CNC DRESSING TOOLS

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Quality and precision achievements

Saint Gobain was founded in 1665 as a company with new ideas for the manufacture of flat glass. Since its foundation Saint Gobain has concentrated on innovation and expertise in the area of technical materials. Saint Gobain has become a market leader in many industries. Today Saint Gobain employs approximately 16,000 people in the areas of bonded abrasive products and dressing tools. Saint Gobain is present in 45 countries worldwide and is the largest manufacturer of dressing tools and abrasives in the world.

Advanced technologies

Manufacturing technology

Saint Gobain has developed up-to-date production facilities through continuous investment in manufacturing equipment. Its excellent on-time delivery performance is backed by in-depth product knowlege and very high quality levels.

Saint Gobain Diamantwerkzeuge is certified according to ISO 9001; ISO 14001 and has also obtained the prestigous FORD Q1-Certification.

Technology Centers for Abrasives Engineering

The objective of the technical centers are to develop and improve grinding technology.
These are located in Germany (at Norderstedt, near Hamburg) and in the USA (at Worcester, near Boston).

They support customers in developing their demands for the future, allowing them to become world class in their application of dressing abrasives and tools.

These “Centers of competence” include developments like “Systemkoncept” that describe the microscopic interrelation of the process during dressing and grinding.
To gather and spread this knowledge of dressing and grinding, a European Technical Data Base (ETDB) has been created and is available at local levels.

Absolute Dressing precision

High accuracy dressing tools are needed to dress an abrasive wheel to close tolerances. Only then it is it possible to guarantee the quality of the components produced. Saint-Gobain is known as a high quality and high precision manufacturer.

Increasing quality and accuracy demands, coupled with more economic machining solutions, are common requirements in modern machine tool building.

To satisfy these fast changing market requirements it is necessary to have a flexible approach to diamond tooling.

To choose the right dressing tool for the application it is necessary to know the required cycle time , the component profile and the tool cost.

Normally, stationary or rotating diamond tools are used to dress grinding wheels

With CNC driven dressing tools, it is possible to create simple and complex profiles in different wheel widths.

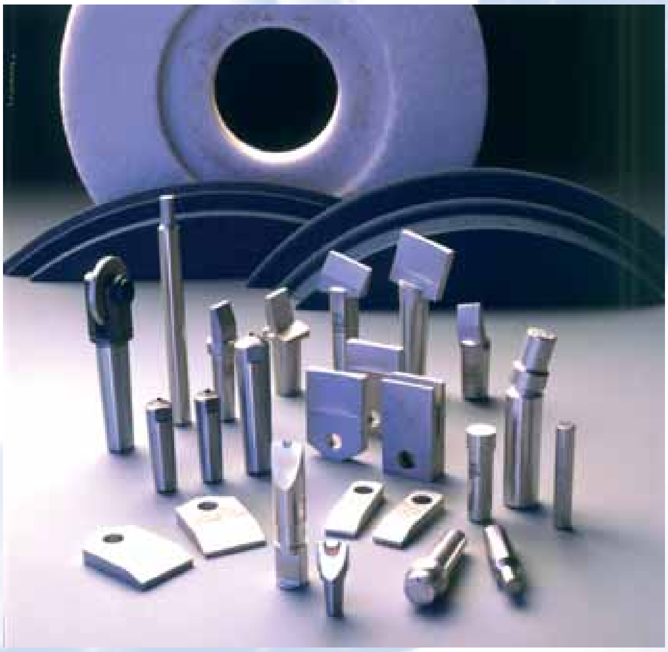
By using the correct specification of dressing tool and dressing parameters, it is possible to influence the result on the component ground.

The use of CNC dressers allows the creation of a variety of profile shapes. In this type of application it is possible to affect the dressing results by changing the speed quotient, the dressing direction and dressing over lap.

For safety, diamond wheels are speed tested during manufacture . The finished wheel is engraved with the maximum speed, the drawing number and a unique manufacturing number, which gives traceability.
With CNC-Dressers, an inspection report is created giving the actual dimensions produced, thus allowing the machine datums to be set accurately.

Infiltrated rotary dresser

Direct plated rotary dresser



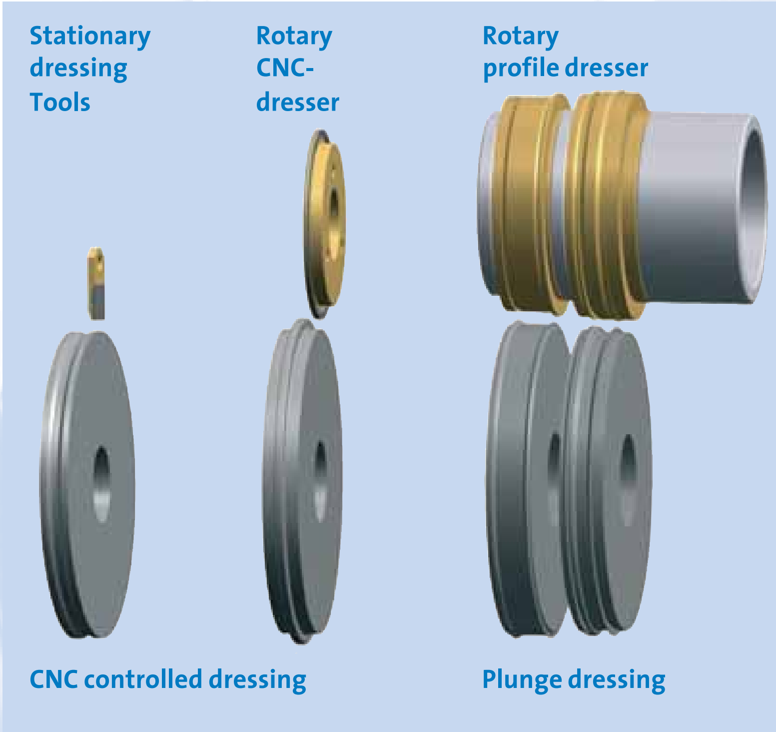
Stationary dressing tools

Types of Dressing Tools

When dressing a grinding wheel there is normally a choice of either stationary or rotary dressers.

Rotary dressers are normally used for the manufacture of components with complex profiles in a mass production environment

To produce the correct geometric form and surface quality it is important to choose the right diamond specification.



