |
|--|-------------------|---------------------------------|-------------|----------------------------|-----------------|---------------------------|
|  | 1                 | 150-240                         | 3044 / 1    | 0,4                        | 3,0             | 66260350081               |
|  |                   | 80-120                          | 3064 / 1    | 0,6                        | 3,0             | 66260350933               |
|  |                   | 60                              | 3084 / 1    | 0,8                        | 3,0             | 69014128213               |
|  |                   | 46                              | 30124 / 1   | 1,2                        | 4,0             | 69014128215               |
|  | 2                 | 150-240                         | 3044 / 2    | 0,4                        | 4,0             | 66260137455               |
|  |                   | 80-120                          | 3064 / 2    | 0,6                        | 4,0             | 66260139158 <sup>1)</sup> |
|  |                   | 60                              | 3084 / 2    | 0,8                        | 5,0             | 66260136762               |
|  |                   | 46                              | 30124 / 2   | 1,2                        | 6,0             | 66260196365               |
|  | 3                 | 150-240                         | 3044 / 3    | 0,4                        | 5,0             | 66260139756               |
|  |                   | 80-120                          | 3064 / 3    | 0,6                        | 6,0             | 66260391992 <sup>1)</sup> |
|  |                   | 60                              | 3084 / 3    | 0,8                        | 7,0             | 66260139163 <sup>1)</sup> |
|  |                   | 46                              | 30124 / 3   | 1,2                        | 8,0             | 66260139466               |
|  | 4                 | 150-240                         | 3044 / 4    | 0,4                        | 6,0             | 66260195857 <sup>1)</sup> |
|  |                   | 80-120                          | 3064 / 4    | 0,6                        | 8,0             | 66260138561 <sup>1)</sup> |
|  |                   | 60                              | 3084 / 4    | 0,8                        | 9,0             | 66260139464 <sup>1)</sup> |
|  |                   | 46                              | 30124 / 4   | 1,2                        | 10,0            | 66260137467               |
|  | 5                 | 150-240                         | 3044 / 5    | 0,4                        | 7,0             | 69014128217               |
|  |                   | 80-120                          | 3064 / 5    | 0,6                        | 10,0            | 66260345996               |
|  |                   | 60                              | 3084 / 5    | 0,8                        | 10,0            | 69014128219               |
|  |                   | 46                              | 30124 / 5   | 1,2                        | 10,0            | 69014128221               |

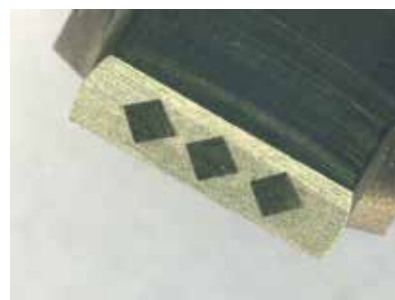
Information on toolholders for diamond Fliesen® tools is given in the section on 'Toolholders and shanks for diamond Fliesen® tools'. A separate section of this chapter deals with shank versions for popular machine toolholders (e.g. MT1).



## D35 CVD NEEDLE BLADE

This blade with its off-centred CVD material is a first choice for angular plunge dressing of all alumina, special fused alumina and sintered alumina grinding wheels.

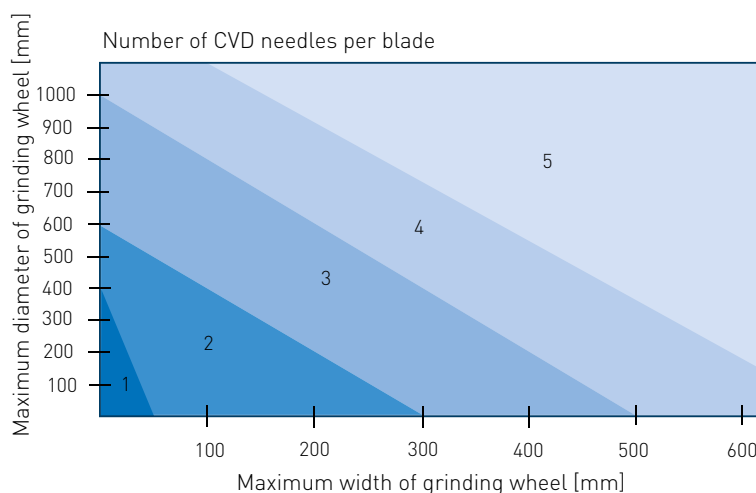
A highly durable tool with CVD needles inserted diagonally.



### SELECTING THE RIGHT BLADE TOOL

We have made it easy for you to select the most suitable blade dresser:

- Simply choose the appropriate blade size from the diagram according to the width and diameter of your grinding wheel.
- Then choose the best blade tool from the table below.



## D35 STANDARD RANGE

|  | NUMBER OF NEEDLES | GRINDING WHEEL GRIT SIZE [mesh] | DESIGNATION    | EFFECTIVE CUTTING WIDTH: T | WIDTH AT TIP: B | ORDER NUMBER              |
|--|-------------------|---------------------------------|----------------|----------------------------|-----------------|---------------------------|
|  | 1                 | 150-240                         | 3544 - OC / 1  | 0,6                        | 3,0             | 66260346491               |
|  |                   | 80-120                          | 3564 - OC / 1  | 0,8                        | 3,0             | 66260346692               |
|  |                   | 60                              | 3584 - OC / 1  | 1,1                        | 3,0             | 66260345994               |
|  |                   | 46                              | 35124 - OC / 1 | 1,5                        | 4,0             | 66260346395               |
|  | 2                 | 150-240                         | 3544 - OC / 2  | 0,6                        | 4,0             | 66260336089               |
|  |                   | 80-120                          | 3564 - OC / 2  | 0,8                        | 4,0             | 66260337490               |
|  |                   | 60                              | 3584 - OC / 2  | 1,1                        | 5,0             | 66260337491 <sup>1)</sup> |
|  |                   | 46                              | 35124 - OC / 2 | 1,5                        | 6,0             | 66260336994               |
|  | 3                 | 150-240                         | 3544 - OC / 3  | 0,6                        | 5,0             | 66260336752               |
|  |                   | 80-120                          | 3564 - OC / 3  | 0,8                        | 6,0             | 66260337624 <sup>1)</sup> |
|  |                   | 60                              | 3584 - OC / 3  | 1,1                        | 7,0             | 66260337292 <sup>1)</sup> |
|  |                   | 46                              | 35124 - OC / 3 | 1,5                        | 8,0             | 66260337195               |
|  | 4                 | 150-240                         | 3544 - OC / 4  | 0,6                        | 6,0             | 66260333197               |
|  |                   | 80-120                          | 3564 - OC / 4  | 0,8                        | 8,0             | 66260195223 <sup>1)</sup> |
|  |                   | 60                              | 3584 - OC / 4  | 1,1                        | 9,0             | 66260336093 <sup>1)</sup> |
|  |                   | 46                              | 35124 - OC / 4 | 1,5                        | 10,0            | 66260336196               |
|  | 5                 | 150-240                         | 3544 - OC / 5  | 0,6                        | 7,0             | 69014128150               |
|  |                   | 80-120                          | 3564 - OC / 5  | 0,8                        | 10,0            | 69014128151               |
|  |                   | 60                              | 3584 - OC / 5  | 1,1                        | 10,0            | 69014128152               |
|  |                   | 46                              | 35124 - OC / 5 | 1,5                        | 10,0            | 69014128153               |

Information on toolholders for diamond Fliesen® tools is given in the section on 'Toolholders and shanks for diamond Fliesen® tools'. A separate section of this chapter deals with shank versions for popular machine toolholders (e.g. MT1).

All dimensions in mm

<sup>1)</sup> Available ex stock

Minimum order quantity for articles not in stock: 4 item, delivery: 4 weeks

# NEEDLE BLADE WITH NATURAL DIAMOND

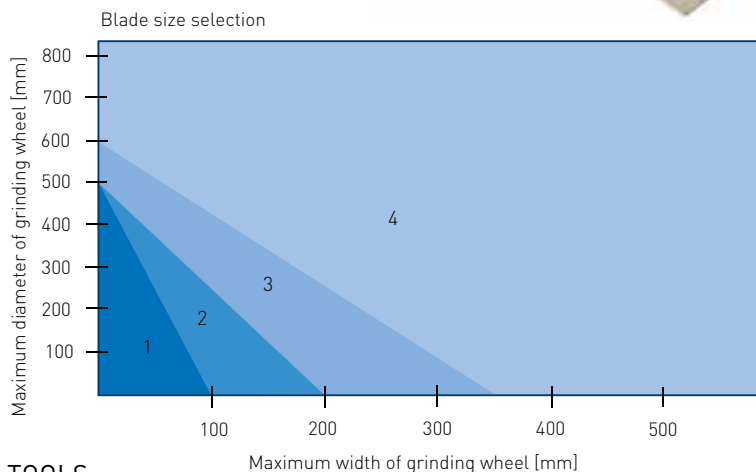
Suitable for angular plunge / straight and profile dressing of all alumina, special fused alumina, and sintered alumina grinding wheels in grit sizes 46–80. Exceptional natural diamond needles, set by hand in a special design, guarantee the long service life of these tools.



## SELECTING THE RIGHT BLADE TOOL

We have made it easy for you to select the most suitable blade dresser:

- Simply choose the appropriate blade size from the diagram according to the width and diameter of your grinding wheel.
- Then choose the best blade tool from the table below.



## STANDARD RANGE OF NEEDLE BLADE TOOLS

|  | BLADE SIZE | SPECIFICATION | W  | X  | X <sub>1</sub> | BOND  | SIZE OF NEEDLES | ORDER NUMBER              |
|--|------------|---------------|----|----|----------------|-------|-----------------|---------------------------|
|  | 1          | FD180         | 10 | 12 | 28             | T645E | N1000           | 69014185757 <sup>1)</sup> |
|  | 2          | FB180         | 10 | 15 | 33             | T645E | N1100           | 69014185754 <sup>1)</sup> |
|  | 3          | FC180         | 20 | 10 | 28             | T645E | N1100           | 69014185756 <sup>1)</sup> |
|  | 4          | FA180         | 20 | 15 | 33             | T645E | N1100           | 69014185755 <sup>1)</sup> |

## SPECIAL DESIGNS OF NEEDLE BLADE TOOLS

Needle blade tools in centered version with highly effective cutting width specifications  $b_d$  and consistent wear characteristics.

|  | BLADE SIZE | SPECIFICATION | W  | X  | X <sub>1</sub> | BOND  | SIZE OF NEEDLES | ORDER NUMBER |
|--|------------|---------------|----|----|----------------|-------|-----------------|--------------|
|  | 2          | 9TFB180       | 10 | 15 | 33             | T645J | N800            | 69014185798  |
|  | 2          | 1TFB180       | 10 | 15 | 33             | T645J | N1000           | 66260388626  |
|  | 4          | 8TFA180       | 20 | 15 | 33             | T645J | N900            | 66260387342  |

Needle blade tools in an off-centred versions with highly effective cutting width specifications  $b_d$  and consistent wear characteristics.

|  | BLADE SIZE | SPECIFICATION | W  | X  | X <sub>1</sub> | BOND  | SIZE OF NEEDLES | ORDER NUMBER |
|--|------------|---------------|----|----|----------------|-------|-----------------|--------------|
|  | 2          | 11TFB180      | 10 | 15 | 33             | T645E | N1000           | 66260100089  |
|  | 2          | 13TFB180      | 10 | 15 | 33             | T645E | N800            | 66260113218  |
|  | 4          | 14TFA180      | 20 | 15 | 33             | T645E | N900            | 69014159391  |

Information on toolholders for diamond Fliesen® tools is given in the section on 'Toolholders and shanks for diamond Fliesen® tools'. A separate section of this chapter deals with shank versions for popular machine toolholders (e.g. MT1).

## STANDARD BLADE WITH DIAMOND GRIT

A universal dressing tool for straight and profiled dressing of alumina and sintered alumina grinding wheels with consistent surface finish over the whole of its working life.

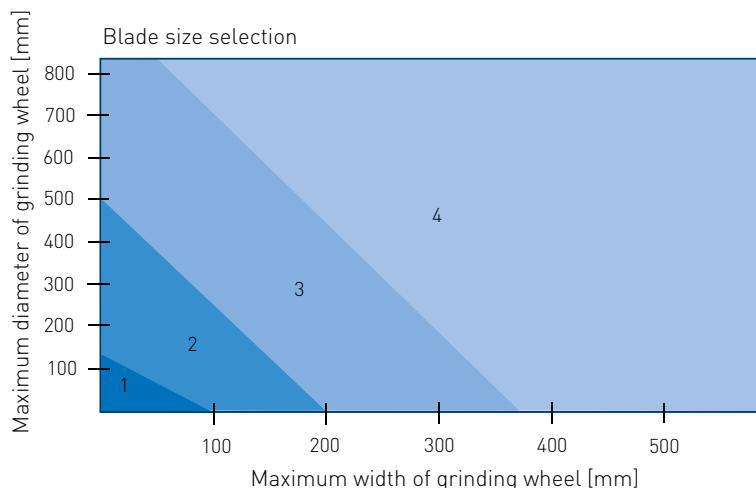
For large grinding wheels and sets of grinding wheels we recommend mounting of two blade tools or use of a twin blade such as 1T FAS 115-20-15-35.



### SELECTING THE RIGHT BLADE TOOL

We have made it easy for you to select the most suitable blade dresser:

- Simply choose the appropriate blade size from the diagram according to the width and diameter of your grinding wheel.
- Then choose the best blade tool from the table below.



### EXPLANATION OF THE SPECIFICATION

| DESIGNATION                       | WIDTH | EFFECTIVE LENGTH | TOTAL LENGTH |
|-----------------------------------|-------|------------------|--------------|
| 1 FRS                             | 5     | 12               | 28           |
| 2 FBS                             | 10    | 15               | 33           |
| 2 FDS                             | 10    | 12               | 28           |
| 3 FAS                             | 20    | 15               | 33           |
| 3 FCS                             | 20    | 10               | 28           |
| 4 Twin blade with cooling channel |       |                  |              |
| 1TFAS                             | 20    | 15               | 35           |

| DESIGNATION | FIPA  |
|-------------|-------|
| 75          | D501  |
| 90          | D711  |
| 115         | D1001 |
| 140         | D1181 |

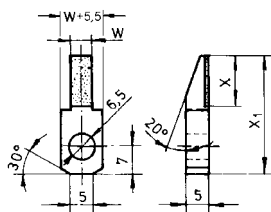
### ORDER SAMPLE

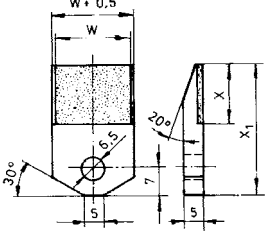
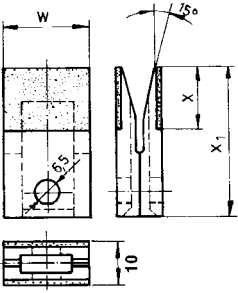
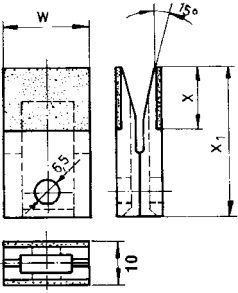
| DRESSING TOOL | WIDTH OF DIAMOND SECTION W | EFFECTIVE LENGTH OF DIAMOND SECTION X | TOTAL LENGTH OF TOOL X <sub>1</sub> | DIAMOND GRIT SIZE | BOND  |
|---------------|----------------------------|---------------------------------------|-------------------------------------|-------------------|-------|
| FAS 115 -     | 20 -                       | 15 -                                  | 33                                  | D1001             | H770J |

### RANGE OF STANDARD BLADE TOOL WITH DIAMOND GRIT

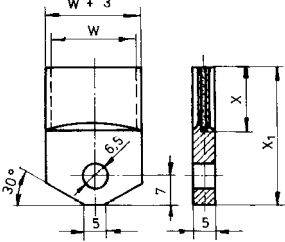
T645E BOND FOR ALUMINA GRINDING WHEELS, INCLUDING SINTERED ALUMINAS (AL<sub>2</sub>O<sub>3</sub>)

| BLADE SIZE | GRIT SIZE GRINDING WHEEL [Mesh] | SHAPE   | W | X  | X <sub>1</sub> | GRIT SIZE OF BLADE | ORDER NUMBER              |
|------------|---------------------------------|---------|---|----|----------------|--------------------|---------------------------|
| 1          | 120-180                         | FRS 75  | 5 | 12 | 28             | D501               | 66260382020               |
|            | 80-120                          | FRS 90  |   |    |                | D711               | 66260114636 <sup>1)</sup> |
|            | 54-80                           | FRS 115 |   |    |                | D1001              | 66260388134               |



|                                                                                    | BLADE<br>SIZE | GRIT SIZE<br>GRINDING<br>WHEEL [Mesh] | SHAPE      | W  | X  | X <sub>1</sub> | GRIT SIZE<br>OF BLADE | ORDER<br>NUMBER           |
|------------------------------------------------------------------------------------|---------------|---------------------------------------|------------|----|----|----------------|-----------------------|---------------------------|
|   | 2             | 120-180                               | FBS 75     | 10 | 15 | 33             | D501                  | 66260387135               |
|                                                                                    |               | 80-120                                | FBS 90     |    |    |                | D711                  | 69014185726 <sup>1)</sup> |
|                                                                                    |               | 54-80                                 | FBS 115    |    |    |                | D1001                 | 69014185727 <sup>1)</sup> |
|                                                                                    |               | 36-54                                 | FBS 140    |    |    |                | D1181                 | 69014185728 <sup>1)</sup> |
|                                                                                    |               | 120-180                               | FDS 75     | 10 | 12 | 28             | D501                  | 69014185747 <sup>1)</sup> |
|                                                                                    |               | 80-120                                | FDS 90     |    |    |                | D711                  | 69014185735 <sup>1)</sup> |
|                                                                                    |               | 54-80                                 | FDS 115    |    |    |                | D1001                 | 69014185736 <sup>1)</sup> |
|                                                                                    |               | 36-54                                 | FDS 140    |    |    |                | D1181                 | 69014185737 <sup>1)</sup> |
|  | 3             | 120-180                               | FAS 75     | 20 | 15 | 33             | D501                  | 66260384327 <sup>1)</sup> |
|                                                                                    |               | 80-120                                | FAS 90     |    |    |                | D711                  | 69014185720 <sup>1)</sup> |
|                                                                                    |               | 54-80                                 | FAS 115    |    |    |                | D1001                 | 69014185721 <sup>1)</sup> |
|                                                                                    |               | 36-54                                 | FAS 140    |    |    |                | D1181                 | 69014185722 <sup>1)</sup> |
|                                                                                    |               | 120-180                               | FCS 75     | 20 | 10 | 28             | D501                  | 69014185746               |
|                                                                                    |               | 80-120                                | FCS 90     |    |    |                | D711                  | 69014185732 <sup>1)</sup> |
|                                                                                    |               | 54-80                                 | FCS 115    |    |    |                | D1001                 | 69014185718 <sup>1)</sup> |
|                                                                                    |               | 36-54                                 | FCS 140    |    |    |                | D1181                 | 69014185716 <sup>1)</sup> |
|  | 4             | 80-120                                | 1T FAS 90  | 20 | 15 | 35             | D711                  | 66260389354               |
|                                                                                    |               | 54-80                                 | 1T FAS 115 |    |    |                | D1001                 | 66260388162 <sup>1)</sup> |
|                                                                                    |               | 36-54                                 | 1T FAS 140 |    |    |                | D1181                 | 66260386770               |

## H770J BOND FOR SILICON CARBIDE (SiC) GRINDING WHEELS

|                                                                                     | BLADE<br>SIZE | GRIT SIZE<br>GRINDING<br>WHEEL [Mesh] | SHAPE   | W  | X  | X <sub>1</sub> | GRIT SIZE<br>OF BLADE | ORDER<br>NUMBER           |
|-------------------------------------------------------------------------------------|---------------|---------------------------------------|---------|----|----|----------------|-----------------------|---------------------------|
|  | 2             | 120-180                               | FBS 75  | 10 | 15 | 33             | D501                  | 69014185749 <sup>1)</sup> |
|                                                                                     |               | 80-120                                | FBS 90  |    |    |                | D711                  | 69014185729 <sup>1)</sup> |
|                                                                                     |               | 54-80                                 | FBS 115 |    |    |                | D1001                 | 69014185730 <sup>1)</sup> |
|                                                                                     |               | 36-54                                 | FBS 140 |    |    |                | D1181                 | 66260384396               |
|                                                                                     |               | 120-180                               | FDS 75  | 10 | 12 | 28             | D501                  | 66260378692 <sup>1)</sup> |
|                                                                                     |               | 80-120                                | FDS 90  |    |    |                | D711                  | 69014185738 <sup>1)</sup> |
|                                                                                     |               | 54-80                                 | FDS 115 |    |    |                | D1001                 | 66260387592               |
|                                                                                     |               | 36-54                                 | FDS 140 |    |    |                | D1181                 | 66260387481 <sup>1)</sup> |
|                                                                                     | 3             | 120-180                               | FAS 75  | 20 | 15 | 33             | D501                  | 69014185748 <sup>1)</sup> |
|                                                                                     |               | 80-120                                | FAS 90  |    |    |                | D711                  | 69014185723 <sup>1)</sup> |
|                                                                                     |               | 54-80                                 | FAS 115 |    |    |                | D1001                 | 69014185724 <sup>1)</sup> |
|                                                                                     |               | 36-54                                 | FAS 140 |    |    |                | D1181                 | 69014185725               |
|                                                                                     |               | 120-180                               | FCS 75  | 20 | 10 | 28             | D501                  | 66260385384               |
|                                                                                     |               | 80-120                                | FCS 90  |    |    |                | D711                  | 66260384227 <sup>1)</sup> |
|                                                                                     |               | 54-80                                 | FCS 115 |    |    |                | D1001                 | 69014185734 <sup>1)</sup> |
|                                                                                     |               | 36-54                                 | FCS 140 |    |    |                | D1181                 | 66260387133               |

All dimensions in mm

<sup>1)</sup> Available ex stock Minimum order quantity for articles not in stock: blade size 1 & 2: 4 items, blade size 3 & 4: 2 items, delivery: 4 weeks

Two types of shank for diamond Fliesen® tools are available for your machine toolholders:

- The variable adjustable angle of the flexible swivel holder allows the dresser to be placed in the best possible position with respect to the grinding wheel and simply clamped.