TOOL TYPE	EXAMPLE	CHARACTERISTICS
Stationary dressing tools 	• Multi point dresser • Blade tools • Blade tool with CVD or MCD inserts	• Influences the surface roughness of the grinding wheel • Flexible dressing system • Low tooling cost • Typically supplied from stock
Rotary dressing tools  	• Rotary profile dresser	• Relatively short dressing cycles • Constant dressing with very low wear • Profile roller dressers are dedicated to the component profile
	• Rotary CNC dresser	• The surface roughness is influenced by a combination of the axial oscillation, the effective width and the speed ratio • Flexible dressing system • Low tool cost • Some availability from stock

CNC dressers are not dedicated to specific component profile and so give flexibility. The form is generated by the CNC control.

The stationary and the rotary dressers offered by Saint-Gobain allow excellent flexibility, give minimum dressing times with low dressing power.

CNC dressers are used on specialised dressing spindles. These contain high precision bearings with close roundness tolerances to ensure out repeatability and accurate geometries are acheived

The super abrasive type is matched to the application. The options available are:

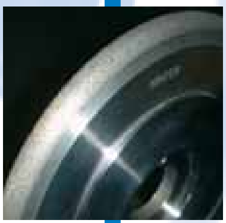
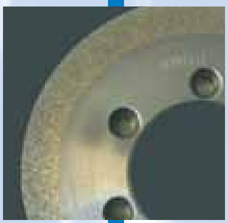
Natural Diamond
Natural 'needle' diamonds (long stones)
Synthetic diamonds such as:
CVD, PCD or MCD

Factors influencing the performance of dressing tools

	Speed ratio	Over lap	Infeed
Stationary dresser	-	X	X
CNC dresser	X	X	X
Rotary profile dresser	X	-	X

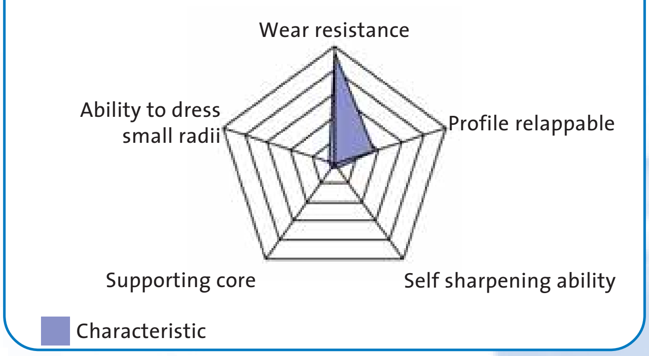
Specifications of CNC dressing tools

CNC Dressers

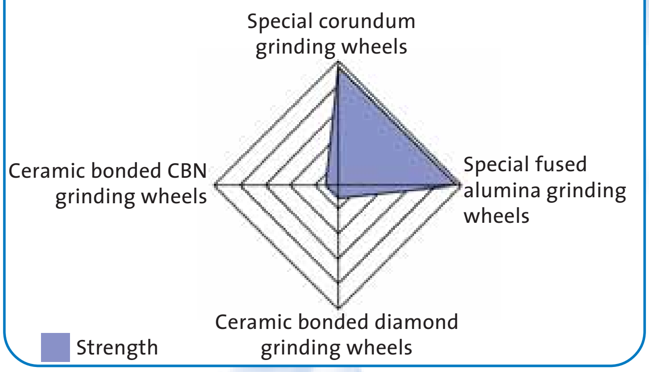
Manufacturing	Reverse manufacturing		Positive manufacturing		
Bond	plated	infiltrated	infiltrated	sintered	plated
Distribution	random	scattered	scattered	random	random
Concentration	highest	scattered	scattered	scattered	highest
					
Type	UZ	TS	DDS	SD	SG

Reversed plated dressers (UZ)

Characteristics of CNC Dressers



Suitability to grinding wheel types

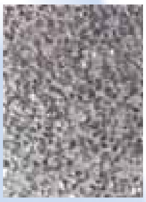


CNC Dressers are produced using a reverse plating method and a single diamond layer which gives good wear resistance.

It is possible to improve the wear resistance of vunerable areas by using corner reinforcement.

Usage:

- Dressing of conventional grinding wheels



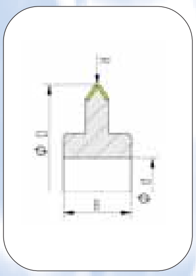
Natural diamond:

- Highest diamond concentration
- Random diamond distribution
- Highest accuracy of the diamond profile is achievable through of the manufacturing process
- Min concave radii of 0,03 mm
- Min convex radii of 0,1 mm
- A wide variety of dresser profiles are possible

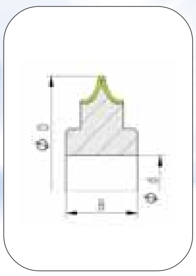
General Limits

- Minimum diamond layer width for profile rollers is 10 mm
- Maximum outer diameter is 320 mm, bore tolerances are H3
- Minimum radius 3 mm over a 180° included angle

Examples:



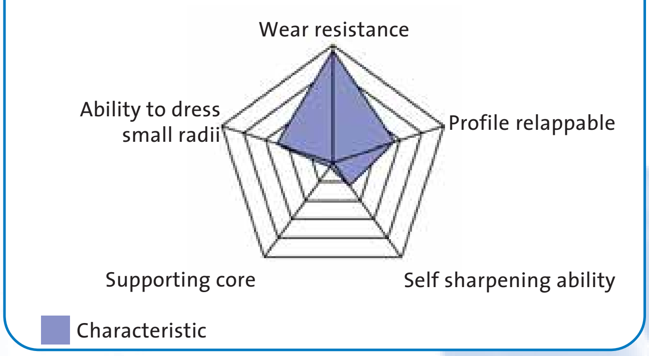
UZ 10



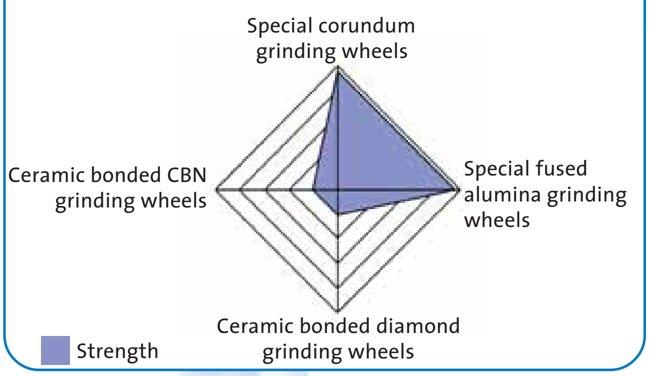
Special applications

Infiltrated dressers (TS)

Characteristics of CNC Dressers



Suitability to grinding wheel types

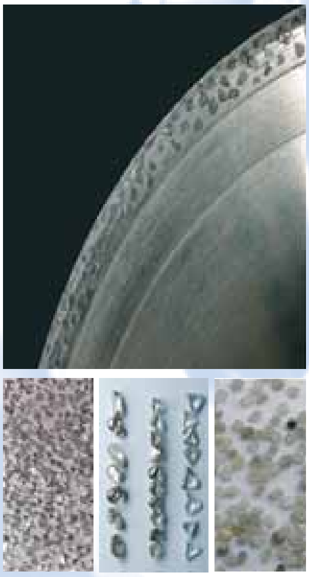


Infiltrated dressers have high wear resistance and are made with a single diamond layer.