All dimensions in mm

## SINGLE POINT DRESSERS

The single point dresser is made of synthetic diamond (CVD or MCD) or a natural diamond, preferably an octahedron. The hard material is gripped in a mount that is suitable for the machine toolholder and direction of use. Diamonds of many different grades and dimensions are used depending on the customer's requests and the application. The main applications for these dressers are small single-profile grinding wheels and internal cylindrical grinding. An exception to this is the profile diamond with a pre-ground radius and angle, which is also used for larger grinding wheels and wheels with complex profiles. Care is required when using these individual dressing tools, as the exposed hard diamond tips are susceptible to vibration and impacts as well as large variations in temperature, which can cause damage to the tool.

### D12 SINGLE POINT DRESSERS WITH MCD NEEDLES

This single point dresser consists of a synthetic MCD needle gripped in a holder. The advantage of the synthetic diamond over the natural one is that its precise geometry remains constant over the whole of its working life. This guarantees a uniformly high surface finish that can be reproduced every time without the need to change any set variables such as feed. It is therefore highly suitable for CNC dressing processes and the machining of small grinding wheels, including profiled ones, and internal cylindrical grinding. There is a cutout in the head of the dresser to make it easier to position the needle correctly with respect to the grinding wheel when setting up. The MCD needle is sintered in diagonally with respect to the cutout as this guarantees the longest possible tool life. The cutout must therefore be at right angles to the grinding wheel to obtain the maximum benefit.



#### STANDARD RANGE OF D12 SINGLE POINT DRESSERS WITH MCD NEEDLES

| TYPE  | NEEDLE DIMENSIONS |     |   | SHANK            |                 | ORDER NUMBER |
|-------|-------------------|-----|---|------------------|-----------------|--------------|
|       | D                 | T   | L | TYPE             | CLAMPING LENGTH |              |
| 1265  | 0,6               | 0,8 | 4 | MT1              | 40              | 66260334408  |
|       |                   |     |   | MT0              | 25              | 66260136620  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 69014164301  |
| 1285  | 0,8               | 1,1 | 4 | MT1              | 40              | 66260340532  |
|       |                   |     |   | MT0              | 25              | 66260369142  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 66260138887  |
| 12115 | 1,15              | 1,5 | 4 | MT1              | 40              | 66260334220  |
|       |                   |     |   | MT0              | 25              | 69014146751  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 66260345558  |

All dimensions in mm

Minimum order quantity for articles not in stock: 1 item, delivery: 4 weeks

#### ORDER SAMPLE

| TYPE | SHANK            | CLAMPING LENGTH |
|------|------------------|-----------------|
| 1285 | Cylindrical Ø 10 | 40              |

Other shank dimensions available on request.



## D30 SINGLE POINT DRESSERS WITH CVD NEEDLES

This single point dresser consists of a synthetic CVD needle gripped in a holder. The advantage of the synthetic diamond over the natural one is that its precise geometry is retained over the whole of its working life. This guarantees a uniformly high surface finish that can be reproduced every time without the need to change any process variables such as feed. It is therefore highly suitable for CNC dressing processes and the machining of small grinding wheels, including profiled ones, and internal cylindrical grinding. There is a cutout in the head of the dresser to make it easier to position the needle correctly with respect to the grinding wheel when setting up. Since this is a CVD needle, its orientation to the grinding wheel has no significant effect on the tool life of the dresser. Nevertheless it should be noted that the diagonal mounting leads to a greater overlap (T dimension). The CVD is sintered into the shank horizontally with respect to the cutout and in this position the T dimension is the smallest.



### STANDARD RANGE OF D30 SINGLE POINT DRESSERS WITH CVD NEEDLES

| TYPE  | NEEDLE DIMENSIONS |     |   | SHANK            |                 | ORDER NUMBER |
|-------|-------------------|-----|---|------------------|-----------------|--------------|
|       | D                 | T   | L | TYPE             | CLAMPING LENGTH |              |
| 3023  | 0,2               | 0,2 | 3 | MT1              | 40              | 66260364163  |
|       |                   |     |   | MT0              | 25              | 66260338571  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 66260336272  |
| 3033  | 0,3               | 0,3 | 3 | MT1              | 40              | 66260339183  |
|       |                   |     |   | MT0              | 25              | 66260356104  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 66260336101  |
| 3044  | 0,4               | 0,4 | 4 | MT1              | 40              | 69014146755  |
|       |                   |     |   | MT0              | 25              | 66260138967  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 66260338797  |
| 3064  | 0,6               | 0,6 | 4 | MT1              | 40              | 66260335519  |
|       |                   |     |   | MT0              | 25              | 66260334913  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 66260155917  |
| 3084  | 0,8               | 0,8 | 4 | MT1              | 40              | 66260155970  |
|       |                   |     |   | MT0              | 25              | 66260139868  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 66260137229  |
| 30124 | 1,2               | 1,2 | 4 | MT1              | 40              | 66260136169  |
|       |                   |     |   | MT0              | 25              | 66260138367  |
|       |                   |     |   | Cylindrical Ø 10 | 40              | 66260195542  |

All dimensions in mm

Minimum order quantity for articles not in stock: 1 item, delivery: 4 weeks

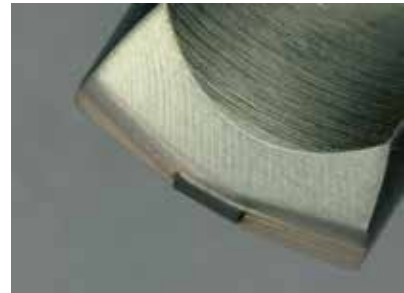
### ORDER SAMPLE

| TYPE | SHANK            | CLAMPING LENGTH |
|------|------------------|-----------------|
| 3084 | Cylindrical Ø 10 | 40              |

Other shank dimensions available on request.

## D53 SINGLE POINT DIAMOND DRESSERS WITH PCD PLATES

This dresser has been specially designed for conditioning centreless regulating wheels. It consists of a PCD plate gripped in a holder. The advantage of PCD over natural diamond is that its precise geometry remains constant over the whole of its working life. This guarantees a uniformly reproducible high surface finish without the need to change any set variables such as feed. It is therefore most suitable for CNC dressing processes.



### STANDARD RANGE OF D53 SINGLE POINT DIAMOND DRESSERS WITH PCD PLATES

| TYPE | PCD DIMENSIONS |   |   | SHANK       |                       |       | ORDER NUMBER |
|------|----------------|---|---|-------------|-----------------------|-------|--------------|
| D53  | B              | H | X | TYPE        | CLAMPING LENGTH $L_1$ | $L_2$ |              |
| 5320 | 0,5            | 2 | 8 | MT1         | 40                    | 13    | 69014164952  |
|      |                |   |   | MT0         | 25                    | 13    | 66260333171  |
|      |                |   |   | Diameter 10 | 40                    | 13    | 66260199498  |

All dimensions in mm

Minimum order quantity for articles not in stock: 1 item, delivery: 4 weeks

### ORDER SAMPLE

| TYPE | SHANK       | CLAMPING LENGTH |
|------|-------------|-----------------|
| 5320 | Diameter 10 | 40              |

# PROFILE DIAMOND, GROUND

Profile diamonds are high quality dressing tools available for all major dressing units (e.g. Diaform, Schaudt, and Fortuna).

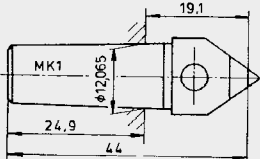
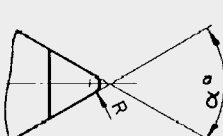
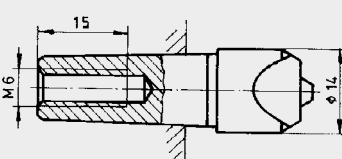
These tools are exceptionally economical as their angles and radii can be reground

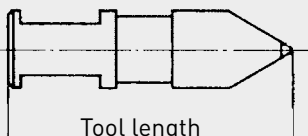
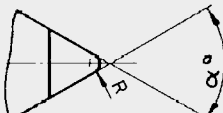
Please note that the number of possible regrinding operations depends on the shape and size of the diamond.

In addition to the durable and extremely high-specification natural diamond tools, we also offer these tools with CVD and PCD inserts.



## STANDARD RANGE OF D53 PROFILE DIAMOND DRESSERS WITH PCD PLATES

|  |                |  |          |  |              |                       |
|-----------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------|--------------|-----------------------|
| TYPE                                                                              | DIAMOND WEIGHT | ANGLE A $\alpha$                                                                  | RADIUS R | TOOL LENGTH                                                                         | DESIGNATION  | DRESSING UNIT / MODEL |
| PD410                                                                             | 1,0            | 70°                                                                               | 0,4      | 44                                                                                  | PD410 70/400 | Schaudt               |

|  |                                             |                |  |             |                                             |                                                                                                                                 |
|------------------------------------------------------------------------------------|---------------------------------------------|----------------|------------------------------------------------------------------------------------|-------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TYPE                                                                               | DIAMOND WEIGHT                              | ANGLE $\alpha$ | RADIUS R                                                                           | TOOL LENGTH | DESIGNATION                                 | DRESSING UNIT / MODEL                                                                                                                                                                                                |
| PD414<br>Type S                                                                    | 0,25-0,5<br>depending<br>on the<br>geometry | 40°            | 0,125                                                                              | 36          | PD414 40/125 S                              | Diaform Dressing unit:<br>AT, ATR, BT, BTR                                                                                                                                                                           |
|                                                                                    |                                             |                | 0,250                                                                              |             | PD414 40/250 S                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             |                | 0,500                                                                              |             | PD414 40/500 S                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             | 60°            | 0,125                                                                              |             | PD414 60/125 S                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             |                | 0,250                                                                              |             | PD414 60/250 S                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             |                | 0,500                                                                              |             | PD414 60/500 S                              |                                                                                                                                                                                                                      |
| PD414<br>Type L                                                                    | 0,25-0,5<br>depending<br>on the<br>geometry | 30°            | 0,125                                                                              | 45,5        | PD414 30/125 L                              | Diaform Dressing unit:<br>2A, 2AR, 2B, 2BR,<br>3A, 3AR, 3B, 3BR,<br>4A, 4AR, 4B, 4BR,<br>5/1, 5/2, 5/2R, 5/50,<br>6/1, 6/2,<br>8/1, 8/2,<br>10/2,<br>12/1, 12/2,<br>14/1, 14/2,<br>16/1, 16/2,<br>18/1, 18/2,<br>CNC |
|                                                                                    |                                             |                | 0,250                                                                              |             | PD414 30/250 L                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             |                | 40°                                                                                |             | 0,125                                       |                                                                                                                                                                                                                      |
|                                                                                    |                                             | 0,250          |                                                                                    |             | PD414 40/250 L                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             | 0,500          |                                                                                    |             | PD414 40/500 L                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             | 60°            | 0,125                                                                              |             | PD414 60/125 L                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             |                | 0,250                                                                              |             | PD414 60/250 L                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             |                | 0,500                                                                              |             | PD414 60/500 L                              |                                                                                                                                                                                                                      |
|                                                                                    |                                             |                | PD414<br>Type X                                                                    |             | 0,25-0,5<br>depending<br>on the<br>geometry |                                                                                                                                                                                                                      |
| 0,250                                                                              | PD414 30/250 X                              |                |                                                                                    |             |                                             |                                                                                                                                                                                                                      |
| 40°                                                                                | 0,125                                       | PD414 40/125 X |                                                                                    |             |                                             |                                                                                                                                                                                                                      |
|                                                                                    | 0,250                                       | PD414 40/250 X |                                                                                    |             |                                             |                                                                                                                                                                                                                      |
|                                                                                    | 0,500                                       | PD414 40/500 X |                                                                                    |             |                                             |                                                                                                                                                                                                                      |
| 60°                                                                                | 0,125                                       | PD414 60/125 X |                                                                                    |             |                                             |                                                                                                                                                                                                                      |
|                                                                                    | 0,250                                       | PD414 60/250 X |                                                                                    |             |                                             |                                                                                                                                                                                                                      |
|                                                                                    | 0,500                                       | PD414 60/500 X |                                                                                    |             |                                             |                                                                                                                                                                                                                      |

| TYPE  | DIAMOND WEIGHT | ANGLE $\alpha$ | RADIUS R | TOOL LENGTH | DESIGNATION  | DRESSING UNIT / MODEL |
|-------|----------------|----------------|----------|-------------|--------------|-----------------------|
| PD425 | 1,0            | 55°            | 0,2      | 42          | PD425 55/200 | Fortuna               |

| TYPE  | DIAMOND WEIGHT | ANGLE $\alpha$ | RADIUS R | TOOL LENGTH | DESIGNATION  | DRESSING UNIT / MODEL |
|-------|----------------|----------------|----------|-------------|--------------|-----------------------|
| PD426 | 1,0            | 60°            | 0,2      | 24          | PD426 60/200 | MSO                   |

| TYPE  | DIAMOND WEIGHT | ANGLE $\alpha$ | RADIUS R | TOOL LENGTH | DESIGNATION  | DRESSING UNIT / MODEL |
|-------|----------------|----------------|----------|-------------|--------------|-----------------------|
| PD428 | 0,5            | 50°            | 0,1      | 22          | PD428 50/100 | Jung / RA38-53        |

| DIMENSIONS $\emptyset \times L$ | CT   | DESIGNATION $\alpha / R$ | ORDER NUMBER |
|---------------------------------|------|--------------------------|--------------|
| 9,52 x 45,5                     | 0,25 | 30/250L                  | 66260343187  |
|                                 |      | 40/125L                  | 66260340672  |
|                                 |      | 40/250L                  | 66260349265  |
|                                 |      | 40/125L                  | 66260389254  |
|                                 | 0,33 | 40/250L                  | 66260339381  |
|                                 |      | 60/250L                  | 66260340002  |
|                                 |      | 60/500L                  | 66260387140  |
|                                 |      | 30/125L                  | 66260339047  |
|                                 | 0,50 | 30/250L                  | 66260340152  |
|                                 |      | 40/125L                  | 66260199494  |
|                                 |      | 40/250L                  | 60157642851  |
|                                 |      | 40/500L                  | 66260339689  |
|                                 |      | 60/500L                  | 66260336405  |

## SPECIAL SHAPES

In addition to the standard types other geometries are available upon request.

Unground Profile diamond tools or Norton WINTER Diamond Fliesen are recommended for the pre-profiling process.

For Diaform units the following Norton WINTER Fliese is available ex stock.

| SHAPE   | W  | X  | HOLDER GEOMETRY | DIAMOND SIZE | BOND | ORDER NUMBER |
|---------|----|----|-----------------|--------------|------|--------------|
| 1TFDS90 | 10 | 12 | Z9,52-30-5-15   | D711         | T645 | 66260384883  |

## SINGLE POINT DRESSERS WITH NATURAL DIAMONDS

Single point dressers are used for straight dressing and for dressing grinding wheels with simple profiles.

Diamonds have a number of working points, depending on the grade.

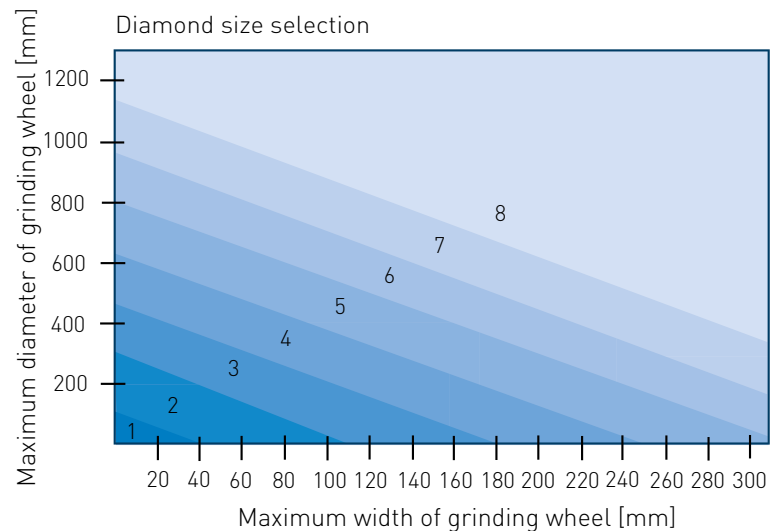
Repositioning the diamonds enables these to be activated in turn. Please send your dresser back to us in good time. Re-brazing the diamond at the factory increases the service life of the tool and makes it even better value for money.



### SELECTING THE RIGHT DRESSER

We have made it easy for you to select the most suitable dresser:

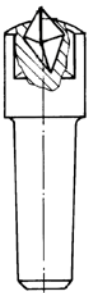
- Choose the size of diamond from the diagram according to the width and diameter of your grinding wheel,
- then choose the best tool from the table below.



### RECOMMENDED DIAMOND SIZE [CT]

|    |             |
|----|-------------|
| 1  | 0,15...0,35 |
| 2  | 0,25...0,50 |
| 3  | 0,35...0,75 |
| 4  | 0,50...1,00 |
| 5  | 0,60...1,25 |
| 6  | 0,70...1,50 |
| 7  | 0,85...1,75 |
| 8* | 1,00...2,00 |

\* Diamonds >2 ct available on request

| TYPE OF DRESSING TOOL                                                                                                 | GRADE OF DIAMOND | DESCRIPTION                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------|
| <br>LEA<br>(single point dressers) | Diacar           | Good industrial grade, at least 3-5 working points, regular octahedron, virtually no inclusions, no cracks |
|                                                                                                                       | Vatom            | Standard grade, at least 2-3 working points, limited irregular shape, few inclusions, no cracks            |
|                                                                                                                       | ZA               | Normal grade, at least 1-2 working points, few inclusions and may have cracks                              |
|                                                                                                                       | Industry         | Simple industrial grade, at least 1 working point                                                          |
| LEW<br>(‘basic’ single point dressers)                                                                                | Basic            | Basic grade with one working point                                                                         |

## ORDER SAMPLE

| TYPE OF DRESSER | DIAMOND [CT] | GRADE OF DIAMOND | HOLDER |
|-----------------|--------------|------------------|--------|
| LEA -           | 0,5 -        | Vatom            | MT1-40 |

The holder of a single point dresser can also be made with a head, depending on the size of the diamond.