Improved wear resistance is possible with CVD, PCD or synthetic diamond corner reinforcement.

Usage:

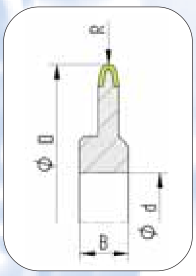
- Dressing conventional grinding wheels

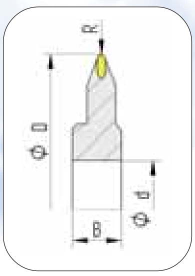


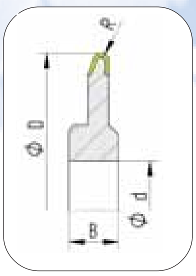
Natural and Synthtetic diamond:

- Random and pattern set diamond distribution
- High precision through grinding the diamond layer
- Reinforcement of small radii by individually selected support diamonds
- Radii less than 0,4mm, set with ‘needle’ diamonds
- Minimum radius 0,1mm for included angle of 30 degrees
- Minimum layer width 2mm with maximum edge radius of 0,2mm
- Maximum outer diameter 340mm, bore tolerances are H3

Examples:


TS 10


TS 10 N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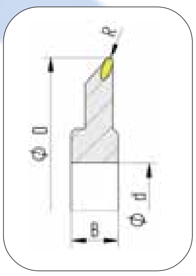
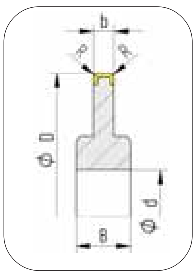
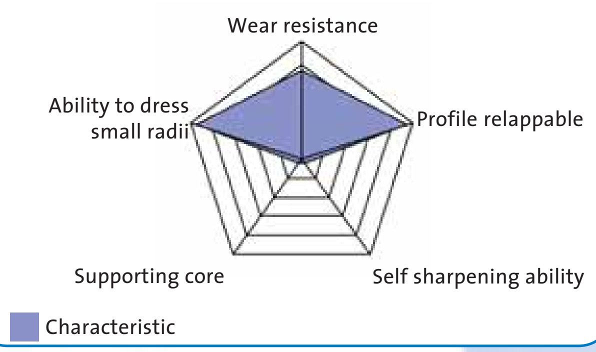

TS 20 N

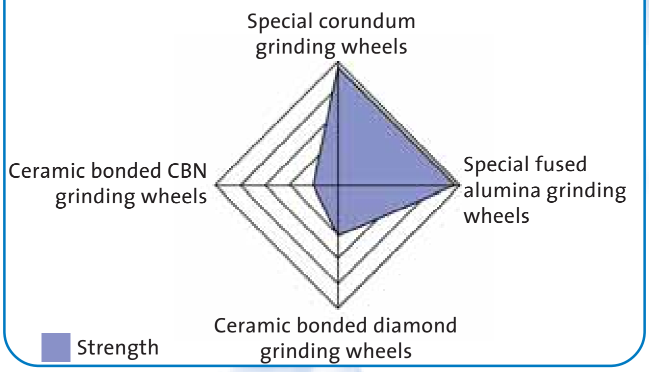

TS 30

Infiltrated dressers with PCD/CVD/MCD diamond (TS)

Characteristics of CNC Dressers



Suitability to grinding wheel types



Infiltrated CNC roller dressers with PCD/CVD or MCD needles are capable of holding small radii.

Depending on the wear condition of the layer, these dressers are relappable.

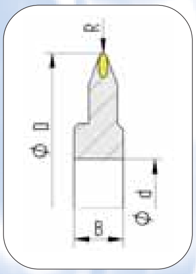
Usage:

- PCD for dressing of AL_2O_3 wheels
- CVD or MCD for dressing of microcrystalline AL_2O_3 wheels (TG/SG/XG etc.)

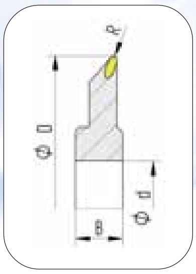
PCD,CVD,MCD and synthetic diamond :

- Pattern set diamond
- High precision through grinding the diamond layer
- Several relaps possible
- Minimum radius for included angle :
  R = 0,05 mm for included angle of 35°
  R = 0,10 mm for included angle of 25°
- Minimum layer width and edge radius for cylindrical type:
  B = 0,5 mm
  R = 0,05 mm
- Maximum outer diameter 340 mm, bore tolerances are H3

Examples:



TS 10 N



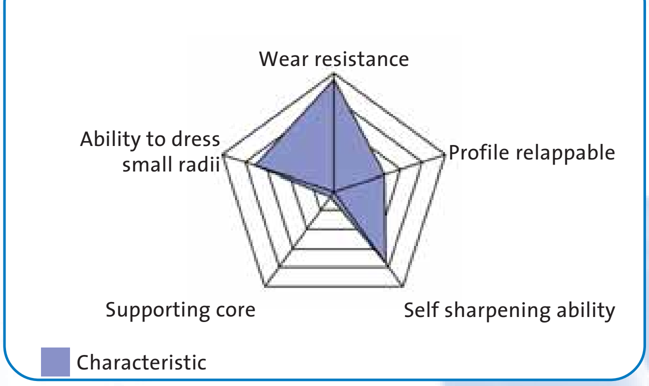
TS 20 N

Infiltrated dresser

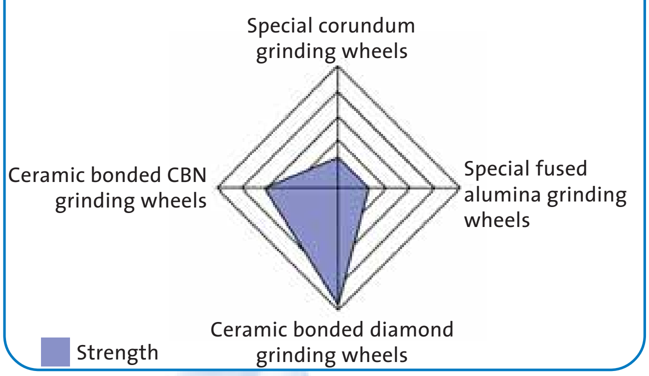
(DDS)

Diamond Dressing System

Characteristics of CNC Dressers



Suitability to grinding wheel types



The Winter DDS dresser enables the high precision CNC dressing of vitrified bonded diamond and CBN grinding wheels.

The DDS dresser uses a constant ratio of contact area to total area, depending on a patented diamond distribution and concentration.

Usage:

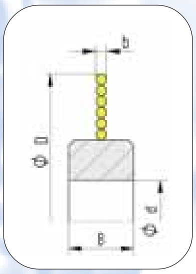
- In process dressing of vitrified bonded diamond- CBN wheels

Natural diamond:

- Controlled diamond distribution
- High precision through grinding the diamond layer
- No backing layer for the diamond
- Ability to dress concave and convex profiles
- Constant layer width
- Ability to dress vitrified bonded diamond wheels
- Diameter 90 mm - 210 mm
- Layer width 0,6 mm - 1,2 mm
- Radius depending on layer width (0,3 mm - 0,6 mm)

Standard version:

	Diameter	Layer width	Core width	Bore
1)	120 mm	1 mm	15 mm	40 H3
2)	150 mm	1 mm	15 mm	52 H3



DS 10

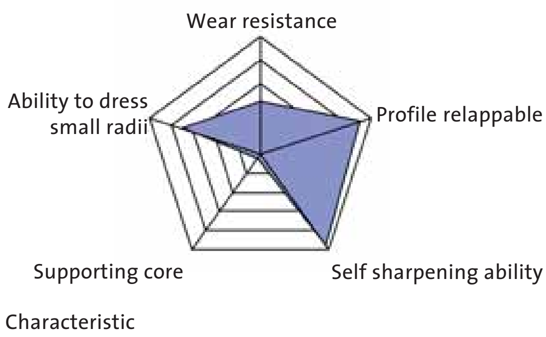
The dresser is constructed by clamping the diamond layer between two steel plates.

Sintered dresser

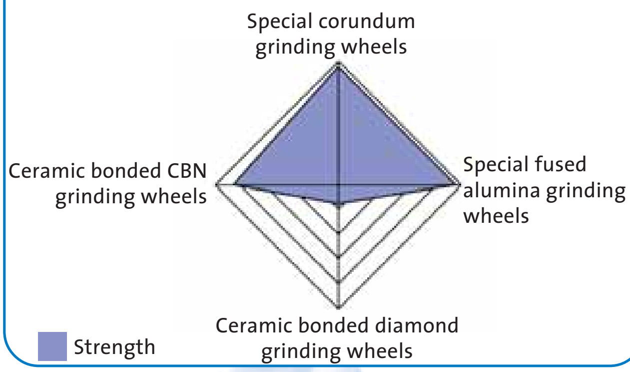
(SD)

Soft Dressing

Characteristics of CNC Dressers



Suitability to grinding wheel types



The metal bonded SD roller dresser is composed of a volume layer which can be resharpened several times.

These CNC dressers are highly capable in cylindrical, centerless and through feed applications where high surface roughness requirements are needed.

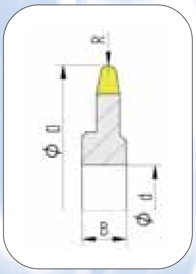
Usage:

- Dressing of vitrified bonded CBN wheels
- Dressing of conventional dressing wheels

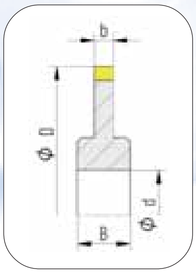
Natural diamond and synthetic diamond:

- Random and pattern set diamond distribution
- High precision through grinding the diamond layer
- Variety of shapes to suit all machines/applications
- Design gives a constant cutting width (b_d)
- Several relaps possible
- Volume layer
    - minimum layer width 0,8 mm (only cylindrical)
    - maximum outer diameter 150 mm
    - maximum layer depth 10 mm
    - constant layer width

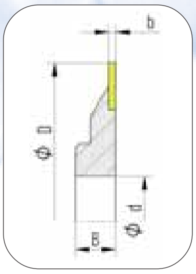
Examples:



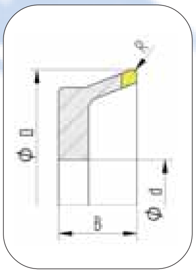
SD 10



SD 30



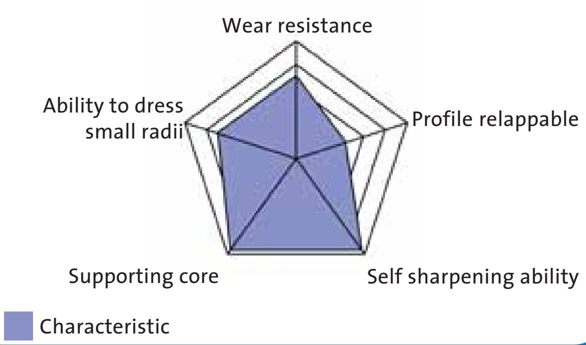
SD 40



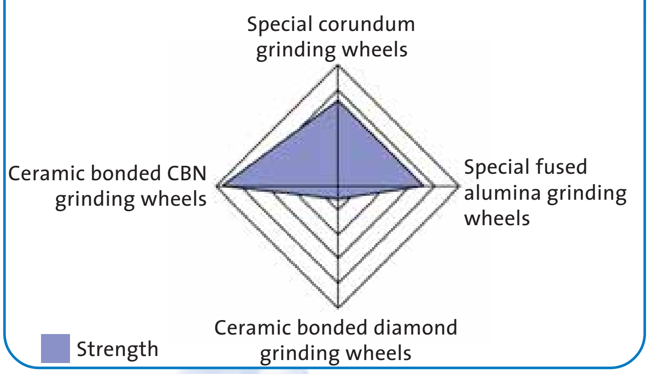
SD 60

Direct Plated dresser (SG)

Characteristics of CNC Dressers



Suitability to grinding wheel types



Direct plated CNC dressers of this type have a well established pedigree. They are made using a single diamond layer giving a constant grinding width.

Core material is either steel or bronze.