## RANGE OF SINGLE POINT DRESSERS IN STOCK

| SPECIFICATION             | GRADE OF DIAMOND | SHAPE - OVERALL LENGTH | DIAMOND [CT] | WORKING POINTS | ORDER NUMBER              |
|---------------------------|------------------|------------------------|--------------|----------------|---------------------------|
| LEA-1-Diacar-MK1-40       | Diacar           | MT1 × 40               | 1,00         | 4              | 66260195848 <sup>1)</sup> |
| LEA-1-Vatom-MK1-40        | Vatom            | MT1 × 40               | 1,00         | 3              | 66260382005 <sup>1)</sup> |
| LEA-1-Standard-MK0-25,5   | Industry         | MT0 × 25,5             | 1,00         | 2              | 66260385415               |
| LEA-1-Standard-MK1-40     |                  | MT1 × 40               | 1,00         | 2              | 66260389207               |
| LEA-0,5-Standard-Z8-30    |                  | Ø 8 × 30               | 0,50         | 2              | 66260386391 <sup>1)</sup> |
| LEA-0,5-Standard-MK0-25,5 |                  | MT0 × 25,5             | 0,50         | 2              | 66260384683 <sup>1)</sup> |
| LEA-0,5-Standard-MK1-40   |                  | MT1 × 40               | 0,50         | 2              | 66260386875 <sup>1)</sup> |
| LEA-0,33-Standard-MK1-40  |                  | MT1 × 40               | 0,33         | 2              | 66260387542               |

All dimensions in mm

<sup>1)</sup> Available ex stock

Minimum order quantity for articles not in stock: 1 item, delivery: 4 weeks

## RANGE OF 'BASIC' SINGLE POINT DRESSERS IN STOCK

| SPECIFICATION     | GRADE OF DIAMOND | SHAPE - OVERALL LENGTH | DIAMOND [CT] | WORKING POINTS | ORDER NUMBER              |
|-------------------|------------------|------------------------|--------------|----------------|---------------------------|
| LEW-0,25-MK0-25,5 | Basic            | MT0 × 25,5             | 0,25         | 1              | 66260342633               |
| LEW-0,1-MK1-40    |                  | MT1 × 40               | 0,10         | 1              | 66260386731 <sup>1)</sup> |
| LEW-0,1-Z8-90     |                  | Ø 8 × 90               | 0,10         | 1              | 66260386964               |
| LEW-0,1-MK0-25,5  |                  | MT0 × 25,5             | 0,10         | 1              | 66260340393 <sup>1)</sup> |
| LEW-0,1-Z8-30     |                  | Ø 8 × 30               | 0,10         | 1              | 66260389256               |

All dimensions in mm

<sup>1)</sup> Available ex stock

Minimum order quantity for articles not in stock: 1 item, delivery: 4 weeks



# RONDIST ROTATABLE TOOLS WITH DIAMOND OR CVD

An economical multi-point dressing tool with the functional characteristics of a single-point dresser. A number of individual diamonds can be used in sequence. Turning the wheel replaces the used diamond grit with a new one. These tools can be supplied with natural diamonds and CVD, for both profiling and straight dressing. The table below shows the commonest types. They can also be made on request with e.g. differing densities of diamond needles on the circumference.



|  | TYPE   | GRINDING WHEELS  |               | DIAMOND SPECIFICATION | QUANTITY OF HARD MATERIAL PER ROTATABLE TOOL |             | ORDER NUMBER              |
|--|--------|------------------|---------------|-----------------------|----------------------------------------------|-------------|---------------------------|
|  |        | GRIT SIZE [MESH] | DIAMETER [mm] |                       | SIZE WEIGHT                                  | QUANTITY    |                           |
|  | R02096 | 46 - 80          | < 600         | Diamond needles       | 2 ct                                         | 96          | 69014185803 <sup>1)</sup> |
|  | R05096 | 36 - 60          | > 600         | Diamond needles       | 5 ct                                         | 96          | 66260390774               |
|  | R01008 | 46 - 100         | ≤ 1000        | Triangular diamonds   | 1,30 ct                                      | 8           | 69014185801 <sup>1)</sup> |
|  |        |                  |               | Triangular CVDs       | Length of sides = 3,5 mm<br>Depth = 1,0 mm   | 8           | 66260354350 <sup>1)</sup> |
|  | R015/5 | 60 - 120         | 5 - 40        | Diamond grit D501     | 0,65 ct                                      | Multi-layer | 66260389341 <sup>1)</sup> |

All dimensions in mm

<sup>1)</sup> Available ex stock

Minimum order quantity for articles not in stock: 1 item, delivery: 4 weeks

## HOLDERS FOR ROTATABLE TOOLS

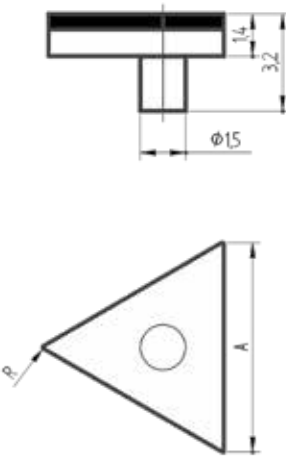
| SPECIFICATION | SHAPE OF HOLDER | ORDER NUMBER |
|---------------|-----------------|--------------|
| 2096/5096     | MT1             | 66260385746  |
|               | MT0             | 66260386916  |
|               | Z12-35          | 66260381329  |
| 1008          | MT1             | 66260386640  |
|               | MT0             | 7958703355   |
|               | Z10-39,5        | 66260391408  |
| W15/5         | MT1             | 69014125429  |
|               | MT0             | 66260385884  |
|               | W15/5           | 66260370419  |

## PCD AND CVD INSERT DRESSERS

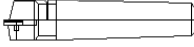
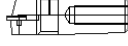
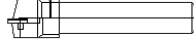
This economical tool has three working points on a defined radius that can be brought into play by rotating the insert.

A certain amount of regrinding is possible to create the next largest radius.



| TOOL                                                                               | TYPE | SHANK LENGTH A | RADIUS R |
|------------------------------------------------------------------------------------|------|----------------|----------|
|  | PCD  | 6,0            | 0,125    |
|                                                                                    |      |                | 0,200    |
|                                                                                    |      |                | 0,250    |
|                                                                                    |      |                | 0,500    |
|                                                                                    |      |                | 0,800    |
|                                                                                    |      |                | 0,125    |
|                                                                                    |      | 6,5            | 0,200    |
|                                                                                    |      |                | 0,250    |
|                                                                                    |      |                | 0,500    |
|                                                                                    |      |                | 0,800    |
|                                                                                    |      |                | 0,125    |
|                                                                                    |      | 7,0            | 0,200    |
|                                                                                    |      |                | 0,250    |
|                                                                                    |      |                | 0,500    |
|                                                                                    |      |                | 0,800    |
|                                                                                    |      |                | 0,125    |
|                                                                                    |      |                | 0,200    |
|                                                                                    |      |                | 0,250    |
|                                                                                    |      |                | 0,500    |
|                                                                                    |      |                | 0,800    |
|                                                                                    | CVD  | 6,0            | 0,125    |
|                                                                                    |      |                | 0,200    |
|                                                                                    |      |                | 0,250    |
|                                                                                    |      |                | 0,500    |
|                                                                                    |      |                | 0,800    |
|                                                                                    |      |                | 0,125    |
|                                                                                    |      | 6,5            | 0,200    |
|                                                                                    |      |                | 0,250    |
|                                                                                    |      |                | 0,500    |
|                                                                                    |      |                | 0,800    |
|                                                                                    |      |                | 0,125    |
|                                                                                    |      | 7,0            | 0,200    |
|                                                                                    |      |                | 0,250    |
|                                                                                    |      |                | 0,500    |
|                                                                                    |      |                | 0,800    |
|                                                                                    |      |                | 0,125    |
|                                                                                    |      |                | 0,200    |
|                                                                                    |      |                | 0,250    |
|                                                                                    |      |                | 0,500    |
|                                                                                    |      |                | 0,800    |

## SINGLE POINT DRESSERS

| DRESSER HOLDER                                                                    | DESIGNATION  | SIZE                |
|-----------------------------------------------------------------------------------|--------------|---------------------|
|  | PKD81A-966/1 | MT1                 |
|  | PKD81A-966/2 | MT1                 |
|  | PK81A-966/3  | Cylindrical 12/10/8 |

See dimensions of the MT0 and MT1 at following page.

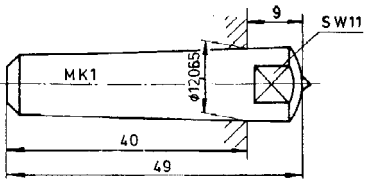
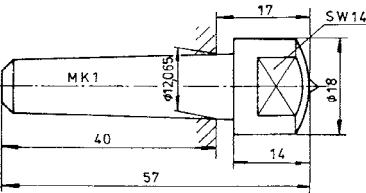
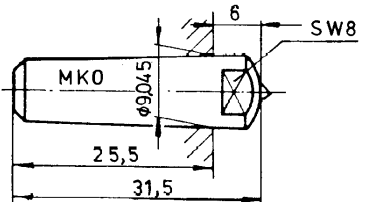
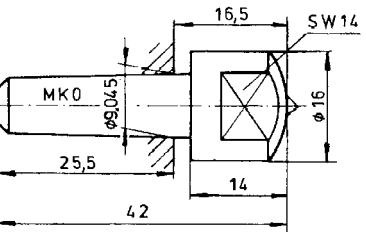
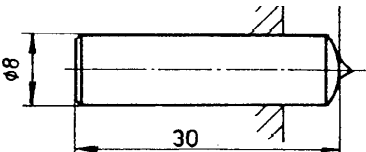
### ORDER SAMPLE

| TYPE           | DIAMOND | DIMENSIONS | RADIUS   |
|----------------|---------|------------|----------|
| Insert dresser | PCD     | 6,0 mm     | 0,125 mm |

# TOOLHOLDERS AND SHANKS FOR COMMON MACHINE TYPES

Most of our stationary dressers are manufactured in standard sizes and kept in stock. The tools can be fastened to a suitable holder or shank to match any machine toolholder. We give here a summary of the most common holders and shanks. Please also consult our section entitled 'Toolholders and shanks for diamond Fliesen® tools'.

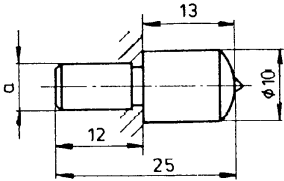
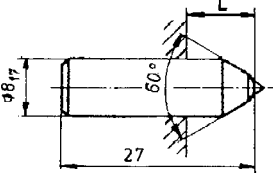
## DIAMOND HOLDER TO DIN 228

|                                                                                     | TYPE | MACHINE MOUNTING |
|-------------------------------------------------------------------------------------|------|------------------|
|   | 400  | MT1              |
|  | 400K | MT1              |
|  | 402  | MT0              |
|  | 402K | MT0              |
|  | 403  | Cylindrical      |

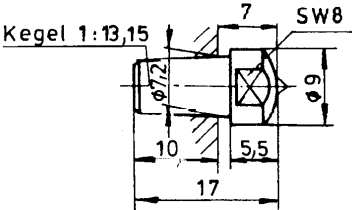
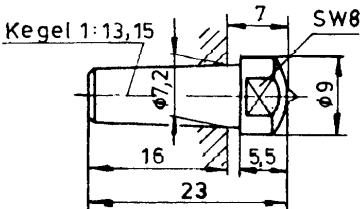
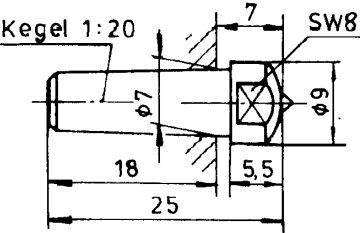
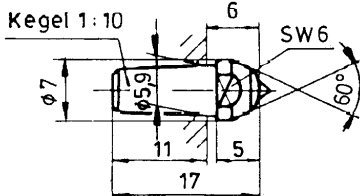
All dimensions in mm

Other shank dimensions on request.

## TOOLHOLDERS AND SHANKS FOR COMMON MACHINE TYPES

|                                                                                   | TYPE | MACHINE MOUNTING         |
|-----------------------------------------------------------------------------------|------|--------------------------|
|  | 405  | Landis a Ø 6; Ø 6,5; Ø 8 |
|  | 406  | D (diamond tip) centred  |

## OTHER DIAMOND HOLDERS

|                                                                                     | TYPE | MACHINE MOUNTING            |
|-------------------------------------------------------------------------------------|------|-----------------------------|
|   | 407  | Jung NT 65 taper 1:13,15    |
|  | 409  | Jung JgN 1751 taper 1:13,15 |
|  | 411  | Jung JgN 1751 taper 1:20    |
|  | 412  | Jung FA 42-12 taper 1:10    |

All dimensions in mm

|  | TYPE | MACHINE MOUNTING         |
|--|------|--------------------------|
|  | 413  | Jung C 8 taper 1:13,15   |
|  | 417  | Jung C 8 taper 1:20      |
|  | 420  | Niles                    |
|  | 421  | Niles                    |
|  | 422  | Kolb KZ 1 + 2 taper 1:50 |
|  | 424  | Deckel                   |

All dimensions in mm

Other shank dimensions on request.



# MULTI-POINT DRESSERS

Multi-point dressers consist of a holder and a diamond section. The dimensions of the diamond section, the grit size and the ratio of the bond to the diamond grit are determined by the grinding wheel to be dressed. If you supply us with your individual grinding wheel parameters we shall be pleased to recommend a suitable multi-point dresser. Please specify the holder and the mounting angle according to your machine mounting system (cylindrical or tapered e.g. MT1, MT0). In addition to their short delivery times multi-point dressers have more to offer:

## Lower costs

Although the actual diamond content of multi-point dressers is usually much higher than that of single-point dressers, the price is lower because the diamonds used are so very much smaller.

## Faster stock removal

As far more diamonds are in contact with the grinding wheel, the working load is distributed between several diamond tips and this enables the feed to be greater. Result: faster removal of material from the grinding wheel. The diamonds can be arranged in various different ways, depending on the application.

## Long service life

Multi-point dressers wear far more slowly than single-point dressers. There is no need to rotate or regrind the points. Multi-point dressers are robust tools and considerably less sensitive than single-point dressers.

## D21 MULTI-POINT DRESSERS WITH NATURAL DIAMOND

A robust tool for the straight dressing of grinding wheels for peripheral and surface grinding. The uniform setting pattern and the special arrangement of the diamonds guarantee a relatively uniform degree of coverage (the number of diamonds making contact).



|  | TYPE | SEGMENT DIMENSIONS |          | DIAMOND       |           | SHANK     |                 | ORDER NUMBER |
|--|------|--------------------|----------|---------------|-----------|-----------|-----------------|--------------|
|  | D21  | WIDTH B            | HEIGHT H | NUMBER / ROWS | GRIT SIZE | SHAPE / D | CLAMPING LENGTH |              |
|  | 2101 | 12                 | 10       | 3             | 851       | 14,8      | 22              | 66260196334  |
|  | 2102 |                    | 6        | 2             | 851       | 11        | 40              | 66260373763  |
|  | 2103 |                    | 10       | 3             | 1181      | 10        | 60              | 66260383028  |
|  | 2104 |                    | 6        | 2             | 1181      | 16        | 50              | 66260387928  |
|  | 2105 | 18                 | 10       | 3             | 851       | 10        | 40              | 66260322879  |
|  | 2106 |                    | 6        | 2             | 851       | 12        | 50              | 66260336054  |
|  | 2107 |                    | 10       | 3             | 1181      | 8         | 10              | 66260391179  |
|  | 2108 |                    | 6        | 2             | 1181      | 10        | 40              | 66260337072  |
|  | 2109 |                    | 10       | 3             | 2240      | 10,9      | 30              | 66260320914  |

## ORDER SAMPLE

| TYPE | SHANK / D | CLAMPING LENGTH | MOUNTING ANGLE / ° |
|------|-----------|-----------------|--------------------|
| 2104 | 16        | 50              | 0                  |

Minimum order quantity for articles not in stock: 1 item, delivery: 4 weeks

## IGEL® MULTI-POINT DRESSERS

A robust tool for the straight dressing of circumferential grinding wheels and wheels for surface grinding.

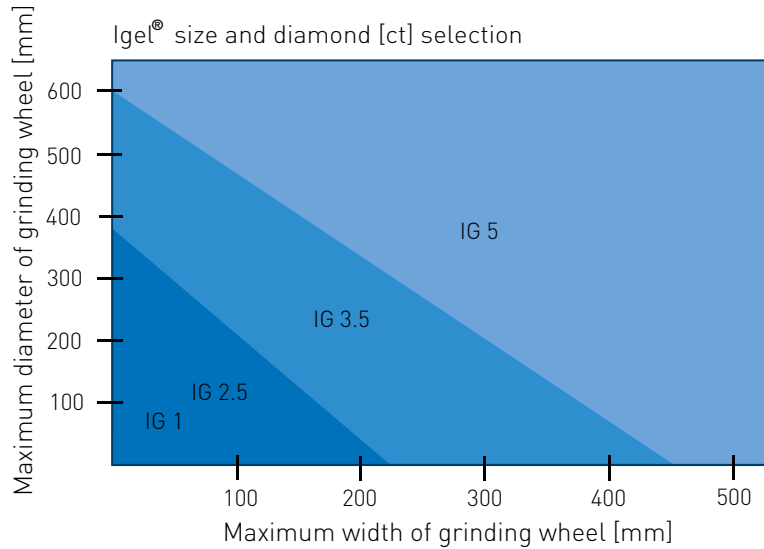
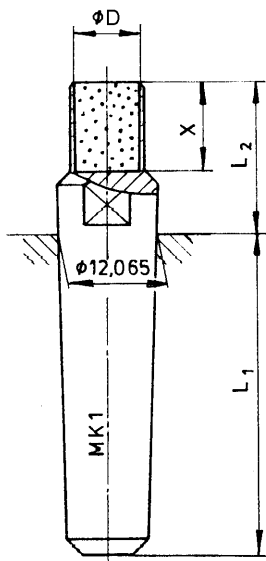
Igel® dressers are easy to handle and very economical in use. A great advantage of the Igel® is that it can be used at high dressing feed rates.



### SELECTING THE RIGHT DRESSER

We have made it easy for you to select a suitable Igel®:

- From the diagram, choose the diamond size and content of the Igel®.
- then choose the best tool from the table below.



| IGEL®  | DIMENSIONS OF DIAMOND SECTION<br>(diameter $\phi$ and length X) | DIAMOND<br>[ct] |
|--------|-----------------------------------------------------------------|-----------------|
| IG 1   | 8 × 4                                                           | 1               |
| IG 2,5 | 8 × 11                                                          | 2,5             |
| IG 3,5 | 8 × 11                                                          | 3,5             |
| IG 5   | 11 × 11                                                         | 5               |

### ORDER SAMPLE

| BOND (first letter of the bonding material) | SIZE OF IGEL® | DIAMOND [ct] | DIMENSIONS | HOLDER | GRIT SIZE | BOND |
|---------------------------------------------|---------------|--------------|------------|--------|-----------|------|
| H                                           | IG -          | 2,5 -        | 8 - 11 -   | MT1-40 | D 1001    | H710 |

MULTI-POINT DRESSERS

BOND FOR ALL ALUMINA GRINDING WHEELS, INCLUDING SINTERED ALUMINA

| IGEL®                      | GRINDING WHEEL GRIT SIZE | GRIT SIZE OF IGEL® | BOND |
|----------------------------|--------------------------|--------------------|------|
| IG 1, IG 2,5, IG 3,5, IG 5 | 60 - 80                  | D711               | H710 |
|                            | 46 - 60                  | D1001              | H710 |
|                            | 36 - 46                  | D2240              | H710 |

BOND FOR SIC GRINDING WHEELS

| IGEL®                      | GRINDING WHEEL GRIT SIZE | GRIT SIZE OF IGEL® | BOND |
|----------------------------|--------------------------|--------------------|------|
| IG 1, IG 2,5, IG 3,5, IG 5 | 60 - 80                  | D711               | H770 |
|                            | 46 - 60                  | D1001              | H770 |
|                            | 36 - 46                  | D2240              | H770 |

BOND FOR SIC GRINDING WHEELS

| SPECIFICATION                   | DIMENSIONS |          | DIAMOND   |     | ORDER NUMBER              |
|---------------------------------|------------|----------|-----------|-----|---------------------------|
|                                 | DIAMETER D | LENGTH X | GRIT SIZE | ct  |                           |
| HIG1-8-4-MK1-40*D1001 H710      | 8          | 4        | D1001     | 1,0 | 66260195955               |
| HIG2,5-8-11-MK1-40*D711 H710    |            | 11       | D711      | 2,5 | 66260387566 <sup>1)</sup> |
| HIG2,5-8-11-MK0-25,5*D1001 H710 |            |          | D1001     |     | 66260383700               |
| HIG2,5-8-11-MK1-40*D1001 H710   |            |          | D1001     |     | 66260195957 <sup>1)</sup> |
| HIG2,5-8-11-MK1-40*D2240 H710   |            |          | D2240     |     | 66260385203               |
| HIG3,5-8-11-MK0-25,5*D711 H710  | 11         | 11       | D711      | 3,5 | 66260389441               |
| HIG3,5-8-11-MK1-40*D711 H710    |            |          | D711      | 5,0 | 66260195960 <sup>1)</sup> |
| HIG5-11-11-MK1-40*D711 H710     |            |          | D711      |     | 66260195972               |
| HIG5-11-11-MK1-40*D1001 H710    |            |          | D1001     |     | 66260195959 <sup>1)</sup> |
| HIG5-11-11-MK1-40*D2240 H710    |            |          | D2240     |     | 66260195953               |

## PRO-DRESS® MULTI-POINT DRESSERS

The design of the pro-dress® is similar to that of the Igel®. The pro-dress® is used for the straight dressing of wheels with fine and very fine grit sizes for flat grinding and peripheral grinding.

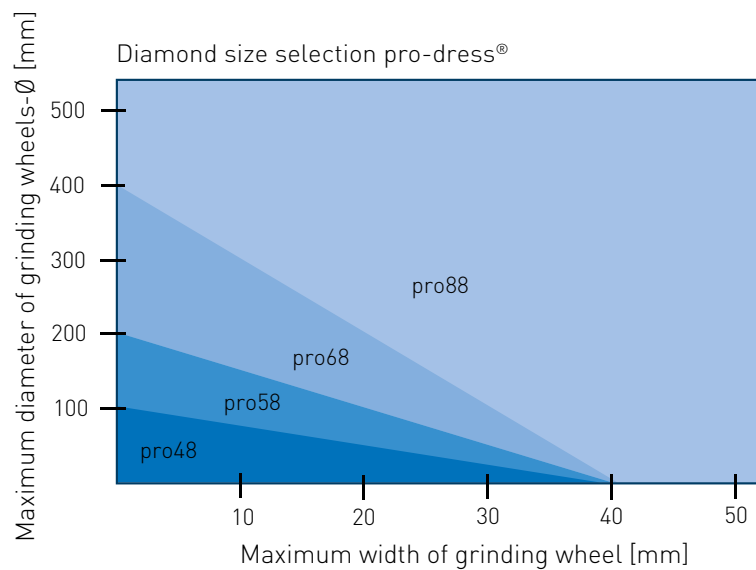
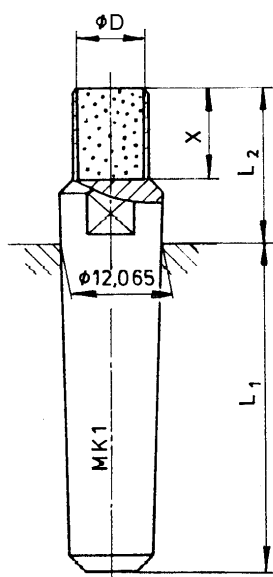
Its low dressing forces make it especially useful for external cylindrical grinding and fine surfaces.



### SELECTING THE RIGHT DRESSER

We have made it easy for you to select the most suitable pro-dress® tool:

- From the diagram, choose the diamond size and content of the pro-dress®.
- then choose the best tool from the table below.



| PRO-DRESS® | DIMENSIONS OF DIAMOND TIP<br>(diameter Ø and length X) | DIAMOND<br>[ct] |
|------------|--------------------------------------------------------|-----------------|
| pro48      | 4 x 8                                                  | 0,6             |
| pro58      | 5 x 8                                                  | 1,0             |
| pro68      | 6 x 8                                                  | 1,3             |
| pro88      | 8 x 8                                                  | 2,4             |

### ORDER SAMPLE

| BOND (first letter) | DESIGN  | DIMENSIONS | HOLDER | GRIT SIZE | BOND |
|---------------------|---------|------------|--------|-----------|------|
| H                   | pro58 - | 5 - 8 -    | MT1-40 | D151      | H760 |

## MULTI-POINT DRESSERS

### PRO-DRESS® FOR DRESSING ALUMINA GRINDING WHEELS (HARD GRADES)

| PRO-DRESS®                    | GRINDING WHEEL GRIT SIZE | GRIT SIZE PRO-DRESS® | BOND |
|-------------------------------|--------------------------|----------------------|------|
| pro48, pro58,<br>pro68, pro88 | 320 - 600                | D76                  | H760 |
|                               | 220 - 320                | D107                 | H760 |
|                               | 180 - 220                | D151                 | H760 |
|                               | 120 - 180                | D213                 | H760 |
|                               | 100 - 120                | D301                 | H760 |
|                               | 80 - 100                 | D426                 | H710 |
|                               | 60 - 80                  | D601                 | H710 |
|                               | 54 - 60                  | D711                 | H710 |

### PRO-DRESS® FOR DRESSING ALUMINA GRINDING WHEELS (LOW HARDNESS GRADES, e.g. A and B)

| PRO-DRESS®                    | GRINDING WHEEL GRIT SIZE | GRIT SIZE PRO-DRESS® | BOND  |
|-------------------------------|--------------------------|----------------------|-------|
| pro48, pro58,<br>pro68, pro88 | 320 - 600                | D76                  | ST469 |
|                               | 220 - 320                | D107                 | ST469 |
|                               | 180 - 220                | D151                 | ST469 |
|                               | 120 - 180                | D213                 | ST469 |
|                               | 100 - 120                | D301                 | ST469 |
|                               | 80 - 100                 | D426                 | ST469 |
|                               | 60 - 80                  | D601                 | ST469 |
|                               | 54 - 60                  | D711                 | ST469 |

### PRO-DRESS® FOR DRESSING SILICON CARBIDE (SiC) GRINDING WHEELS

| PRO-DRESS®                    | GRINDING WHEEL GRIT SIZE | GRIT SIZE PRO-DRESS® | BOND |
|-------------------------------|--------------------------|----------------------|------|
| pro48, pro58,<br>pro68, pro88 | 320 - 600                | D76                  | H770 |
|                               | 220 - 320                | D107                 | H770 |
|                               | 180 - 220                | D151                 | H770 |
|                               | 120 - 180                | D213                 | H770 |
|                               | 100 - 120                | D301                 | H770 |
|                               | 80 - 100                 | D426                 | H770 |
|                               | 60 - 80                  | D601                 | H770 |
|                               | 54 - 60                  | D711                 | H770 |

### PRO-DRESS® RANGE

| SPECIFICATION                 | DIMENSIONS |          | DIAMOND   |     | ORDER NUMBER |
|-------------------------------|------------|----------|-----------|-----|--------------|
|                               | DIAMETER Ø | LENGTH X | GRIT SIZE | ct  |              |
| HPRO48-4-8-Z6-24*D301 H760    | 4          | 8        | D301      | 0,6 | 66260384896  |
| HPRO58-5-8-Z6-25*D426 H710    | 5          | 8        | D426      | 1,0 | 66260196226  |
| HPRO68-6-8-MK0-25,5*D213 H760 | 6          | 8        | D213      | 1,3 | 66260196258  |

All dimensions in mm

<sup>1)</sup> Available ex stock

Minimum order quantity for articles not in stock: 6 item, delivery: 6 weeks

# TECHNICAL NOTES

## DRESSING SIDE FEED AND POSITIONS IN RELATION TO THE GRINDING WHEEL FOR STATIONARY DRESSING TOOLS

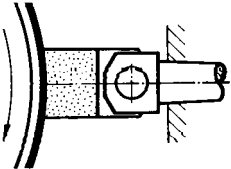
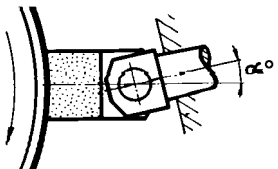
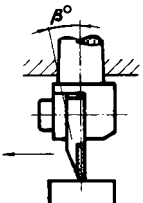
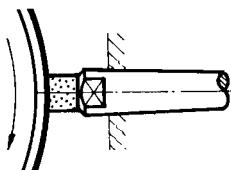
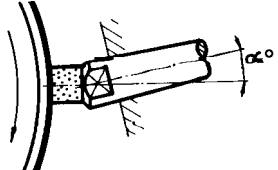
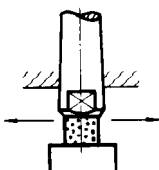
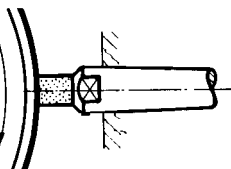
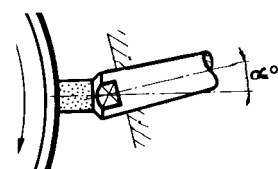
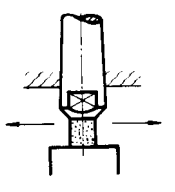
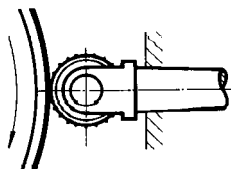
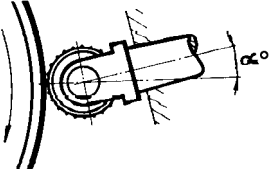
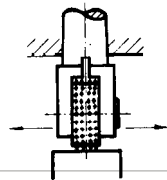
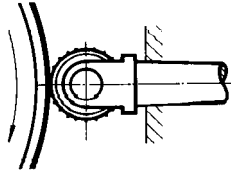
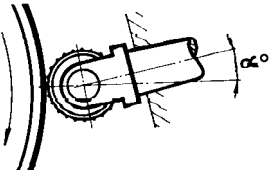
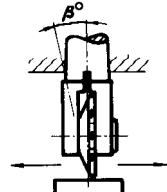
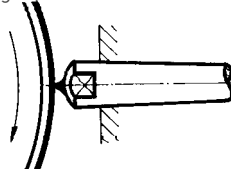
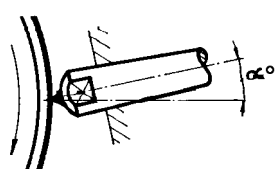
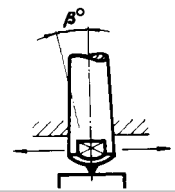
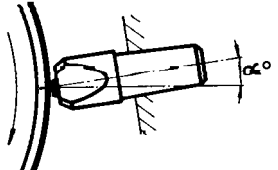
| GRINDING WHEEL GRIT SIZE | RECOMMEND-ED DRESSING FEED (mm/rev) | GRINDING WHEEL SPEED [RPM] |       |       |       |       |       |       |       |       |       |
|--------------------------|-------------------------------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                          |                                     | 500                        | 1.000 | 1.500 | 2.000 | 2.500 | 3.000 | 3.500 | 4.000 | 4.500 | 5.000 |
| 150                      | 0,05                                | 25                         | 50    | 75    | 100   | 125   | 150   | 175   | 200   | 225   | 250   |
| 100                      | 0,15                                | 75                         | 150   | 225   | 300   | 375   | 420   | 525   | 600   | 675   | 750   |
| 60                       | 0,25                                | 125                        | 250   | 375   | 500   | 625   | 750 * | 875   | 1.000 | 1.125 | 1.250 |
| 46                       | 0,35                                | 175                        | 350   | 525   | 700   | 875   | 1.050 | 1.225 | 1.400 | 1.575 | 1.750 |
| < 46                     | 0,45                                | 225                        | 450   | 675   | 900   | 1.125 | 1.350 | 1.575 | 1.800 | 2.025 | 2.250 |

\* Example for grinding wheel with 60 mesh grit and speed n = 3000 rpm, dressing feed 750mm/min

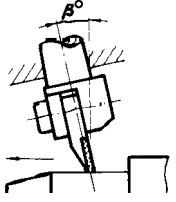
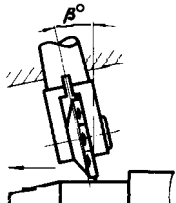
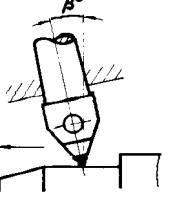
Dressing feed [mm/min]

| GRINDING WHEEL GRIT SIZE | RECOMMEND-ED DRESSING FEED (mm/rev) | GRINDING WHEEL SPEED [RPM] |       |       |       |       |       |       |       |       |        |
|--------------------------|-------------------------------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
|                          |                                     | 5.500                      | 6.000 | 6.500 | 7.000 | 7.500 | 8.000 | 8.500 | 9.000 | 9.500 | 10.000 |
| 150                      | 0,05                                | 275                        | 300   | 325   | 350   | 375   | 400   | 425   | 450   | 475   | 500    |
| 100                      | 0,15                                | 825                        | 900   | 975   | 1.050 | 1.125 | 1.200 | 1.275 | 1.350 | 1.425 | 1.500  |
| 60                       | 0,25                                | 1.375                      | 1.500 | 1.625 | 1.750 | 1.875 | 2.000 | 2.125 | 2.250 | 2.375 | 2.500  |
| 46                       | 0,35                                | 1.925                      | 2.100 | 2.275 | 2.450 | 2.625 | 2.800 | 2.975 | 3.150 | 3.325 | 3.500  |
| < 46                     | 0,45                                | 2.475                      | 2.700 | 2.925 | 3.150 | 3.375 | 3.600 | 3.825 | 4.050 | 4.275 | 4.500  |

Dressing feed [mm/min]

| WORK SETTINGS FOR STATIONARY DRESSING TOOLS                                                                 |                                                                                     |                                                                                                                          |                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| WITH STRAIGHT HOLDING FIXTURE                                                                               | WITH TILTED HOLDING FIXTURE                                                         | WHEN STRAIGHT DRESSING                                                                                                   |                                                                                                                                                        |
| Diamantfliesen®<br>        |    | Inclination is compensated by swiveling the blade in the holding fixture<br>$\alpha = 0...30^\circ$<br>or rigidly brazed | <br>Vertical<br>till<br>$\beta = 30^\circ$                          |
| Igel®<br>                  |    | If the holding fixture is tilted, please state the angle of inclination $\alpha^\circ$                                   | <br>Vertical                                                        |
| Pro-dress®<br>            |   | If the holding fixture is tilted, please state the angle of inclination $\alpha^\circ$                                   | <br>Vertical                                                       |
| Rondist 2096/5096<br>    |  |                                                                                                                          | <br>Vertical                                                      |
| Rondist 1008<br>         |  |                                                                                                                          | <br>Vertical<br>or<br>$\alpha = 30^\circ$                         |
| Single point dresser<br> |  | $\alpha = 5...45^\circ$                                                                                                  | <br>Vertical<br>or $\alpha = 15^\circ$ to main dressing direction |
| Profile diamond<br>      |                                                                                     | $\alpha = 5...10^\circ$                                                                                                  |                                                                                                                                                        |



|  | WORK SETTING FOR<br>PROFILE DRESSING                                                | EFFECTIVE<br>CUTTING<br>WIDTH $b_d$<br>[mm]                                       | CONTACT<br>RATIO $U_d$ | DRESS-<br>ING<br>INFEED<br>AMOUNT<br>$a_{ed}$ [mm] | DRESSING<br>SIDE FEED<br>$f_{ad}$ [mm/U] | OTHER NOTES                                                                                                                                                                                                                                                      |
|--|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------|----------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |    | $\sim 0,8 \cdot d_K$<br><br>$d_K =$<br>theoretical<br>diameter of<br>diamond grit | 2 - 8                  | 0,01 - 0,03                                        | 0,05 - 0,5                               | Slightly diagonal setting possible when<br>dressing straight<br>=Recutting effect<br>=feiner surface quality                                                                                                                                                     |
|  | $\beta = 30^\circ \dots 45^\circ$                                                   |                                                                                   |                        | 0,01 - 0,05                                        | 0,3 - 1,0                                | Because of the large number of active<br>diamonds during dressing the dressing<br>feed $f_{ad}$ and/or the feed rate $v_{fad}$ must be<br>increased accordingly                                                                                                  |
|  |                                                                                     |                                                                                   |                        | 0,005 - 0,3                                        | 0,005 - 0,5                              | Because of the large number of active<br>diamonds during dressing the dressing<br>feed $f_{ad}$ and/or the feed rate $v_{fad}$ must be<br>increased accordingly                                                                                                  |
|  |                                                                                     | $\sim 0,8 \cdot d_K$<br>per active<br>grit                                        |                        | 0,01 - 0,05                                        | 0,3 - 1,0                                | Because of the four active diamonds the<br>dressing feed $f_{ad}$ and/or the feed rate $v_{fad}$<br>must be increased accordingly                                                                                                                                |
|  |  | $\sim 0,8 \cdot d_K$                                                              | 2 - 8                  | 0,01 - 0,03                                        | 0,05 - 0,5                               |                                                                                                                                                                                                                                                                  |
|  | $\beta = 30^\circ \dots 45^\circ$                                                   |                                                                                   |                        |                                                    |                                          |                                                                                                                                                                                                                                                                  |
|  |                                                                                     | According to<br>the degree of<br>wear                                             | 2 - 8                  | 0,01 - 0,03                                        | 0,05 - 0,15                              | When sharpness deteriorates, rotate<br>diamond insert approx. $60^\circ$ about its own<br>axis, remount in good time.<br>Do not allow wear flats to become larger<br>than approx. 1 mm <sup>2</sup><br>Stop! Too late!                                           |
|  |                                                                                     |                                                                                   |                        |                                                    |                                          |    |
|  |  | According to<br>the profile of<br>the diamond<br>(angle/ra-<br>dius)              | 2 - 8                  | 0,01 - 0,02                                        | 0,03 - 0,10                              | Please observe the manufacturer's<br>instructions for equipment and machines                                                                                                                                                                                     |
|  | $\beta = 30^\circ \dots 45^\circ$                                                   |                                                                                   |                        |                                                    |                                          |                                                                                                                                                                                                                                                                  |