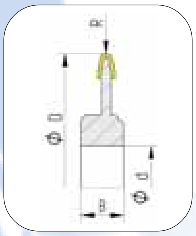
Usage:

- Dressing of vitrified bonded CBN grinding wheels
- Dressing of conventional grinding wheels

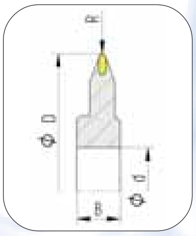
Nature diamond:

- Maximum diamond concentration
- High roundness accuracy through finishing the diamond layer
- Constant layer width from a radial single layer
- Minimum radius size dependant on diamond grit size
- Variety of shapes to suit all machines/applications
- Standard dresser shapes held in stock
- Maximum outer diameter 340 mm
- Bore tolerances are H3

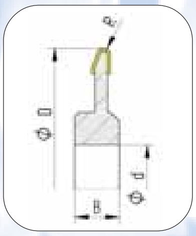
Examples:



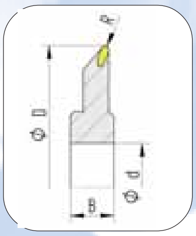
SG 10



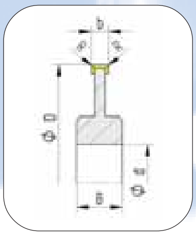
SG 10 N



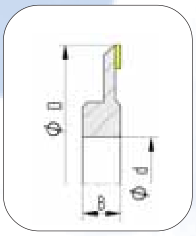
SG 20



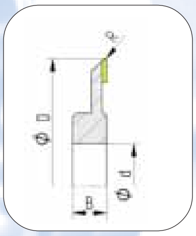
SG 20 N



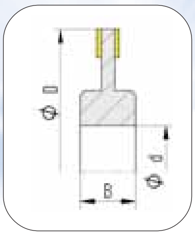
SG 30



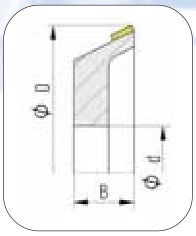
SG 40



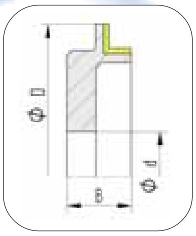
SG 40 R



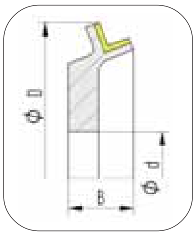
SG 50



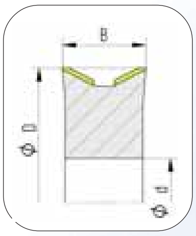
SG 60



SG 70



SG 80



SG 90

Selection matrix for CNC dressers

This matrix is designed to help find the best suited dresser for an application. The choice of dresser depends on the machine/wheel specification, the geometry and the surface roughness required. The following is a guideline reccommendation only.

(A team of technical support staff are available for a more detailed application enquiries, see back cover for details)

Can the wheel be dressed on the grinding machine ? — NO → **External profiling**

YES ↓

Does the grinding machine have the equipment for rotary dressing? — NO → **Stationary dresser**

YES ↓

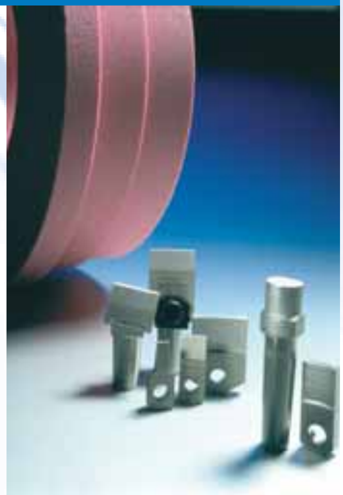
Does the grinding machine have a CNC controller? — NO → **Dedicated Profile dresser**

YES ↓

What grinding wheel specification will be dressed?

- Vitrified bonded wheel
  Diamond grinding wheel
  → **DDS**
- Vitrified bonded CBN grinding wheel
  → What type of profile will be dressed?
  - Concave/ Convex → **SG / SD / DDS**
  - Convex/ Cylindrical → **SG / SD**
- Conventional grinding wheels
  → What type of profile will be dressed?
  - Concave/ Convex → **TS** Radi < 0,4 mm: **PCD / CVD**
  - Convex/ Cylindrical → **TS / SD / UZ / SG**

Stationary dressing tools for CNC dressing



Tool selection

	Needle Blade Natural diamond	Needle Blade Synthetic diamond	Blade with Natural diamond grit	Multi-Point Dresser Natural diamond
Angle Head (profile) grinding	XX	XXX	X	unsuitable
Plunge grinding	XX	XXX	X	unsuitable
Internal grinding	XX	XXX	XX	X
Centerless through feed grinding	XX	X	XXX	XX
Flat grinding	XX	-	XXX	XX

XXX = first recommendation, XX = second recommendation, X = third recommendation.

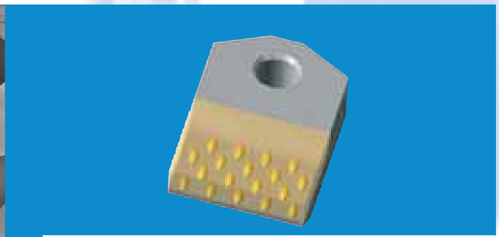
Stationary CNC dressers are very easy and flexible to use and are a low cost option.

Saint-Gobain has a standard range of blades tools which use natural and synthetic diamond and which are suitable for any technical / cost requirement .

Examples

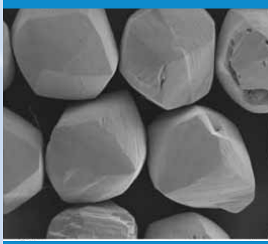
Blades Tools using natural diamond grit:

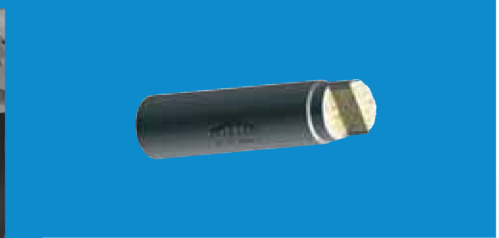
For economic dressing with high consistency. Useable diamond layer length of 15mm gives long life.



Multi-Point Dresser:

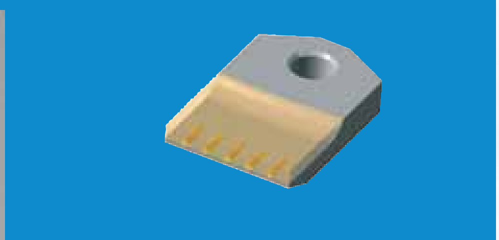
Very economical tool for straight dressing with high dressing speed and low technical demands.





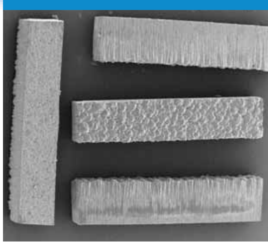
Blades tool with synthetic monocrystalline diamond (MCD)

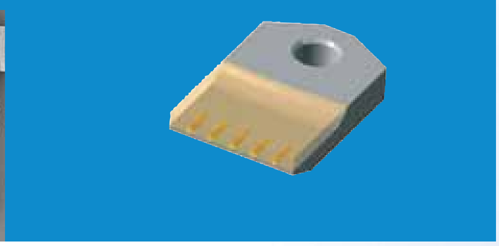
Capable of the highest demands of repeatability and surface finish.
Used to dress microcrystalline AL_2O_3 Wheels.