# INFORMATION ON CHOOSING YOUR TOOL

| Application               |            |                                                                 | Centreless / through-feed grinding                     |                       |                                                   |                                    |                                            | Angular plunge / profile grinding                       |                                            |                       | Straight plunge grinding                                |                                            |
|---------------------------|------------|-----------------------------------------------------------------|--------------------------------------------------------|-----------------------|---------------------------------------------------|------------------------------------|--------------------------------------------|---------------------------------------------------------|--------------------------------------------|-----------------------|---------------------------------------------------------|--------------------------------------------|
| Designation of abrasives  |            |                                                                 | All standard alumina (Al <sub>2</sub> O <sub>3</sub> ) | Silicon carbide (SiC) | Quantum, SG, TG, XG, ES, Vortex, sintered alumina | Altos, Altos IPX, extruded alumina | Regulating wheel, rubber or vitrified bond | All standard aluminas (Al <sub>2</sub> O <sub>3</sub> ) | Quantum, SG, TG, XG, ES, sintered aluminas | Silicon carbide (SiC) | All standard aluminas (Al <sub>2</sub> O <sub>3</sub> ) | Quantum, SG, TG, XG, ES, sintered aluminas |
| Dressing tool Recommended |            |                                                                 |                                                        |                       |                                                   |                                    |                                            |                                                         |                                            |                       |                                                         |                                            |
| Diamond Fliesen®          | page 55    | Ti-Tan™                                                         |                                                        |                       | ○                                                 | ●                                  |                                            |                                                         | ○                                          |                       | ○                                                       | ○                                          |
|                           | page 55    | Furioso™                                                        |                                                        |                       | ●                                                 | ○                                  |                                            |                                                         | ○                                          |                       | ○                                                       | ●                                          |
|                           | page 57    | D25 – MCD needle blade dressers                                 |                                                        | ○                     | ○                                                 | ○                                  |                                            |                                                         |                                            | ●                     |                                                         |                                            |
|                           | page 59    | D30 – CVD needle blade dressers                                 | ●                                                      |                       | ○                                                 |                                    |                                            |                                                         |                                            |                       | ●                                                       | ○                                          |
|                           | page 60    | D35 – CVD needle blade dressers                                 |                                                        |                       |                                                   |                                    |                                            | ●                                                       | ●                                          |                       | ○                                                       | ○                                          |
|                           | page 61    | Needle blade with natural diamond                               |                                                        |                       |                                                   |                                    |                                            | ○                                                       | ○                                          | ○                     |                                                         |                                            |
|                           | page 62    | Standard blade with diamond grit                                | ○                                                      | ●                     | ○                                                 | ○                                  |                                            |                                                         |                                            |                       | ○                                                       | ○                                          |
| Single point dressers     | page 65    | D12 – single point dresser with MCD needle                      |                                                        |                       |                                                   |                                    |                                            |                                                         |                                            |                       |                                                         |                                            |
|                           | page 66    | D30 – single point dresser with CVD needle                      |                                                        |                       |                                                   |                                    |                                            |                                                         |                                            |                       |                                                         |                                            |
|                           | page 67    | D53 – single point dresser with PCD plate                       |                                                        |                       |                                                   |                                    | ●                                          |                                                         |                                            |                       |                                                         |                                            |
|                           | page 67    | Profile diamond / ground Diaform chisel                         |                                                        |                       |                                                   |                                    |                                            |                                                         |                                            |                       |                                                         |                                            |
|                           | page 70    | Single point dresser with natural diamond                       |                                                        |                       |                                                   |                                    | ○                                          |                                                         |                                            |                       |                                                         |                                            |
|                           | page 71    | Rondist rotatable tools with diamond or CVD                     |                                                        |                       |                                                   |                                    |                                            |                                                         |                                            |                       |                                                         |                                            |
|                           | page 72    | PCD and CVD insert dressers                                     | ○                                                      |                       | ○                                                 | ○                                  |                                            |                                                         |                                            |                       |                                                         |                                            |
| Multipoint dressers       | page 77    | D21 – multi-point dressers with natural diamonds in 2 or 3 rows | ○                                                      | ○                     |                                                   |                                    |                                            |                                                         |                                            |                       |                                                         |                                            |
|                           | page 78-82 | Igel® and pro-dress multi-point dressers                        |                                                        |                       |                                                   |                                    |                                            |                                                         |                                            |                       |                                                         |                                            |

| Grinding              |                                                         | Internal grinding / grinding wheels ≥ 500 mm |                       |                                                         | Internal grinding / grinding wheels < 500 mm |                       |                                                                 | Flat / creep feed grinding          |                       |                                  | Profile grinding DIA-FORM equipment                                        | Grinding wheels with very coarse or very fine grit, straight dressing |  |
|-----------------------|---------------------------------------------------------|----------------------------------------------|-----------------------|---------------------------------------------------------|----------------------------------------------|-----------------------|-----------------------------------------------------------------|-------------------------------------|-----------------------|----------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------|--|
| Silicon carbide (SiC) | All standard aluminas (Al <sub>2</sub> O <sub>3</sub> ) | Quantum, SG, TG, XG, ES, sintered aluminas   | Silicon carbide (SiC) | All standard aluminas (Al <sub>2</sub> O <sub>3</sub> ) | Quantum, SG, TG, XG, ES, sintered aluminas   | Silicon carbide (SiC) | Vortex, all standard aluminas (Al <sub>2</sub> O <sub>3</sub> ) | Altos, Altos IPX, sintered aluminas | Silicon carbide (SiC) | All conventional grinding wheels | All standard aluminas (Al <sub>2</sub> O <sub>3</sub> ), sintered aluminas | Silicon carbide (SiC)                                                 |  |
|                       |                                                         | ○                                            |                       |                                                         |                                              |                       | ○                                                               | ●                                   |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         | ○                                            |                       |                                                         |                                              |                       | ○                                                               | ○                                   |                       |                                  |                                                                            |                                                                       |  |
| ○                     |                                                         | ○                                            | ●                     |                                                         |                                              |                       | ○                                                               | ○                                   | ●                     |                                  |                                                                            |                                                                       |  |
|                       | ●                                                       | ●                                            |                       |                                                         |                                              |                       | ○                                                               | ○                                   |                       | ○                                |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       |                                                         |                                              |                       |                                                                 |                                     |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       |                                                         |                                              |                       |                                                                 |                                     |                       |                                  |                                                                            |                                                                       |  |
| ●                     | ○                                                       | ○                                            | ○                     |                                                         |                                              |                       | ○                                                               | ○                                   | ○                     |                                  | ○                                                                          | ○                                                                     |  |
|                       |                                                         |                                              |                       | ○                                                       | ○                                            | ●                     |                                                                 |                                     |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       | ●                                                       | ●                                            |                       |                                                                 |                                     |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       |                                                         |                                              |                       |                                                                 |                                     |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       |                                                         |                                              |                       |                                                                 |                                     |                       | ●                                |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       | ○                                                       | ○                                            | ○                     |                                                                 |                                     |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       | ○                                                       | ○                                            | ○                     | ○                                                               | ○                                   |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       | ○                                                       | ○                                            |                       | ○                                                               | ○                                   |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       |                                                         |                                              |                       |                                                                 |                                     |                       |                                  |                                                                            |                                                                       |  |
|                       |                                                         |                                              |                       |                                                         |                                              |                       |                                                                 |                                     |                       |                                  | ●                                                                          | ●                                                                     |  |

- First choice
- Second choice

# CHECKLIST

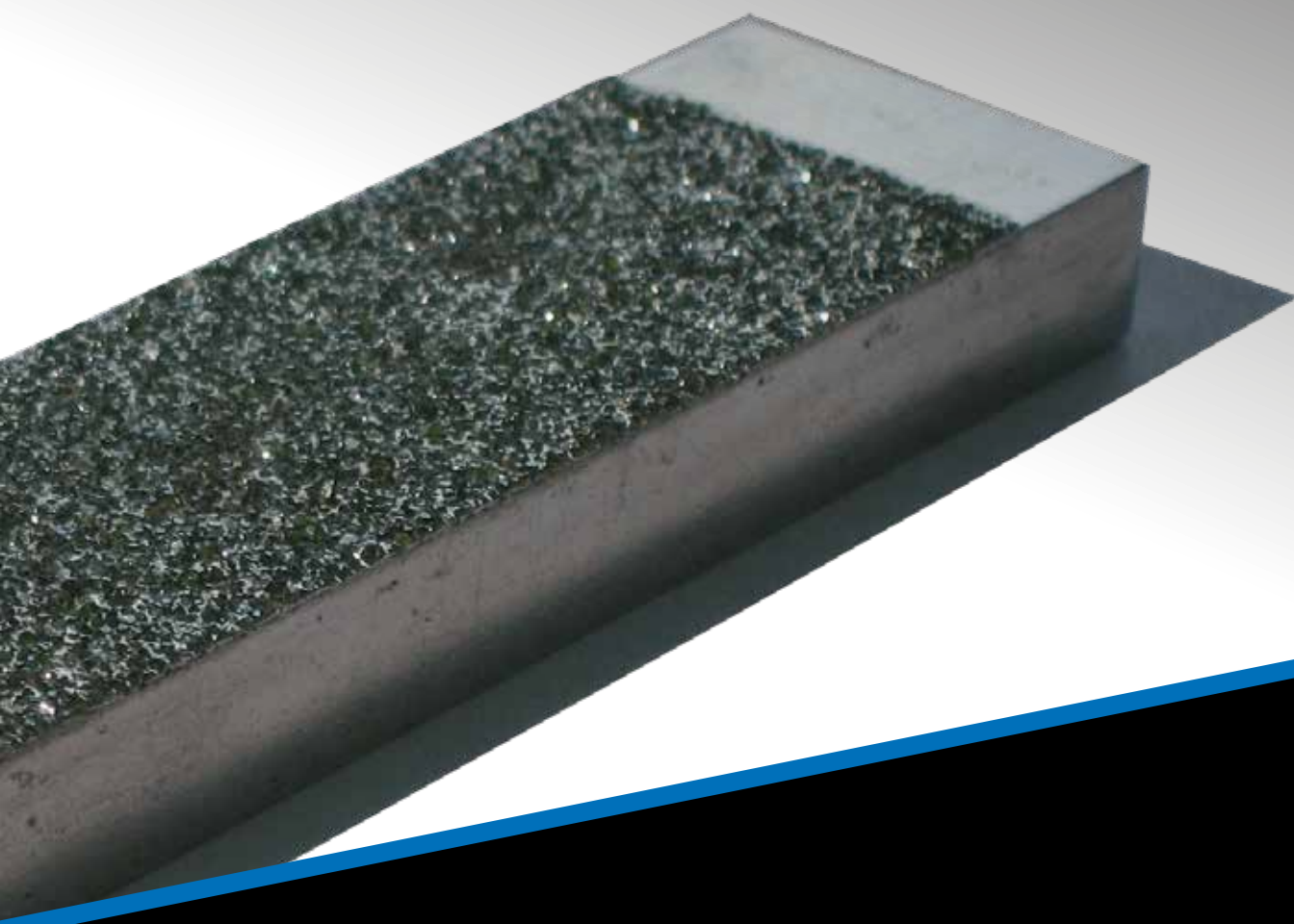
## FOR STATIONARY DRESSING TOOLS

|                                 |                                                  |                                                  |                                                   |
|---------------------------------|--------------------------------------------------|--------------------------------------------------|---------------------------------------------------|
| COMPANY CUSTOMER NO.:           |                                                  |                                                  |                                                   |
| 1. WORKPIECE                    | 1.1 Drawing of workpiece                         |                                                  |                                                   |
|                                 | 1.2 Workpiece material                           |                                                  |                                                   |
|                                 | 1.3 Surface finish required                      |                                                  | $R_a, R_l, R_z$                                   |
| 2. MACHINE                      | 2.1 Manufacturer                                 |                                                  |                                                   |
|                                 | 2.2 Model/type                                   |                                                  |                                                   |
|                                 | 2.3 Grinding process                             | Angular plunge grinding <input type="checkbox"/> | Straight plunge grinding <input type="checkbox"/> |
|                                 | 2.4 Cooling lubricant                            |                                                  |                                                   |
| 3. GRINDING WHEEL               | 3.1 Dimensions                                   |                                                  | mm                                                |
|                                 | 3.2 Specification                                |                                                  |                                                   |
|                                 | 3.3 Manufacturer                                 |                                                  |                                                   |
| 4. DIAMOND DRESSER IN USE       | 4.1 Designation                                  |                                                  |                                                   |
|                                 | 4.2 Dimensions                                   |                                                  | mm                                                |
|                                 | 4.3 Specification                                |                                                  |                                                   |
| 5. DRESSING PROCESS             | 5.1 Straight dressing                            | Circumferential <input type="checkbox"/>         | On the face <input type="checkbox"/>              |
|                                 | 5.2 Copy dressing / profile dressing             |                                                  |                                                   |
| 6. CURRENT DRESSING INSERT DATA | 6.1 Grinding wheel cutting speed during dressing | $v_{sd} =$                                       | m/s                                               |
|                                 | 6.2 Dressing infeed/ stroke                      | $a_{ed} =$                                       | mm                                                |
|                                 | 6.2 Dressing infeed/ stroke                      | $f_{ad} =$                                       | mm                                                |
| 7. REQUIREMENT OR PROBLEM       | $vf_{ad} =$                                      |                                                  | mm/min                                            |

**NORTON**

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**WINTER**



# ANCILLARY DRESSERS

## **DRESSING TOOLS FOR VITRIFIED BONDED GRINDING TOOLS**

### **DRESSING TOOLS FOR RESIN-BONDED GRINDING WHEELS**

Electroplated and sintered metal bond dressing tools

### **DRESSING TOOLS FOR DIAMOND AND CBN GRINDING WHEELS**

Norton Winter dressing unit

Cleaning and sharpening stones

91

92

92

93

93

93

## **MANUAL DRESSING TOOLS**

D20 manual dressing tool with natural diamond in an electroplated bond

Multigrit manual dressing tool with natural diamond in a sintered metal bond

94

94

95

## ANCILLARY DRESSERS

Standard dressing tools keep grinding wheels in shape and in the best possible condition to do their jobs. The choice of process to be used depends on the grinding machine, the type of dressing unit, the shape and type of the grinding wheel, as well as the workpiece to be machined.

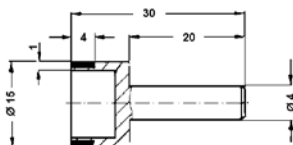
We offer an appropriate dressing solution for every application – from the dressing tool to the dressing unit. Most standard dressing tools are kept in stock and are available immediately. This chapter includes details of rotary dressing cups for internal grinding, sharpening stones for subsequent sharpening of grinding wheels and manual dressers for hand dressing of alumina and silicon carbide wheels.



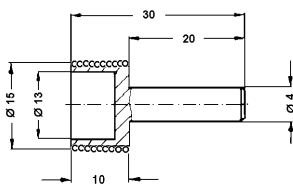
# DRESSING TOOLS FOR VITRIFIED BONDED GRINDING TOOLS

Dressing pins and cups are particularly suitable for dressing small grinding wheels for internal cylindrical grinding.

| SHAPE                                                                   | D  | T | X | S | L  | GRIT SIZE | BOND     | CONCENTRATION | ORDER NUMBER |
|-------------------------------------------------------------------------|----|---|---|---|----|-----------|----------|---------------|--------------|
| DIAMOND DRESSING PINS FOR DRESSING VITRIFIED BONDED CBN GRINDING WHEELS |    |   |   |   |    |           |          |               |              |
| 4BZ 07B                                                                 | 15 | 4 | 1 | 4 | 30 | D301      | BZ 387,1 | C135          | 66260100343  |

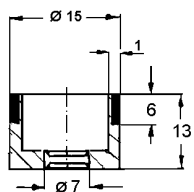


|         |    |    |  |   |    |      |      |     |             |
|---------|----|----|--|---|----|------|------|-----|-------------|
| 50S 07B | 15 | 10 |  | 4 | 30 | D426 | G825 | S33 | 60157644198 |
|---------|----|----|--|---|----|------|------|-----|-------------|

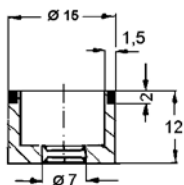


| SHAPE                                                                   | D | T | X | H | GRIT SIZE | BOND | CONCENTRATION | ORDER NUMBER |
|-------------------------------------------------------------------------|---|---|---|---|-----------|------|---------------|--------------|
| DIAMOND DRESSING CUPS FOR DRESSING VITRIFIED BONDED CBN GRINDING WHEELS |   |   |   |   |           |      |               |              |

|        |    |   |   |   |      |        |      |             |
|--------|----|---|---|---|------|--------|------|-------------|
| 2BZ6A9 | 15 | 6 | 1 | 7 | D301 | BZ 387 | C135 | 66260379145 |
|--------|----|---|---|---|------|--------|------|-------------|



|        |    |   |     |   |      |          |      |             |
|--------|----|---|-----|---|------|----------|------|-------------|
| 1BZ6A9 | 15 | 2 | 1,5 | 7 | D213 | BZ 387,1 | C135 | 66260112087 |
|--------|----|---|-----|---|------|----------|------|-------------|



All dimensions in mm

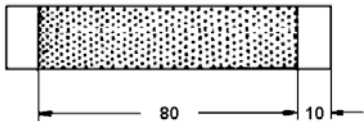
Minimum order quantity for articles not in stock: 1 item, delivery: 6 weeks

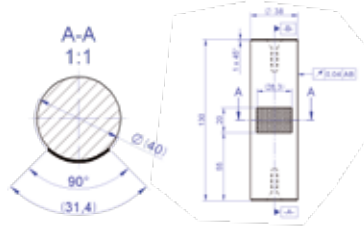


# DRESSING TOOLS FOR RESIN BONDED GRINDING WHEELS

## ELECTROPLATED AND SINTERED METAL BOND DRESSING TOOLS

Norton WINTER also offers suitable tools for dressing resin-bonded diamond and cBN grinding wheels. Electroplated and sintered metal-bonded dressing tools are available from stock.

|                                                                                     | APPLICATION                                                                                                                                                                                    | SHAPE         | SPECIFICATION | ORDER NUMBER              |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|---------------------------|
| <b>NORTON WINTER DRESSING BLOCK</b>                                                 |                                                                                                                                                                                                |               |               |                           |
|  | For truing resin bond diamond and cBN grinding wheels on surface grinders. If used with coolant, subsequent sharpening with WA150GV sharpening stone or Norton WINTER stone No. 2 is required. | 1S09H-80-20-8 | D301 / S11    | 66260134287 <sup>1)</sup> |

|                                                                                     | APPLICATION                                                                                                                                                                                          | SHAPE       | SPECIFICATION | ORDER NUMBER |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|--------------|
| <b>NORTON WINTER DRESSING CYLINDER</b>                                              |                                                                                                                                                                                                      |             |               |              |
|  | For dressing resin bond diamond and cBN grinding wheels on cylindrical grinders. If used with coolant, subsequent sharpening with WA150GV sharpening stone or Norton WINTER stone No. 2 is required. | 1S44B-40-20 | D301 / S11    | 60157642712  |

All dimensions in mm

<sup>1)</sup> Available ex stock

Minimum order quantity for articles not in stock: 1 item, delivery: 5 weeks

# DRESSING TOOLS FOR DIAMOND AND CBN GRINDING WHEELS

## NORTON WINTER DRESSING UNIT

This brake-controlled dressing unit, for dressing diamond and cBN grinding wheels, comes complete with two SiC wheels, one 37 C60-MV and one 39 C802-15V

Order no. 66260195821



| REPLACEMENT GRINDING WHEELS | FOR GRIT SIZES                                                | ORDER NUMBER              |
|-----------------------------|---------------------------------------------------------------|---------------------------|
| Norton WINTER dressing unit |                                                               | 69014151167               |
| 39C60-MV                    | D64 - D126                                                    | 66253051624 <sup>1)</sup> |
| 39C802-IV                   | ≤ D64                                                         | 66253052726 <sup>1)</sup> |
| Accessories                 | 1 set consisting of: 3 brake segments, 3 springs and 3 screws | 66260274670 <sup>1)</sup> |

Only use dry; subsequent sharpening with a Norton WINTER stone previously soaked in water should be used as necessary

<sup>1)</sup> Available ex stock

## CLEANING AND SHARPENING STONES

| CLEANING AND SHARPENING STONES |                                                              | ORDER NUMBER              |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Stone No. 1AW (100×20×20)      | Special white fused alumina, vitrified bonded, 360 mesh, for sharpening resin bond grinding wheels with grit size < D46                         | 66260395639 <sup>1)</sup> |
| Stone No. 2 (100×24×13)        | Special white fused alumina, vitrified bonded, 180 mesh, for sharpening resin and metal-bonded grinding and cut-off wheels with grit size ≥ D46 | 66260195816 <sup>1)</sup> |
| Stone No. 3 (100×40×15)        | Silicon carbide, rubber-bonded, 80 mesh, for cleaning and sharpening electroplated and vitrified bonded grinding wheels and pins                | 66260195817 <sup>1)</sup> |
| Stone No. 3A (80×15×10)        | See Norton WINTER stone No. 3                                                                                                                   | 66260389357 <sup>1)</sup> |
| Stone No. 3B (100×50×25)       | See Norton WINTER stone No. 3                                                                                                                   | 66260386167 <sup>1)</sup> |
| Stone No. 4 (90×70×20)         | Special pink fused alumina, vitrified bonded, 60 mesh, for sharpening metal bond grinding wheels with grit size ≥ D251                          | 60157642665 <sup>1)</sup> |
| Stone No. 5 (100×50×25)        | See Norton WINTER stone No. 2                                                                                                                   | 66260389054 <sup>1)</sup> |

| CLEANING AND SHARPENING STONES |                          | ORDER NUMBER              |
|--------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------|
| Stone WA150GV (25×25×150)      | Cleaning and sharpening vitrified and resin bond grinding wheels ≥ D54, recommended for sharpening Q-Flute2 | 69936621643 <sup>1)</sup> |
| Stone WA220GV (25×25×150)      | Cleaning and sharpening vitrified and resin bond grinding wheels                                            | 69936621630 <sup>1)</sup> |
| Stone WA320GV (25×25×150)      | Cleaning and sharpening vitrified and resin bond grinding wheels ≤ D46                                      | 69936651380 <sup>1)</sup> |

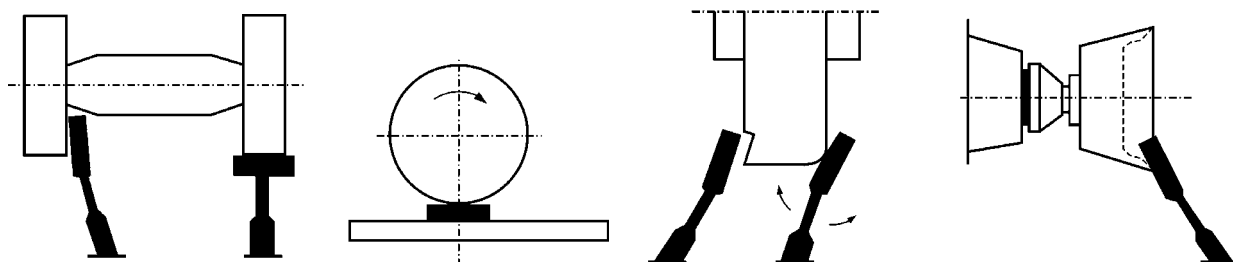
All dimensions in mm

<sup>1)</sup> Available ex stock

# MANUAL DRESSING TOOLS

You can use these robust tools to dress glazed and loaded conventional vitrified grinding wheels. This will give you a better grinding tool topography and improve the radial running truth of the grinding wheel. The high concentration of diamonds in these dressers ensures a long service life with good wear resistance and enables sharpening the wheels without damaging the tool. They are designed for the rapid dressing of grinding wheels up to 1.000 mm in diameter with grain sizes of 36–120 mesh.

Examples showing the use of the straight and side versions of our manual dressing tools



## D20 MANUAL DRESSING TOOL WITH NATURAL DIAMOND IN AN ELECTROPLATED BOND

The 2001 and 2002 versions are principally for particularly hard grinding wheels such as SiC, supplied also with an M6 thread handle to be screwed in at the side or the end.



|  | TYPE | SEGMENT DIMENSIONS |    | DESIGN  |          | DIAMOND CONTENT [ct] | ORDER NUMBER              |
|--|------|--------------------|----|---------|----------|----------------------|---------------------------|
|  | D 20 | L                  | B  | LATERAL | STRAIGHT |                      |                           |
|  | 2001 | 45                 | 12 | x       | x        | 5                    | 66260139141 <sup>1)</sup> |
|  | 2002 | 20                 | 12 | x       | x        | 2,2                  | 66260195353               |

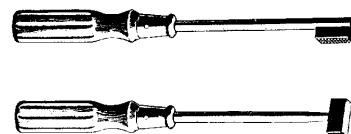
All dimensions in mm

<sup>1)</sup> Available ex stock

# MULTIGRIT MANUAL DRESSING TOOL WITH NATURAL DIAMOND IN A SINTERED METAL BOND

Models Igel-P (side-mounted) and Igel-T (end-mounted) have a fixed handle.

They are suitable for all alumina grinding wheels.



| TYPE   | SEGMENT DIMENSIONS |   | DESIGN   | DIAMOND CONTENT [ct] | ORDER NUMBER              |
|--------|--------------------|---|----------|----------------------|---------------------------|
|        | L                  | B |          |                      |                           |
| Igel-P | 25                 | 7 | lateral  | 1,3                  | 66260134089 <sup>1)</sup> |
| Igel-T | 25                 | 7 | straight | 1,3                  | 66260133388               |

All dimensions in mm

<sup>1)</sup> Available ex stock





The background of the cover features a close-up photograph of two Norton Winter dressing tools. These tools are cylindrical and composed of multiple horizontal segments, giving them a segmented, wheel-like appearance. They are mounted on a dark, possibly metallic, shaft. The lighting is dramatic, highlighting the texture of the dressing segments and the metallic surfaces. The overall color palette is dominated by the metallic grays and blues of the tools, with the white and blue of the text providing a sharp contrast.

**NORTON**

SAINT-GOBAIN

**WINTER**

# DRESSING PARAMETERS

## CONDITIONING

Characteristics of conditioning processes

99

## PROCESS PARAMETERS

Infeed,  $a_{ed}$ , when dressing with stationary dressers and CNC dressing discs

100

Overlap ratio,  $U_d$ , for stationary and CNC dressing tools

101

Infeed,  $a_{ed}$ , when dressing with profile rollers

102

Speed ratio,  $q_d$ , of rotary dressing tools

102

## GENERAL

Other influences on active surface roughness and workpiece surface finish when using profile roller dressers

99

Contact detection

100

101

102

104

104

105



## DRESSING PARAMETERS

The correct choice of dressing parameters is essential to optimize the grinding process. Dressing is a method of rapidly and flexibly influencing the active surface roughness and geometry of a grinding wheel, thereby changing its surface topography, profile accuracy, and the grinding forces during use.





# CONDITIONING

| DRESSING                                        |                                      | CLEANING                                  |
|-------------------------------------------------|--------------------------------------|-------------------------------------------|
| PROFILING                                       | SHARPENING                           |                                           |
| Macrostructure                                  | Microstructure                       | Microstructure                            |
| Imparting running truth and correct wheel shape | Producing the wheel topography       | Elimination of chips from the chip spaces |
| Intentional modification of grit and bond       | Intentional setting back of the bond | No intention to modify the grinding wheel |

Dressing parameters have a very great influence on the behaviour of a grinding wheel. The use of CNC dressing tools enables quick and easy changes to the active surface roughness and geometry of a grinding wheel, thereby influencing its surface finish, profile accuracy and grinding forces.

The grinding results are influenced by the radial dressing infeed,  $a_{ed}$ , and the axial dressing feed,  $f_{ad}$ . Together with the dressing feed, the diamond grit size is another important factor that affects the grinding result. The effective dressing width,  $b_d$ , and the associated overlap,  $U_d$ , affect the active surface roughness,  $R_{ts}$ , of the grinding wheel.

In the case of CNC dressing discs the dressing results are also affected by the speed factor,  $q_d$ , and the direction of rotation, whether dressing is uni-directional (GL) or counter-directional (GGL). It is important to use a suitable coolant with adequate filtration during the dressing process.

When dressing with profile roller dressers, the roll is plunged into the grinding wheel surface. Its effect is achieved through the speed factor and direction of dressing as mentioned above. There is no lateral motion.

## CHARACTERISTICS OF CONDITIONING PROCESSES

| SYSTEM COMPONENT                                                                                     | PROCESS VARIABLES                         | TARGETS                                        |
|------------------------------------------------------------------------------------------------------|-------------------------------------------|------------------------------------------------|
| Grinding wheel                                                                                       | Dressing forces                           | Grinding wheel profile                         |
| Dressing tool                                                                                        | Structure-borne noise signal              | Grinding wheel running truth                   |
| Coolant conditions                                                                                   | Power from grinding and dressing spindles | Active surface roughness of the grinding wheel |
| Dressing parameters:<br>– Overlap ratio (CNC)<br>– Speed ratio<br>– Grinding wheel speed<br>– Infeed |                                           | Dressing wear ratio<br>Workpiece quality       |

# PROCESS PARAMETERS

## INFEED $a_{ed}$ WHEN DRESSING WITH STATIONARY DRESSERS AND CNC DRESSING DISCS

With radial infeed,  $a_{ed}$ , the dressing tool advances towards and into the grinding wheel with each dressing pass. The total dressing infeed,  $a_{ed\ tot}$ , can be divided into roughing and finishing infeeds.

### Dressing infeeds for conventional grinding wheels:

Total infeed  $a_{ed\ tot}$  for special fused alumina grinding wheels: 20  $\mu\text{m}$  – 40  $\mu\text{m}$ , depending on the grit size of the grinding wheel

Total infeed  $a_{ed\ tot}$  for sintered alumina grinding wheels: 10  $\mu\text{m}$  – 20  $\mu\text{m}$ , depending on the grit size of the grinding wheel

### Dressing infeed for cBN grinding wheels with vitrified bonds:

Infeed  $a_{ed}$  per dressing pass: 1  $\mu\text{m}$  – 3  $\mu\text{m}$

Maximum dressing amount  $a_{ed\ tot}$ : No more than 10% of the average grit diameter of the grinding wheel

In general, cBN grinding wheels with vitrified bonds have a much longer interval between dressing events and therefore the number of dressing operations needed is far lower for a given output than when conventional grinding wheels are used.

### EXAMPLE USING VITRIFIED CBN GRINDING WHEELS

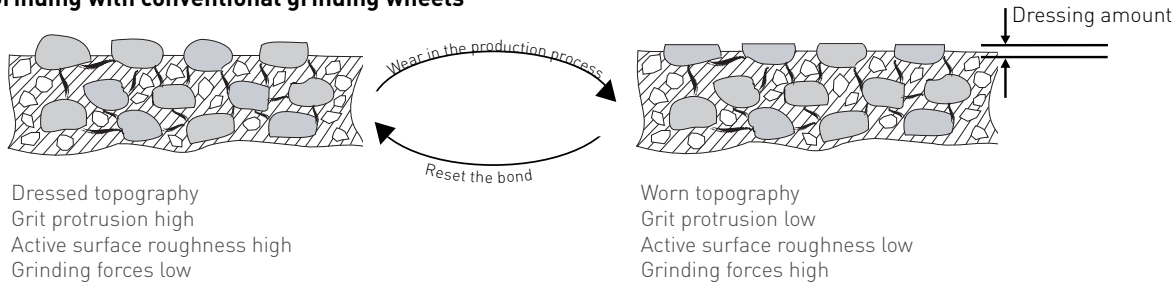
B126 indicates an average grit diameter of the grinding wheel of 118  $\mu\text{m}$ , so infeed  $a_{ed\ tot}$  will be 10  $\mu\text{m}$  – 12  $\mu\text{m}$

#### General notes:

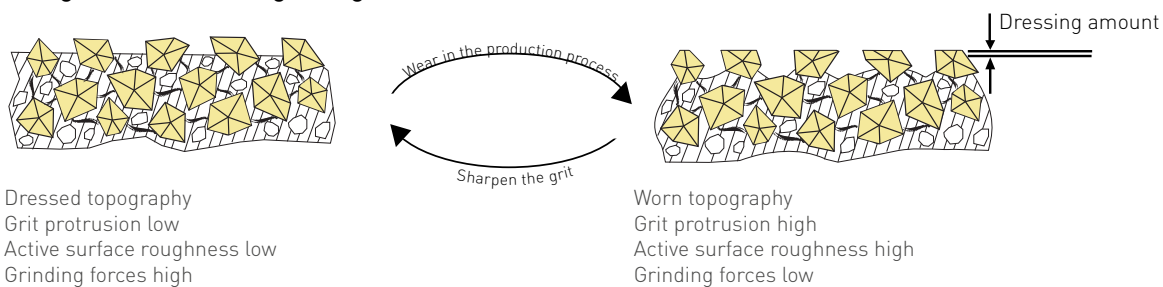
- Avoid dressing passes without infeed  $a_{ed}$
- Contact sensors are needed for accurate control and economics
- Ensure that suitable coolant is used

## THERE IS A FUNDAMENTAL DIFFERENCE BETWEEN DRESSING REQUIREMENTS NEEDED FOR CONVENTIONAL GRINDING WHEELS AND CBN GRINDING WHEELS WITH A VITRIFIED BOND:

### Grinding with conventional grinding wheels



### Grinding with vitrified cBN grinding wheels



## OVERLAP RATIO, $U_D$ , FOR STATIONARY AND CNC DRESSING TOOLS

In addition to the geometric and dimensional accuracy of a grinding wheel, the required active surface roughness,  $R_{ts}$ , plays an important role. It defines the surface finish of the ground workpiece.

Both CNC dressing tools and stationary dressing tools are driven over the grinding wheel profile to be dressed with an axial feed,  $f_{ad}$ . One of the advantages of CNC dressing is that different feed rates can be used on different sections of profile. Flat surfaces can be dressed with a smaller overlap ratio,  $U_d$ , in order to prevent burning in these areas.

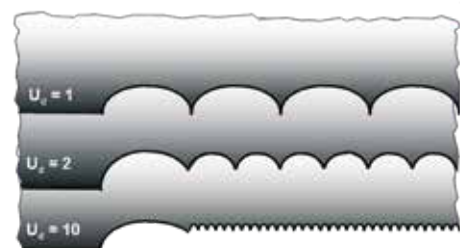
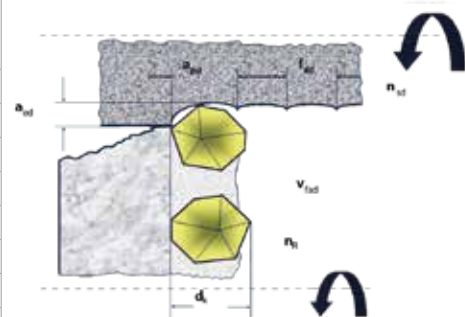
The overlap ratio,  $U_d$ , is defined as the number of revolutions executed by a grinding wheel, during which the dressing tool has traversed by its exact contact width,  $a_{pd}$ .

|           |                                                                                                                      |                                               |
|-----------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| $U_D$     | $= a_{pd} / f_{ad}$<br>$\approx d_k / [v_{fad} / n_{sd}]$<br>$\approx d_k / [v_{fad} * d_s * n / (v_{cd} * 60,000)]$ |                                               |
| $U_D$     | [ - ] :                                                                                                              | Overlap ratio                                 |
| $A_{PD}$  | [mm] :                                                                                                               | Contact width of dressing tool                |
| $D_K$     | [mm] :                                                                                                               | Grit size of dressing tool                    |
| $D_S$     | [mm] :                                                                                                               | Diameter of grinding wheel                    |
| $F_{AD}$  | [mm] :                                                                                                               | Axial feed for each grinding wheel revolution |
| $N_{SD}$  | [rpm] :                                                                                                              | Grinding wheel speed                          |
| $V_{CD}$  | [m/s] :                                                                                                              | Cutting speed while dressing                  |
| $V_{FAD}$ | [mm/min] :                                                                                                           | Axial infeed speed while dressing             |

Lower  $U_d$  -  
High active surface roughness of the grinding wheel

Higher  $U_d$  -  
Lower active surface roughness of the grinding wheel

|                   |                       |                     |
|-------------------|-----------------------|---------------------|
| Suggested values: | Overlap ratio $U_d$   | $= a_{pd} / f_{ad}$ |
|                   | Rough grinding        | $= 2 - 4$           |
|                   | Finish grinding       | $= 4 - 8$           |
|                   | Super finish grinding | $= 8 - 20$          |



## INFEEED, $a_{ed}$ , WHEN DRESSING WITH PROFILE ROLLERS

With radial infeed,  $a_{ed}$ , the dressing tool advances towards the grinding wheel with each dressing pass. The radial infeed depends on the grit size, hardness and dimensions of the grinding wheel, rigidity of the machine and dressing unit and the specification and developed length of the profile roller.

### Dressing infeeds for conventional grinding wheels:

Total infeed,  $a_{ed\ tot}$ , for special fused alumina grinding wheels: 20  $\mu\text{m}$  – 40  $\mu\text{m}$ , depending on the grit size of the wheel

Total infeed,  $a_{ed\ tot}$ , for sintered alumina grinding wheels: 10  $\mu\text{m}$  – 20  $\mu\text{m}$ , depending on the grit size of the wheel

### Dressing infeed for cBN grinding wheels with vitrified bonds:

Maximum dressing amount,  $a_{ed\ tot}$ : No more than 10% of the average grit diameter of the grinding wheel

## CONTINUOUS DRESSING (CD)

In the continuous dressing (CD) process, the dresser is in continuous contact with the grinding wheel. The progressive reduction of the grinding wheel diameter must be compensated for during the grinding process by the CNC machine control. Through the continuous sharpening and profiling, a constant roughness and profile holding of the grinding wheel is obtained. The dressing process is especially suitable for roughing and creep feed grinding processes.

Recommended infeed per wheel  
rev. = 0,7~1,0  $\mu\text{m}/\text{rev}$ .



## SPEED RATIO, $q_d$ , OF ROTARY DRESSING TOOLS

The speed ratio,  $q_d$ , ( $V_R/V_S$ ) between the rotary dressing tool and the grinding wheel has a considerable influence on the grinding wheel topography and consequently on the dressing and grinding result.

Recommended values for the speed ratio,  $q_d$ :

### CNC dressing discs:

Uni-directional: +0,5 ...+0,85

Counter-directional: - 0,2 ...- 0,5

### Profile roller dresser

Uni-directional: +0,3 ...+0,8

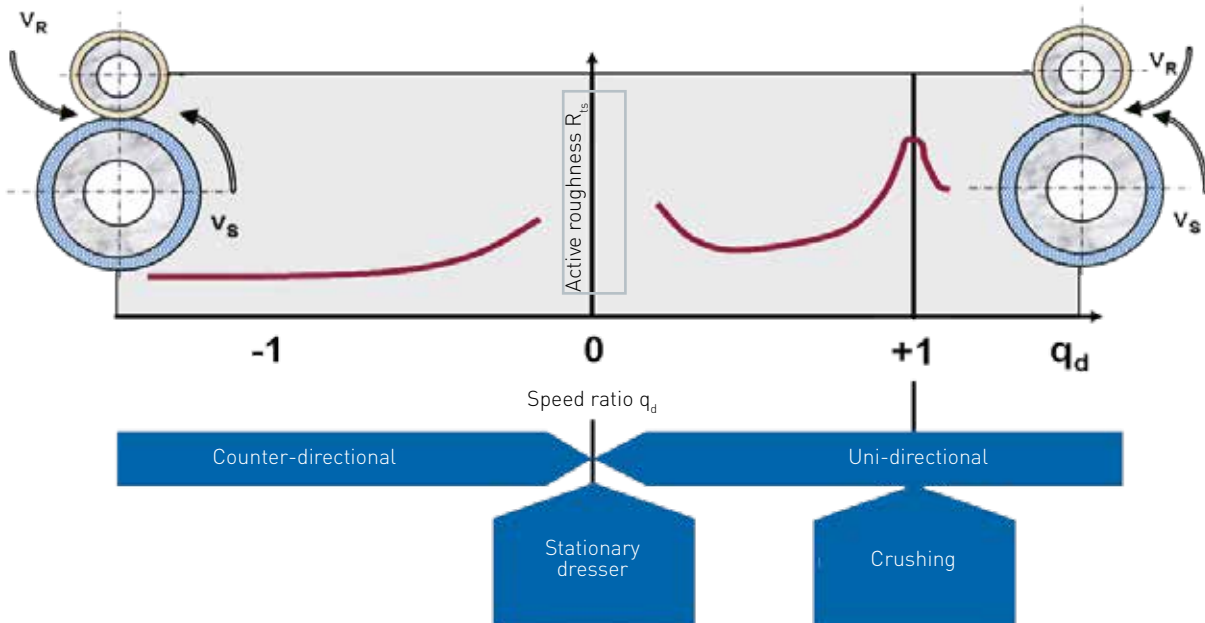
Counter-directional: - 0,2 ...- 0,5

Vitrified cBN grinding wheels should usually be dressed in the same direction in order to achieve the greatest active surface roughness on the grinding wheel.

Uni-directional: +0,6 ...+0,9

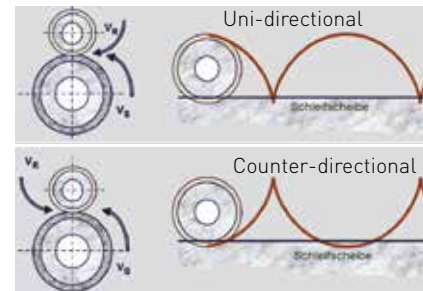
**ATTENTION**

A speed ratio of +1 leads to increased dressing forces and can damage the tools.



The different dressing forces are explained by the different paths (cycloids) of the grinding wheel and roller dresser.

| Dressing speed ratio                                      | $q_d = \frac{v_r}{v_{sd}}$ |
|-----------------------------------------------------------|----------------------------|
| Circumferential speed of the roller dresser               | $v_r$                      |
| Circumferential speed of the grinding wheel when dressing | $v_{sd}$                   |
| Dressing speed ratio                                      | $q_d$                      |
| > 0:                                                      | Uni-directional            |
| = 1:                                                      | Crushing                   |
| = 0:                                                      | Stationary dresser         |
| < 0:                                                      | Counter-directional        |

**UNI-DIRECTIONAL DRESSING:**

During uni-directional dressing the diamond moves along a shorter path (epicycloid), causing it to penetrate the grinding wheel surface at a more acute angle and producing a highly aggressive active surface roughness,  $R_{ts}$ , on the grinding wheel.