Blades tools with synthetic multicrystalline diamond CVD

Economical for highest demands on repeatability and consistancy of dressing.





Stationary dressing tools for contour controlled dressing

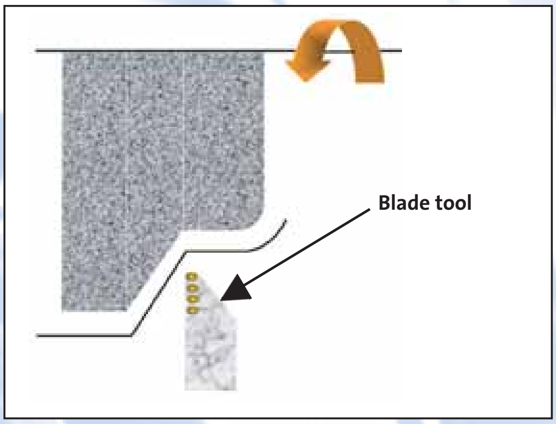
Dressing of profiles with blade tools:

Dressing tools use 'needle' form natural or synthetic diamonds.
Needle diamonds are especially suited to dressing profiles using infeed and angular infeed.

Natural diamond:
An effective diamond layer width upto 15mm gives a very economic dressing solution.

Using precise diamond setting patterns, it is possible to overlap rows of stones to ensure that consistent dressing results are achieved.

Synthetic diamonds:
The constant cross section given by rows of synthetic diamonds, guarantee a constant dressing behaviour through the complete life of the dressing tool.



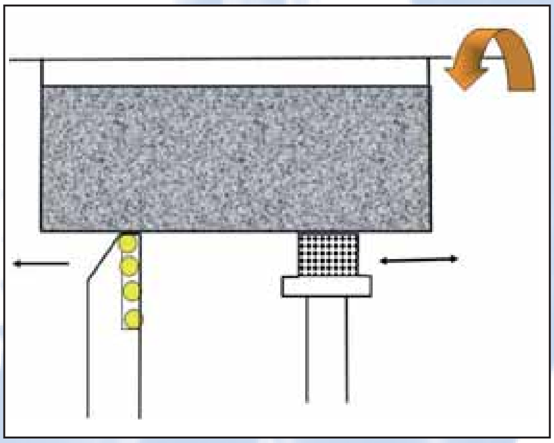
Selection of grit size		
Grit size of grinding wheel	Synthetic diamond size	Natural diamond size
◂ 46	1 x 1	N1100
46 bis 60	0,8 x 0,8	N1100
80 bis 100	0,6 x 0,6	N1100
120 bis 240	0,4 x 0,4	N800

Straight dressing with Multi-Point blade tools:

The hard-wearing nature of diamond grit combined with a special setting pattern, which is matched to the application, gives a constant dressing behaviour with a long life.

Multi-Point blade tools:
A blade tool using a single layer with diamond setting matched to the process requirements. These can dress a grinding wheel giving repeatable results and with a high surface roughness.

These dressing tools are very robust and efficient where low dressing requirements are needed.



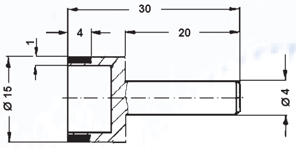
Selection of grit size		
Grit size of grinding wheel	Diamond Igel	Diamond blade tool
36 bis 46	D2240	
46 bis 54	D1001	D1181
54 bis 80	D711	D1001
80 bis 120	D426	D711
120 bis 180	D301	D501

Diamond dressing pins and cups for small grinding wheels

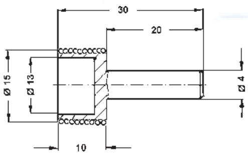
Diamond dressing pins and cups are suitable for dressing small internal grinding wheels.

Diamond dressing pins

4BZ 07B



50S 07B



Diamond dressing pins

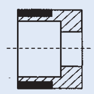
Shape - D - T - X - H	Grit size	Bond	Concen-tration	Order No.
4BZ 07B - 15 - 4 - 1	D301	BZ 387.1	C135	66260100343
50S 07B - 15 - 10 - 4 - 30	D426	G825	S33	60157644198

Application
For dressing vitrified CBN grinding wheels.

Dressing spindles 'Revolution 33 ae'

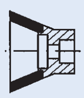
This system is for dressing vitrified CBN grinding wheels in internal grinding applications. It controls dressing by evaluating the acoustic signal emitted.

Shape: 6A9/5
Dimensions: 15 x 13 x 7 mm



Order No.:* *1011375

Shape: 11V2/5
Dimensions: 18 x 20 x 7 mm



Order No.:* *128360 Z

Dressing parameters

Conditioning

DRESSING		CLEANING
Truing	Sharpening	
Macrostructure	**Microstructure**	**Microstructure**
Run out and profile of the grinding wheel	Generation of wheel topography	Removal of chips
Effect of grit and bonding material	Conditioning the bond	Not effected by grinding wheel

Dressing parameters can heavily influence the grinding characretistcs of a wheel. The dressing of grinding wheels using a contour-controlled dressing tool enables a quick and flexible solution. It allows the roughness and geometric form of the grinding wheel and consequently the surface quality, profile accuracy and grinding forces to be influenced

The results of dressing are influenced by the radial dressing amount a_{ed} and the axial dressing feed rate f_{ad}.

The dressing feed rate is closely linked to the diamond grit size, an important factor for the dressing result.

The active dressing contact width b_d and the associated overlap factor U_d, influence the roughness R_{ts} of the grinding wheel.