- Greater influence on the grinding wheel topography
- Higher dressing forces
- Higher stresses on the roller dresser

**COUNTER-DIRECTIONAL DRESSING:**

During counter-directional dressing the path is much longer (hypocycloid) and the diamond penetrates the grinding wheel at a much flatter angle, producing a much lower active surface roughness,  $R_{ts}$ , on the grinding wheel.

- Lesser influence on the grinding wheel topography
- Lower dressing forces
- Lower stresses on the roller dresser

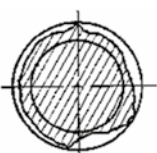
**NOTES**

1. Wherever possible, dress at grinding speed to prevent dynamic imbalance  $v_c = v_{cd}$

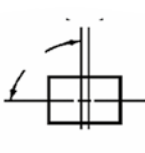
2. Avoid ratios that are whole numbers  $n_s : n_0$

- Figure shows the dresser on the grinding wheel
- Patterns form on the workpiece

Radial run-out



Axial run-out



Imbalance



# GENERAL

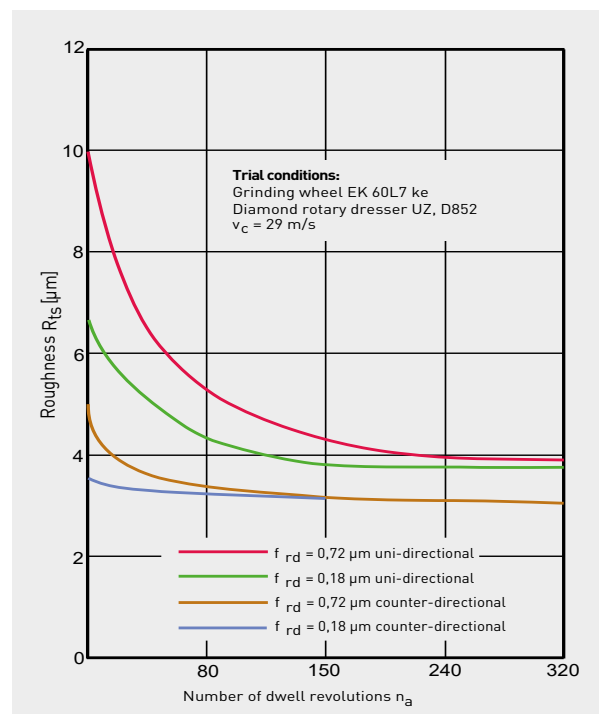
## OTHER INFLUENCES ON ACTIVE SURFACE ROUGHNESS AND WORKPIECE SURFACE FINISH WHEN USING PROFILE ROLLER DRESSERS

### DWELL REVOLUTION

The figure shows the effect of the number of dwell revolutions on active surface roughness. In practical terms this means that after 80 counter-directional dwell revolutions or 160 uni-directional dwell revolutions the minimum active surface roughness is reached on the grinding wheel, and that if the diamond roller dresser remains in contact for any longer this roughness will remain unchanged. These absolute values apply to one particular dressing device. Designs that have different rigidities will have different absolute values, but the principle remains the same.

- $R_{ts}$  Active surface roughness
- $v_c$  Peripheral speed of the grinding wheel
- $f_{rd}$  Dressing infeed per grinding wheel revolution

Effect of the number of dwell revolutions on active surface roughness according to G. Pahlitzsch and R. Schmidt <sup>1)</sup>



### DIAMOND GRIT SIZE

In addition to the dressing conditions, the diamond grit size also affects the achievable grinding wheel surface roughness and consequently the surface finish of the workpiece. In the case of diamond roller dressers with hand-set diamonds, the required workpiece finish is obtained by adjusting the concentration and pattern of diamonds. The roughness and waviness of the workpiece can be reduced by dressing with a correspondingly longer dwell time. For diamond roller dressers with statistically distributed diamonds (type UZ), it is preferable to select a greater diamond density in the interest of greater active surface roughness whenever the workpiece profile allows this.

<sup>1)</sup> G. Pahlitzsch and R. Schmidt „Wirkung von Korngröße und Konzentration beim Abrichten von Schleifscheiben mit diamantbestückten Rollen“

## CONTACT DETECTION

A high-precision dressing spindle is required when a form roll is used to dress vitrified cBN or diamond grinding wheels. A contact detection device monitors the point at which the dressing disc touches the grinding wheel and supervises the complete dressing cycle.

Contactless measurement using noise signals transmitted through the machine structure and subsequently displayed on the monitor guarantees minimum loss of the grinding wheel coating and retention of the chip space.

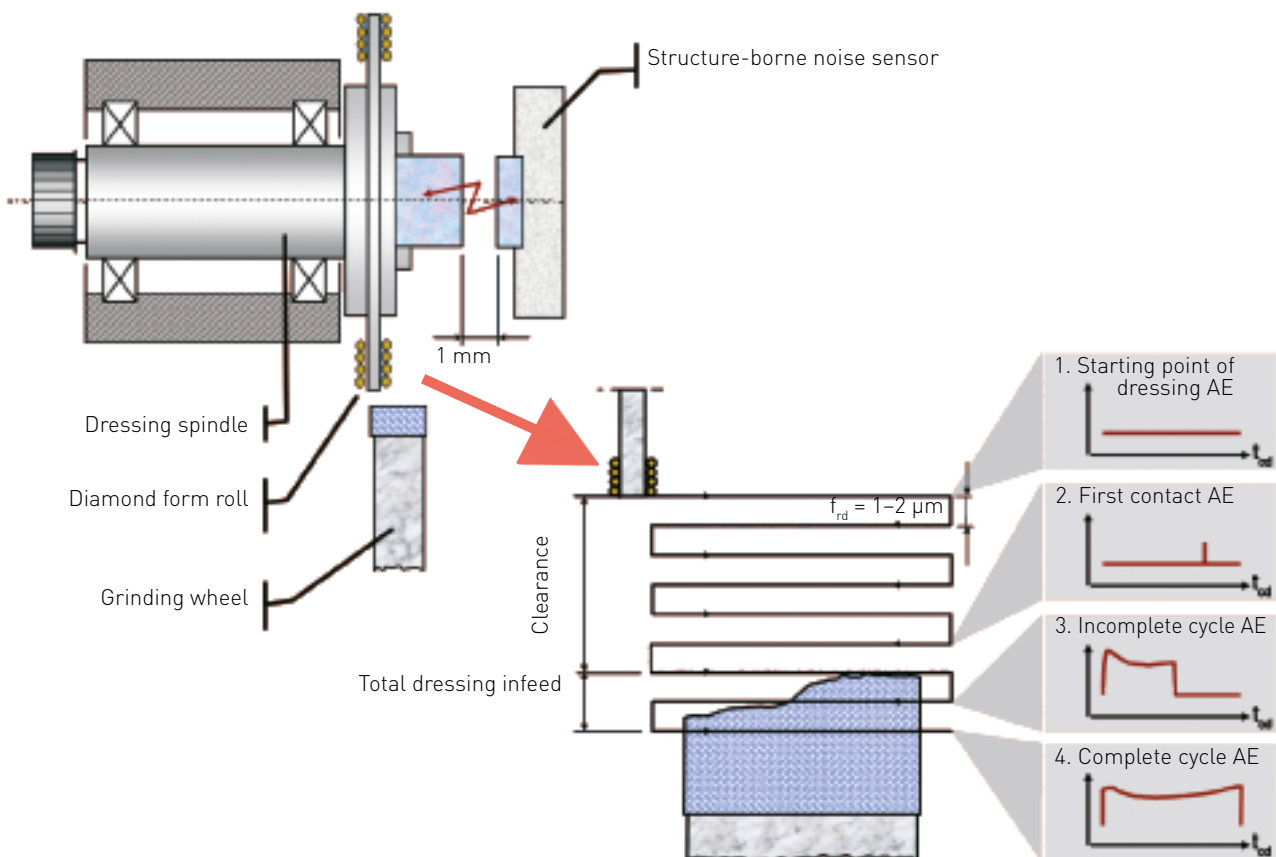
Minimizing the amount of dressing means that tool costs are markedly reduced and guarantees a high degree of process reliability together with a continuously controlled dressing and grinding process.



Source: Dittel

### ADVANTAGES OF CONTACT DETECTION:

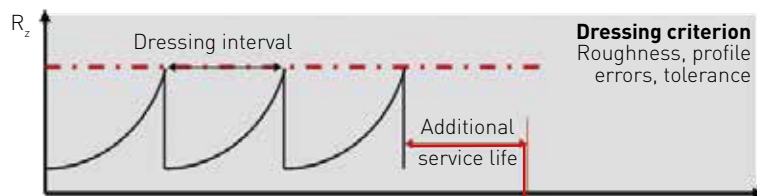
- Grinding processes are displayed
- Grinding processes are optimized
- 'Dead times' are identified
- Cycle times are reduced
- Tool life is prolonged
- Weak points are analyzed



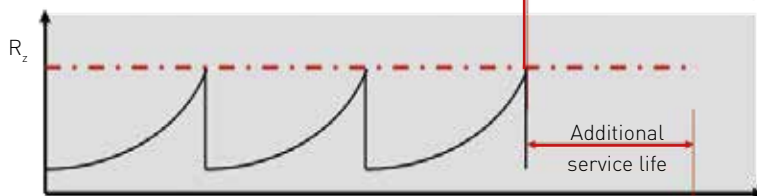


## OPTIMIZED DRESSING PROCESS

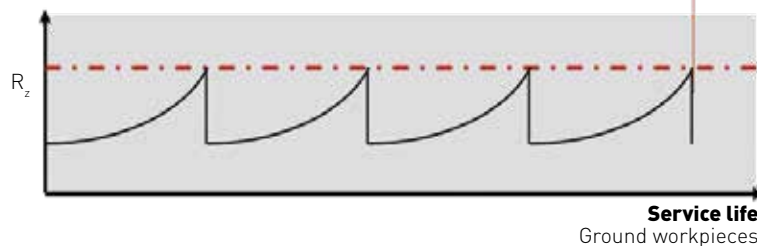
Initial process



Optimized grinding wheel  
Extended dressing cycles

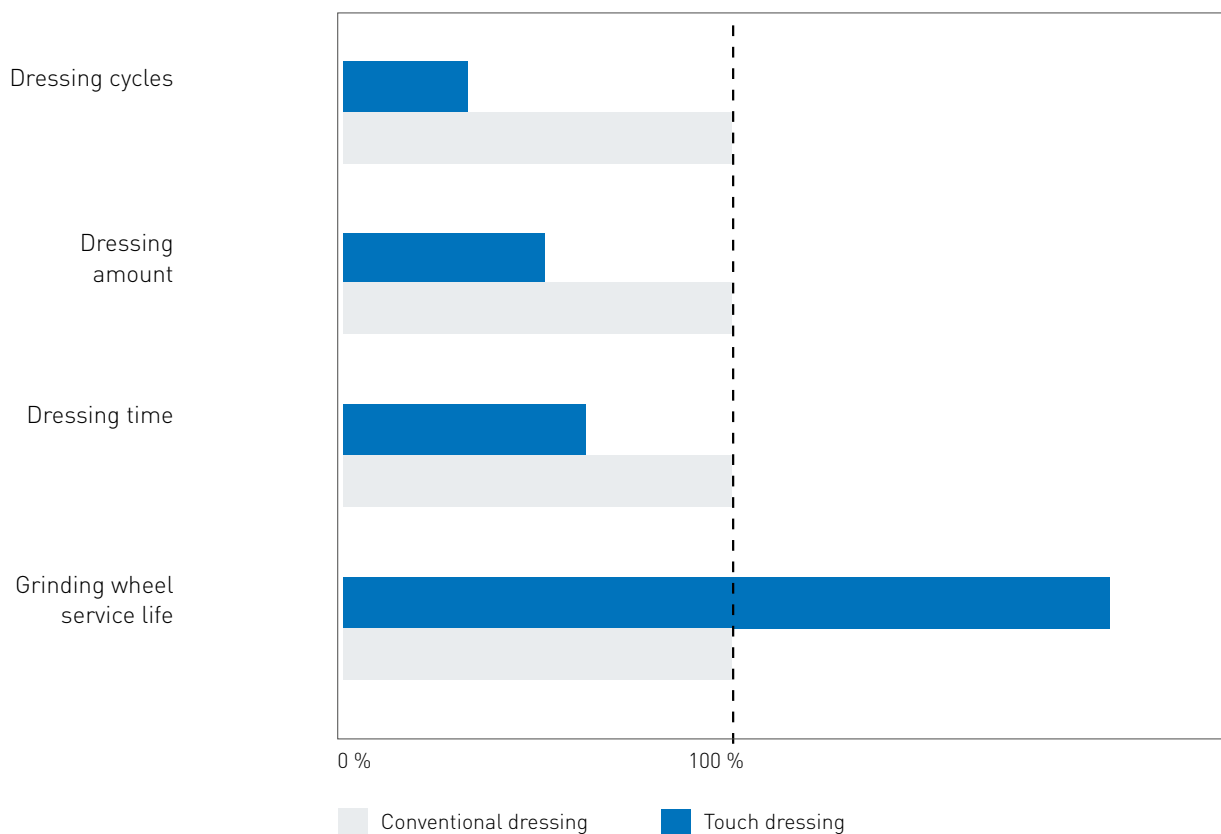


By using contact detection optimized dressing results in a reduced dressing infeed and prolongs the working life of the grinding wheel



## COMPARISON OF TIME SAVINGS AND WORKING LIFE

In order to minimize the amount of dressing when using vitrified cBN grinding wheels and exploit the potential tool life to the maximum, 'Touch dressing' is used for dressing and conditioning. Contact detection systems with rapid, reliable monitoring of the initial contact between grinding wheel and dresser permit dressing amounts in the range of a few microns and thus enable increased economy and productivity.



The background of the top half of the page is a technical drawing of a mechanical part, likely a gear or a mold, with various dimensions and tolerances. A blue diagonal banner with the Norton logo is in the top right. A fountain pen and a pair of compasses are also visible on the drawing.

**NORTON**

SAINT-GOBAIN

**WINTER**

# TECHNICAL INFORMATION

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The Norton WINTER brand represents over 160 years of heritage and grinding experience. Many companies worldwide involved in industrial production benefit from this expertise.

We know our customers' requirements and help you with our technological expertise and competence. This way, your grinding process becomes more effective and profitable.

## SERVICE

Competition is keen, and cost pressures are acute. To improve productivity and technical capability, you need a supplier who co-operates efficiently. Norton WINTER not only provides high performance grinding tools but can also assist in analysing your processes, to identify the best solution, and then to implement it together with you.

### ADVICE:

Our field service engineers and customer service team are here to help, and can offer advice on all Norton WINTER products and grinding processes. Together with product management and our application engineering team, customised solutions will be found which meet your needs.

### PRODUCT DEVELOPMENT

Norton WINTER, as the grinding industry's technology leader, invests heavily in Research and Development. Basic research supports new customer-specific product and application developments at our global Technology Centres. Our EGTC (European Grinding Technology Centre) with the R&D Department in Norderstedt, closely co-operate with our Research and Technology Centres in the USA, France and China.

### PROCESS OPTIMISATION

At our EGTC (European Grinding Technology Centre), we can evaluate your grinding processes using sophisticated sensing and measurement systems which you may not have access to. So we can demonstrate improvements to your process without interrupting your production. On your factory floor, our application and development engineers continue to support you. Our dedicated specialists are expert in the field of complex grinding systems, and can advise on new production strategies with the help of innovative process diagnostic technology. The result for customers is a fine-tuned production process, and optimised day-to-day operations.

### TRAINING AND CONTINUING EDUCATION

We offer regular seminars on current issues and developments at our European Grinding Technology Centre (EGTC) in Norderstedt. Economic and advanced production processes are reviewed with top-class experts from different parts of the industry. We invite internal and external consultants on specific subjects to comment on the technological state-of-the-art and development trends.

**Ask your field salesman for the latest calendar of scheduled seminars and get yourself registered.**

**Specific training programmes can also be arranged according to your individual requirements. Just contact us - we will gladly make an offer that meets your needs.**

### NORTON WINTER OFFERS SEMINARS ON TOPICS SUCH AS:

- Tool Grinding Technology Forum (expert panel discussion)
- Grinding (basic training)
- Grinding fluids (focused technology review)
- Dressing technology (focused review)





## FIELD INSTRUMENTATION SYSTEM (FIS)

### OPTIMISE YOUR PRODUCTION PROCESS

Have us make a **FIS process analysis** and optimise your production process: field instrumentation system is a portable system to monitor and measure your grinding process. Exact and comparable data is obtained and can contribute to increase your performance:

- Process optimisation, reduction of cycle time
- Prolongation of tool life time
- Machine and process studies
- Analytical determination and benchmarking

**GIVE IT A TRY!**



## MDRESS - MOBILE DRESSING UNIT

### FOR BETTER GRINDING RESULTS

Almost every CNC grinding machine can be upgraded by MDress, the mobile rotary diamond dressing unit. Using MDress ensures highly precise reconditioning of grinding wheel profiles. The grinding wheel achieves its ultimate axial and radial running truth directly on the main spindle. Our customers are enabled to test, for example, vitrified bonded grinding wheels, on the CNC grinding machine and obtain a more economic grinding result.

Our application engineers will give you support, to demonstrate an optimised dressing process with the MDress dressing system on your machine at your premises.

**JUST CONTACT US.**



## MAKE ASSURED, INFORMED, & FAST DECISIONS WHILE GRINDING

### PROCESS MONITORING AND DIAGNOSTIC SYSTEM

The new Norton 4Sight process monitoring and diagnostic system allows you to efficiently and cost effectively monitor the performance and productivity of your grinding process. Real-time data gathered through the Norton 4Sight system will provide you with the insights you need to optimize your process for improved operating performance, wheel life, work piece quality, and system productivity. With instant notifications, real-time dashboards and historical analytics reporting, the Norton 4Sight system can help you grind smartly and remotely. No installation on internal IT infrastructure is required, the Norton 4Sight system operates simply with additional ISP or cellular support.

Turn your machine into an Industry 4.0 smart grinding system and let the Norton 4Sight system put all of the data you need at your fingertips.

### KEY INDUSTRIES

ALL PRECISION ENGINEERING MARKETS





## RFID – RADIO FREQUENCY IDENTIFICATION

This technology makes it possible to transfer stored data from the grinding wheel to the grinding machine. The advantages are

### THE INCREASED LEVEL OF TRANSPARENCY

- Integrated tool-life monitoring
- Automated scanning and storage of tool use

### SHORTER SET-UP TIMES

- Direct access to grinding wheel data by the machine control system
- Elimination of operator error in manual recording and entry of data

### IMPROVED PROFITABILITY

- Reduced machine downtime by automatic data transfer between machine and grinding wheel



## DIAMOND WEAR PART

Capitalising on the superior material properties offered by PCD (polycrystalline diamond) and in house design and manufacturing facilities, the Norton WINTER team are able to offer solutions for your grinding projects, maximising output with minimised rework and defects thanks to our Diamond Wear Parts portfolio.

### POTENTIAL IMPROVEMENTS

- Lower tool cost per piece thanks to the extreme low wear on PCD compared to tungsten carbide and other tool materials.
- Improved and stable grinding process.  
Over half friction compared to tungsten carbide.
- Higher quality and increased productivity.  
PCD allows higher forces and higher RPM on the work piece.
- Less down time due to fewer tool changes and less corrections and scrap.

### EXAMPLES OF TOOLS SUITABLE FOR PCD

- Centre points for cylindrical grinding.
- Measuring points and fingers.
- Centreless work rest blades for plunge grinding.
- Shoes and shoe systems in centreless grinding.
- Shoes in steady rests

# GLOSSARY

For your reference: a short explanation of grinding terms

## BONDS

To meet the challenges of the wide diversity of grinding applications, it is inevitable that a wide range of bond systems is required. Bonds are categorised according to the fundamental material type used, and many variations exist within each type.

### RESIN BOND SYSTEMS

These are based on either phenolic or polyimide resins, usually together with added fillers, as well as the abrasive grains. Resin bonds are at the lower end of the hardness scale, and are used in a wide range of applications due to their fast and cool grinding behaviour.

### SINTERED METAL BONDS

Most metal bonds are based on bronze, although harder systems may be based on steel or even hardmetal. Sintered bronze bonds are relatively soft and at their softest can overlap the hardest resin bonds. Steel and hardmetal bonds are more wear resistant, so therefore act harder and grip the abrasive grains more strongly, leading to longer tool life, although the abrasive can sometimes appear blunt.

Metal bonded grinding wheels generally grind more slowly, in most applications acting harder, and more grinding heat is developed than in resin bonded wheels. However, metal bonds can also readily dissipate heat, which also impacts the grinding process. Metal bonds are ideal for grinding wheels with sharp edge profiles, and for machining abrasive materials that would otherwise wear the bond. Furthermore, metal bonds are shock-resistant, and are suitable for very aggressive operating conditions. Metal bonds are mostly used in wet grinding. Special variants are crushable, brittle metal bonds that can be dressed on the machine in a special crushing process. These bonds are especially useful in creep feed grinding.

### ELECTROPLATED BONDS

In this bond system, the metal bond is deposited electrolytically onto a bronze or steel body. The grit is tenaciously anchored by the bond, and grain tips can protrude from the bond layer by 30 - 50% of the grain diameter. This leads to a grinding layer with a very high material-removal-rate capability. However, only the outermost grain layer acts in this way, which is why these tools are mainly designed in single-layer versions. Such single layer bond systems are suitable for profiled wheel bodies of all kinds; profile accuracy is dependent on the grit size specified.

### VITRIFIED BONDS

Vitrified bonds are based on fusible glasses combined with fillers and the abrasive grains. While resin and metal bonds are generally fully dense, vitrified bonds are usually produced with a defined porosity, and are available in different hardness levels. This variation in porosity and hardness is analogous to the vitrified bonds of conventional grinding wheels. The main features of vitrified bonds are:

- Good dressability and profileability
- Free-cutting due to the porosity and self sharpening behaviour
- Fluid availability, due to porosity, in the grinding zone allows cool grinding at low grinding forces
- High cutting speeds and material removal rates are possible.



## CONCENTRATION

According to the Norton WINTER system, the concentration value defines the volume fraction of diamond or cBN in the abrasive layer as follows:

| DIAMOND       |                         |          | cBN           |                         |          |
|---------------|-------------------------|----------|---------------|-------------------------|----------|
| CONCENTRATION | Carat / cm <sup>3</sup> | Volume % | Concentration | Carat / cm <sup>3</sup> | Volume % |
| C50           | 2,2                     | 12,5     | V120          | 2,09                    | 12       |
| C75           | 3,3                     | 18,75    | V180          | 3,13                    | 18       |
| C100          | 4,4                     | 25       | V240          | 4,18                    | 24       |
| C125          | 5,5                     | 31,25    | V300          | 5,22                    | 30       |

These definitions are not applicable for single layer electroplated tools.

## CONDITIONING

Conditioning of a grinding wheel consists of dressing and cleaning:

| DRESSING                                        |                                      | CLEANING                                  |
|-------------------------------------------------|--------------------------------------|-------------------------------------------|
| PROFILING                                       | SHARPENING                           |                                           |
| Macrostructure                                  | Microstructure                       | Microstructure                            |
| Imparting running truth and correct wheel shape | Producing the wheel topography       | Elimination of chips from the chip spaces |
| Intentional modification of grit and bond       | Intentional setting back of the bond | No intention to modify the grinding wheel |

## CUBIC BORON NITRIDE (cBN)

Boron nitride is found in two structural modifications: Cubic boron nitride (cBN) has the zinc-blende crystal structure equivalent to diamond, and has a hardness just a little below that of diamond. The graphite-like hexagonal modification of boron nitride (hBN) is soft and is used as a lubricant.

Compared to diamond, cBN has technological and economic advantages when grinding materials having a chemical affinity to carbon, such as steels and ferrous alloys. Applications for cBN are becoming increasingly economic, and cBN grinding of workpieces with hardness as low as 50 HRC have been demonstrated.

## DIAMOND

Diamond is one of the three carbon modifications (the others are graphite and the fullerenes) and, with a Moh's hardness of 10, diamond is the hardest material known. The grinding (Rosiwal) hardness is 140 times higher than that of alumina. Because of its hardness and wear resistance, diamond is used for grinding hard, brittle and short-chipping materials. Examples are tungsten carbide, glass, ceramics, quartz, semiconductor materials, graphite and wear-resistant thermal spray alloys as well as hard-facing alloys, plastics with glass fiber reinforcement, and other difficult to machine materials. Both natural and synthetic diamonds are used in industrial applications.

- **NATURAL DIAMOND:**  
these diamonds were created in the earth's mantle under high pressure and temperature (1200 -1400°C). Both single crystals (octahedrons, triangles...) and crushed grit (boart) are used in industrial diamond tools.
- **SYNTHETIC DIAMOND:**  
synthetic diamond grits are formed in presses in a very high pressure/high temperature (HP/HT) process, at up to 60000 bar and 1500°C, using a variety of solvent/catalyst materials which help to convert graphite into diamond.
- **MCD:**  
large synthetic diamonds that are produced in a HP/HT process similar to synthetic diamond grit.
- **PCD:**  
polycrystalline diamond pieces formed by sintering micronized diamond particles together with a binder under HP/HT conditions.
- **CVD:**  
these diamonds are manufactured by gas phase deposition (methane, hydrogen) at low pressure using a vacuum system.



## DIRECTION OF ROTATION INDICATOR

Resin and metal bond diamond and cBN grinding wheels always show an indicator for the direction of rotation. At the end of the production chain of a multilayer grinding wheel is the profiling and sharpening process. In the sharpening process, a bond tail is formed behind each of the active abrasive grains. This bond tail supports the grain and prevents the grain from untimely fracture. If the wheel is mounted the wrong way round, this bond tail would precede the grains during cutting, which would lead to lower chip-space, increased grinding pressure, and early grain fracture. Therefore, it is important to adhere to the rotational direction shown by the indication arrow or to re-sharpen the grinding wheel before use, if you chose to change the direction of rotation.

## DRESSING = TRUING + SHARPENING

It is necessary to distinguish between the key wheel preparation steps of truing, sharpening and cleaning of the grinding wheel surface.

Dressing describes the processes of truing and sharpening a grinding wheel. When grinding with conventional alumina or silicon carbide wheels, "dressing" is the combined process of truing and sharpening. However, for superabrasive grinding wheels containing either diamond or cBN abrasives in a resin or metal bond, after truing, a separate sharpening step is usually required to remove some of the bond material and expose the grains. In addition, the grinding wheel surface must be cleaned (Dressing + Cleaning = Reconditioning) periodically. The dressing interval depends upon the grinding process parameters being used, and the type of workpiece material being ground.

Grinding wheel truing generates the correct geometric shape, develops the necessary concentricity, and also removes any surface contamination. In so doing, worn blunted grains are either removed or resharpened, and fresh grains are exposed. To achieve optimum results, dressing tools, dressing parameters and dressing strategy must be finely tuned to the grinding wheel and grinding process. Therefore, different tools and methods are used, such as either alumina-based or SiC sharpening stones, SiC grinding wheels, the Norton WINTER brake-dressing device, CNC rotary dressers, diamond dressing sticks, rotary profile dressers, etc.

**Our engineers can offer advice to help you chose the best method for your application.**

## FEPA

The Federation of European Producers of Abrasives (FEPA) is a non-profit European organisation which publishes safety guidelines and standards for conventional and superabrasive (diamond and cBN) grinding tools as well as loose abrasive grain (see grit sizes). It also provides standards for the most common grinding wheel shapes and dimensions.

## FEPA-SHAPES

These drawings show the most important grinding wheel geometries:

|      |          |          |          |      |
|------|----------|----------|----------|------|
|      |          |          |          |      |
| 1A1  | 1A1R     | 1V1      | 1A1W     | 4A2  |
|      |          |          |          |      |
| 4A9  | 4BT9     | 4ET9     | 6A2      | 6A9  |
|      |          |          |          |      |
| 6L2  | 6V5      | 9A3      | 11A2-70° | 11V2 |
|      |          |          |          |      |
| 11V9 | 12A2-20° | 12C9-20° | 12V2     | 12V9 |
|      |          |          |          |      |
| 14A1 | 14E1     | 14F1     | 14FF1    | 14M1 |

## GRINDING

According to DIN 8589, grinding is defined as material removal using geometrically undefined cutting edges. All grinding wheels with either diamond or cubic boron nitride (cBN) are grinding tools according DIN 8589. The "cutting edges" are composed of the diamond or cBN grit.

## GRINDING RATIO (G-RATIO)

The grinding-ratio is calculated as a ratio of the ground workpiece volume  $V_w$  to the wheel wear volume  $V_s$ .

## GRINDING WHEEL BODIES

The body of a grinding wheel provides the static and dynamic stiffness to the tool. Dependent on the kind of grinding layer, it may consist of aluminium, filled resin, brass, steel or ceramics. The body significantly influences the vibration behaviour and the thermal conductivity of the grinding wheel; the following table shows examples for superabrasive grinding wheel bodies.

| BODY MATERIAL TYPE              | LABEL  | VIBRATION ABSORPTION | HEAT TRANSMISSION | MECHANICAL STIFFNESS                                 |
|---------------------------------|--------|----------------------|-------------------|------------------------------------------------------|
| Resin with metal fillers        | H      | medium               | sufficient        | good                                                 |
| Resin with non-metallic fillers | B or D | good                 | bad               | satisfactory (not sufficient with thinwalled bodies) |
| Aluminium                       | A      | bad                  | good              | very good                                            |
| Steel                           | E      | bad                  | satisfactory      | very good                                            |
| Copper                          | C      | bad                  | very good         | very good                                            |
| Composite material              | CFK    | good                 | bad               | good                                                 |

## GRIT SIZES

The sieve-sizes for diamond and cBN range according to FEPA standards (also ISO 6106) and are shown in the following table. As abrasives always contain a range of grit sizes, the values given for average grit sizes and particles per carat are approximations. D-prefix indicates diamond, while B-prefix refers to cBN.

| FEPA GRIT SIZE D OR B | STANDARD [Mesh] | AVERAGE GRIT SIZE [ $\mu\text{m}$ ] | PARTICLES PER CT |
|-----------------------|-----------------|-------------------------------------|------------------|
| 1181                  | 16/18           | 1100                                | 60               |
| 1001                  | 18/20           | 930                                 | 100              |
| 851                   | 20/25           | 780                                 | 160              |
| 711                   | 25/30           | 660                                 | 270              |
| 601                   | 30/35           | 555                                 | 450              |
| 501                   | 35/40           | 465                                 | 760              |
| 426                   | 40/45           | 395                                 | 1200             |
| 356                   | 45/50           | 330                                 | 2100             |
| 301                   | 50/60           | 280                                 | 3500             |
| 251                   | 60/70           | 233                                 | 6000             |
| 213                   | 70/80           | 197                                 | 10000            |
| 181                   | 80/100          | 167                                 | 16000            |
| 151                   | 100/120         | 140                                 | 28000            |
| 126                   | 120/140         | 118                                 | 46000            |
| 107                   | 140/170         | 99                                  | 80000            |
| 91                    | 170/200         | 83                                  | 135000           |
| 76                    | 200/230         | 72                                  | 200000           |
| 64                    | 230/270         | 63                                  | 300000           |
| 54                    | 270/325         | 55                                  | 460000           |
| 46                    | 325/400         | 47                                  | 750000           |
| 39                    | 400/500         | 38                                  | 1400000          |
| 33                    | 500/600         | 33                                  | 2100000          |

Norton WINTER has its own classification for fine and microgrit sizes. FEPA standards are similar (M 63...M1,0).

| NORTON WINTER DIAMOND CLASSIFICATION | GRIT SIZE [µm] |
|--------------------------------------|----------------|
| D 25                                 | 40 - 60        |
| D 20 C                               | 34 - 45        |
| D 20 B                               | 25 - 37        |
| D 20 A                               | 20 - 30        |
| D 15                                 | 8 - 25         |
| D 15 C                               | 15 - 25        |
| D 15 B                               | 10 - 20        |
| D 15 A                               | 8 - 15         |
| D 10                                 | 6 - 10         |
| D 7                                  | 5 - 10         |
| D 5                                  | 3 - 7          |
| D 3                                  | 2 - 5          |
| D 1                                  | 0,5 - 2        |
| D 0,7                                | 0 - 1          |
| D 0,25                               | 0 - 0,5        |

## HARDNESS OF ABRASIVES

The hardness value of a material is generally influenced by the method of measurement. Different measuring methods and equipment result in different scales and units which cannot easily be compared. Thus several scales exist, for example:

Moh's hardness: abrasion behaviour (measure of scratch resistance)

Rosiwal hardness: stock removal behaviour (measure of resistance to stock removal)

Vicker's Microhardness: indentation behaviour (resistance to penetration)

In the following table, different hardness values for abrasives are given and compared to some reference materials:

| MATERIAL        | MOH'S HARDNESS | ROSIWAL HARDNESS | VICKERS MICROHARDNESS (HV) |
|-----------------|----------------|------------------|----------------------------|
| Diamond         | 10             | 140.000          | 10.000                     |
| cBN             | 9,9            |                  | 9.000                      |
| Silicon carbide | 9,6            |                  | 2.600                      |
| Corundum        | 9              | 1.000            | 2.060                      |
| Quartz          | 7              | 120              | 1.120                      |
| Manganese       | 5              | 6,5              | 540                        |
| Gypsum          | 2              | 1,25             | 36                         |
| Talc            | 1              | 0,03             | 2,6                        |

Diamond's stock removal resistance (Rosiwal hardness) is 140 times higher than corundum (alumina), even though its penetration hardness (Vickers) is only 5 times higher.

# MATERIAL REMOVAL RATE

The material removal rate, MRR or  $Q_w$ , is expressed in  $\text{mm}^3/\text{s}$  and defines the volume of workpiece material ground per unit time (second).  
The specific material removal rate,  $\text{MRR}'$  or  $Q'_w$ , refers to the removal rate per millimetre of wheel contact width and is expressed in units of  $[\text{mm}^3/(\text{s} \cdot \text{mm})]$ .

# PARAMETERS INFLUENCING GRINDING RESULTS

The table shows some correlations between process variables and the grinding results.

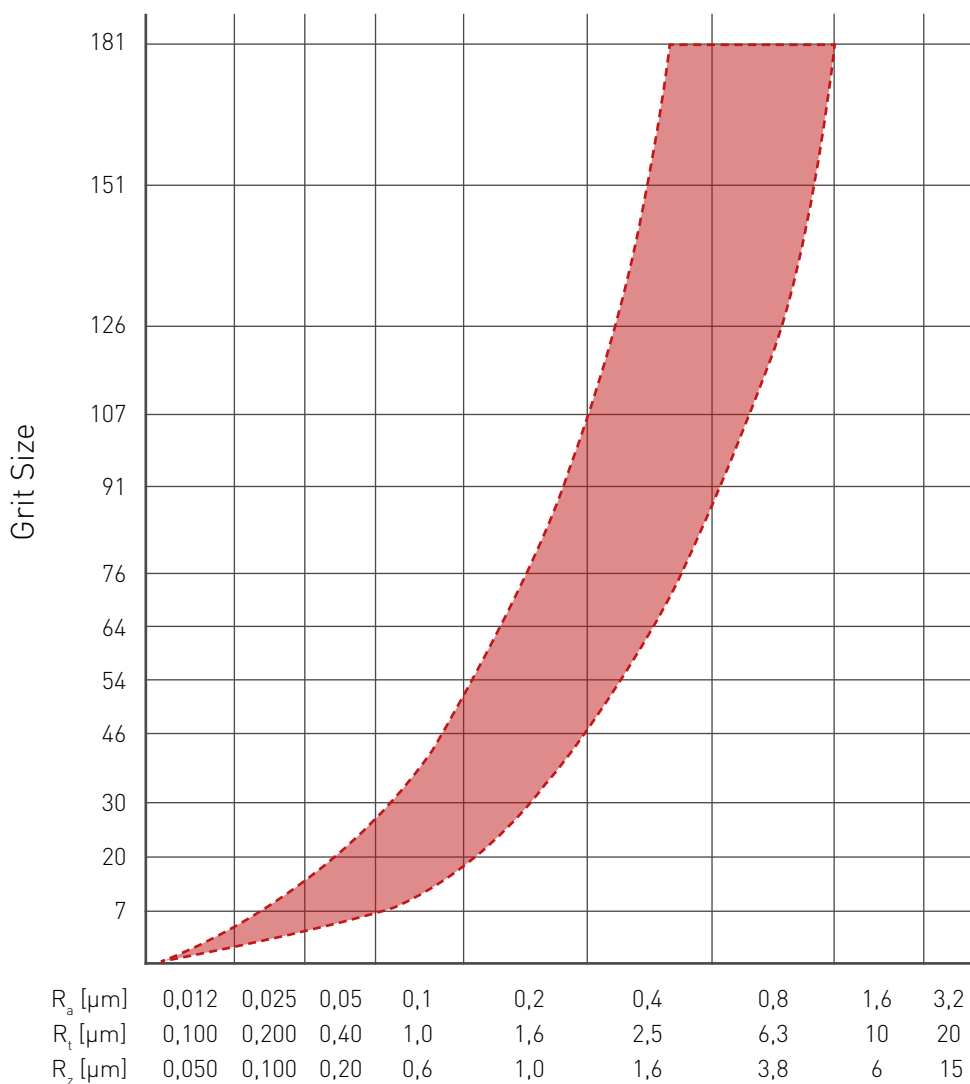
| APPRAISAL CRITERION<br>INFLUENCING PARAMETERS |                                                        | CUTTING FORCE F<br>$F = F(\dots)$ | GRINDING RATIO G<br>$G = F(\dots)$ | ROUGHNESS $R_a$<br>$R_a = F(\dots)$ | TEMPERATURE $\vartheta$<br>$\vartheta = F(\dots)$ |
|-----------------------------------------------|--------------------------------------------------------|-----------------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|
| Machine- and<br>Operation<br>Paramters        | Cutting Speed $v_c$ (m/s)                              |                                   |                                    |                                     |                                                   |
|                                               | Material Removal Rate $Q_w$ ( $\text{mm}^3/\text{s}$ ) |                                   |                                    |                                     |                                                   |
|                                               | Coolant<br>(Oil Content)                               |                                   |                                    |                                     |                                                   |
| Grinding Wheel                                | Grit Size ( $\mu\text{m}$ )                            |                                   |                                    |                                     |                                                   |
|                                               | Concentration<br>(Carat/ $\text{cm}^3$ )               |                                   |                                    |                                     |                                                   |

## ROUGHNESS

The surface roughness of a ground workpiece is influenced by many diverse parameters:

- Grit size of abrasive grain
- Concentration of abrasive grain
- Specification of bond system
- Type and hardness of work piece
- Grinding process
- Grinding parameters
- Dressing parameters

A general and qualitative correlation between grit size and surface roughness is shown below:



SPECIFICATION

The specification is the general description of the grinding tool and contains all relevant information concerning the product’s features. In general, the specification always contains the following details:

EXAMPLE:

|       |             |           |        |               |               |
|-------|-------------|-----------|--------|---------------|---------------|
| 11V9  | 100-2-10-20 | D126      | K+888R | C75           | A             |
| Shape | Dimension   | Grit Size | Bond   | Concentration | Body Material |

Furthermore, the specification can contain additional information regarding drawing index, production method, structure, and other details.

SUPERABRASIVES

Diamond and cubic boron nitride are the hardest materials existing in industry today, according to the current state of knowledge. The levels of hardness of diamond and cBN are significantly higher than those of conventional abrasives like alumina (corundum) and silicon carbide (see hardness).

WEAR EFFECTS ON DIAMOND AND CBN

The hardness of an abrasive grit type alone is not sufficient to determine the grinding tool’s grinding behaviour. Diamond and cBN grains can wear in many ways, causing different effects.

Primarily, there are two main types of wear.

MECHANICAL WEAR:

Abrasion, micro-chipping of cutting edges, grit macrofracture, and breakout of grain from the bond.

CHEMICAL AND THERMAL WEAR

Carbon diffusion, graphitization, oxidation, and reaction with grinding fluids.

Diamond not only reacts with iron (above a certain threshold temperature), but also with chromium, vanadium and tungsten. cBN does not show chemical reaction with iron or other metals. Therefore, cBN has proven to give better tool performance when machining, for example, high speed steel, although it is not as hard as diamond.

An outward sign of the occurrence of thermo-chemical wear is the rapid appearance of wear flats on the grains, when no grain chipping from mechanical wear is present.

## CONTACT

Whom to ask first? Who is my nearest contact person?

Where can I get quick and easy help on grinding tools and grinding processes?

**For your inquiries please ask you sales engineer:**



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