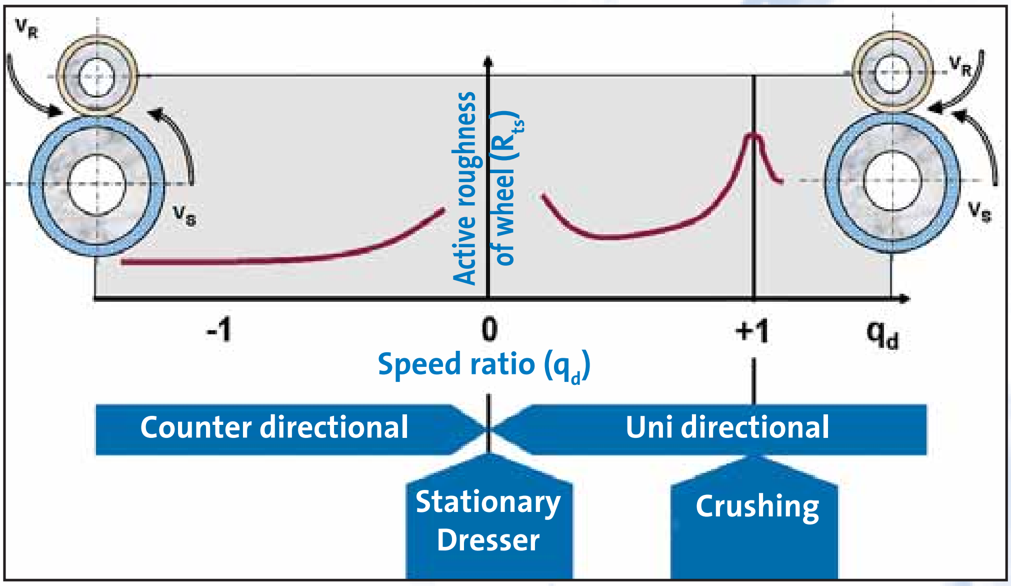
The dressing results from a rotary CNC dresser are additionally influenced by the dressing speed ratio q_d and the rotation direction [uni direction (GL) or counter direction (GGL).] Note also the importance of the correct coolant volume and direction and the associated coolant filtration system.

Characteristics of the conditioning process

Control parameters:	Process parameters:	Target parameters:
Specification of grinding wheel	Dressing forces	Grinding wheel profile
Specification of dressing tool	Acoustic emission signals	Runout of the grinding wheel
Conditions of cooling	Power of the grinding and dressing spindles	Active roughness of grinding wheel
Dressing parameters: · overlap factor U_d · dressing speed ratio q_d · wheel peripheral speed v_s · infeed		Dressing wear ratio
		Component quality

Dressing speed ratio (q_d),
Dressing by counter direction (GGL) and uni direction (GL)

The dressing speed ratio (q_d) between the grinding wheel and rotary dresser has a high influence on the topography of the grinding wheel and consequently the dressing and grinding result.



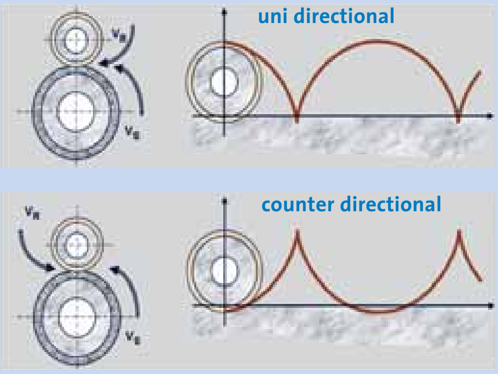
Speed ratio (q_d):

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

Vitrified CBN grinding wheels should always be dressed using uni directional dressing.

The different dressing forces are explained by the different paths (cycloids) of the grinding wheel relative to the rotary CNC dresser:

Speed ratio for dressing



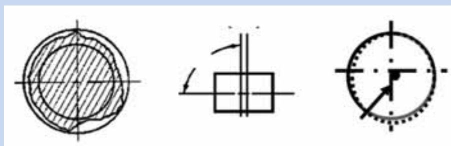
$$q_d = \frac{v_r}{v_{sd}}$$

Dresser peripheral speed	v_r
Wheel peripheral speed for dressing	v_{sd}
Speed ratio for dressing	q_d

> 0:	uni directional	= 0:	stationary dresser
= 1:	crushing	< 0:	counter directional

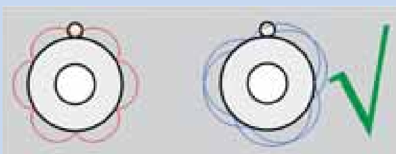
If possible, dress at grinding speed

Radial runout   Axial runout   Imbalance



- Preventing dynamic unbalance
- $v_c = v_{cd}$

Not a whole-numbered ratio $n_s : n_D$



- Rotary dresser illustration on the grinding wheel
- Patterns on the component surface

Dressing at uni directional (GL):

Dressing in uni directional gives a diamond trace with a shorter path (epicycloids), generating a high aggressive roughness R_{ts} on the grinding wheel.

- ☑ Higher influence on the topography of grinding wheel
- ☑ Higher dressing forces
- ☑ Higher stresses on the rotary dresser

Dressing at counter directional (GGL):

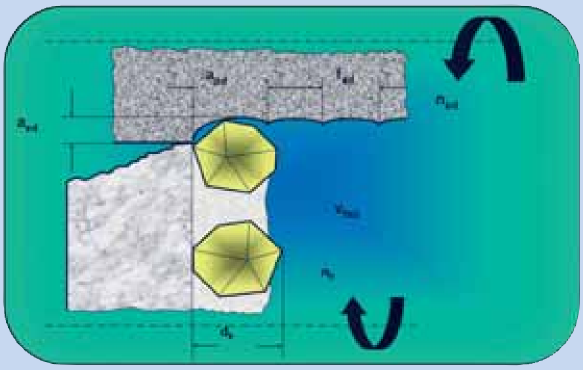
Dressing in counter directional gives a diamond trace with a longer path (hypocycloids) generating a lower roughness R_{ts} on the grinding wheel.

- ☑ Lower influence on the topography of grinding wheel
- ☑ Lower dressing forces
- ☑ Lower stress on the rotary dresser

Overlap factor (U_d)

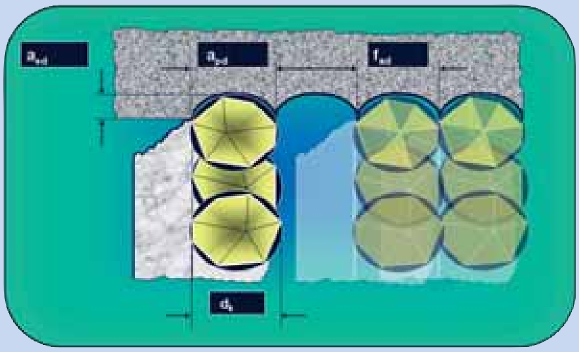
In addition to the geometric accuracy of the grinding wheel, it also plays a prominent role in influencing the active roughness R_{ts} of the grinding wheel. The active roughness defines the surface quality ground on the component. Rotary and stationary dressers are controlled by an axial feed rate f_{ad} over the dressed area of the grinding wheel. Contour-controlled dressing has the additional advantages of allowing different feed rates within one dressed profile. Straight faces within a profile should be dressed with a smaller overlap factor U_d, to eliminate burning.

The overlap U_d is defined as the number of revolutions a grinding wheel moves until the actual contact width a_{pd} (dk) of the dressing tool is shifted exactly once in the direction of the feed.



$U_d = a_{pd} / f_{ad}$
$\approx d_k / [v_{fad} / n_{sd}]$
$\approx d_k / [v_{fad} * d_s * \pi / (v_{cd} * 60.000)]$

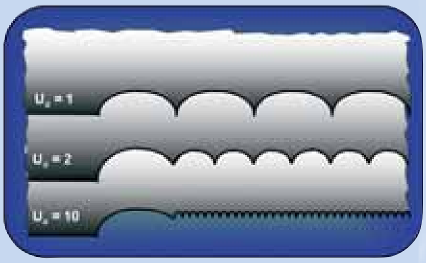
U_d	[-]	: Overlap factor
a_{pd}	[mm]	: Actual contact width
d_k	[mm]	: Average grit size of dressing tool
d_s	[mm]	: Diameter of grinding wheel
f_{ad}	[mm]	: Axial feed rate per revolution of wheel
n_{sd}	[1/min]	: Speed of grinding wheel for dressing
v_{cd}	[m/s]	: Wheel peripheral speed for dressing
v_{fad}	[mm/min]	: Axial feed rate for dressing



$U_d = a_{pd} / f_{ad}$

Small U_d – rough grinding wheel
Large U_d – smooth grinding wheel

a_{ed}: Infeed amount for dressing
a_{pd}: Actual contact width of dressing tool
f_{ad} : Axial feed rate per revolution of wheel
d_k : Average grit size in dressing tool



Infeed amount for dressing a_{ed}
Active width b_d

$$b_d = \sqrt{8 r_p a_{ed}}$$

Axial feed rate per revolution of the wheel f_{ad}

$$a_{pd} = \frac{1}{2}(b_d + f_{ad})$$

Actual contact width of dressing tool a_{pd}

Overlap factor U_d

$$U_d = \frac{a_{pd}}{f_{ad}}$$

Principles:

- ☑ Grit size of the dressing tool should 2-3 times the grit size of the grinding wheel
- ☑ Overlap factor U_d:

Roughing	=	2 - 4
Semi-finishing	=	4 - 8
Finishing	=	8 - 20

Dressing infeed (a_{ed})

Is defined as the infeed per revolution of the wheel in the direction of the grinding wheel.

The total dressed amount $a_{ed\ total}$ is for the complete truing cycle which includes both roughing and finishing:

Dressing infeed for corundum grinding wheels:

- ☑ **Grinding wheels with corundum:**
  Total dressing amount $_{aed\ total}$: 20 µm - 40 µm, according to the grit size of grinding wheel

- ☑ **Grinding wheels with special corundum:**
  Total dressing amount $_{aed\ total}$: 10 µm - 20 µm, according to the grit size of grinding wheel

Dressing infeed vitrified CBN grinding wheels:

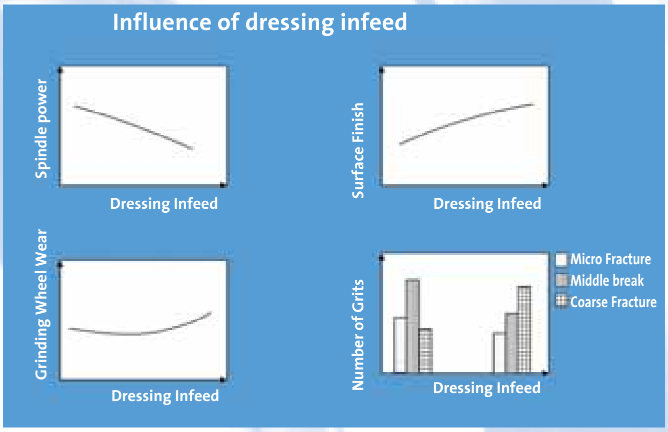
- ☑ **The maximum dressing amount $a_{ed\ total}$ per dressing cycle is 10% of the average grit diameter of the grinding wheel**

- ☑ **Dressing amount per dressing feed rate a_{ed}: 1 µm – 3 µm**

Example:
A wheel containing B126 grit has an average grit diameter of 126µm, therefore the infeed $a_{ed\ total}$ = 126 µm

General details:

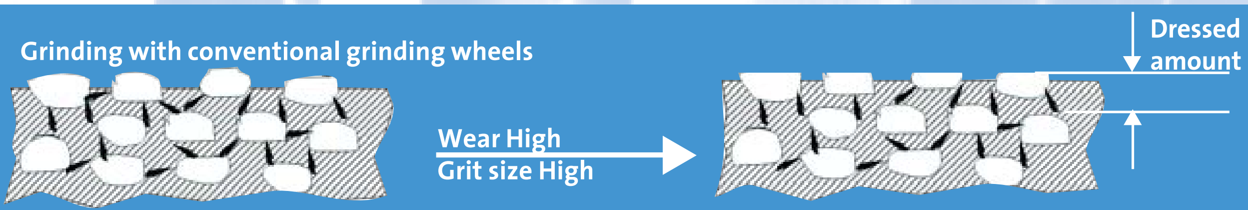
- ☑ **Never dress without infeed a_{ed}**
- ☑ **To improve cost effectiveness it is advisable to have an acoustic dressing sensor**
- ☑ **Note the importance of the correct coolant volume and direction and the associated coolant filtration system.**



General:
As dressing infeed increases, the active surface roughness of the grinding wheel increases.

There is a difference in the dressing infeed amount between conventional and vitrified CBN grinding wheels:

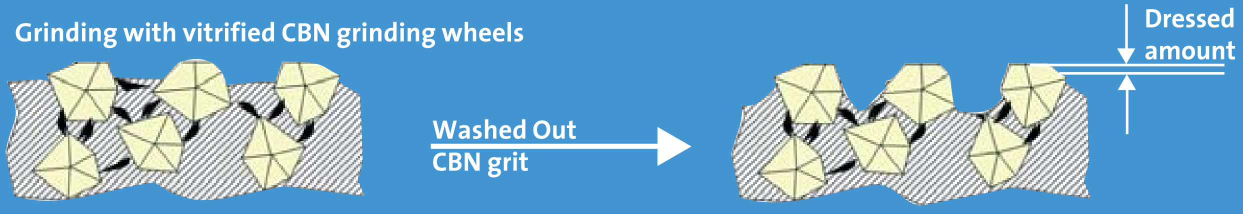
Grinding with conventional grinding wheels



Dressed topography
Grit protrusion high
Active surface roughness high
Grinding forces low

Worn topography
Grit protrusion low
Active surface roughness low
Grinding forces high

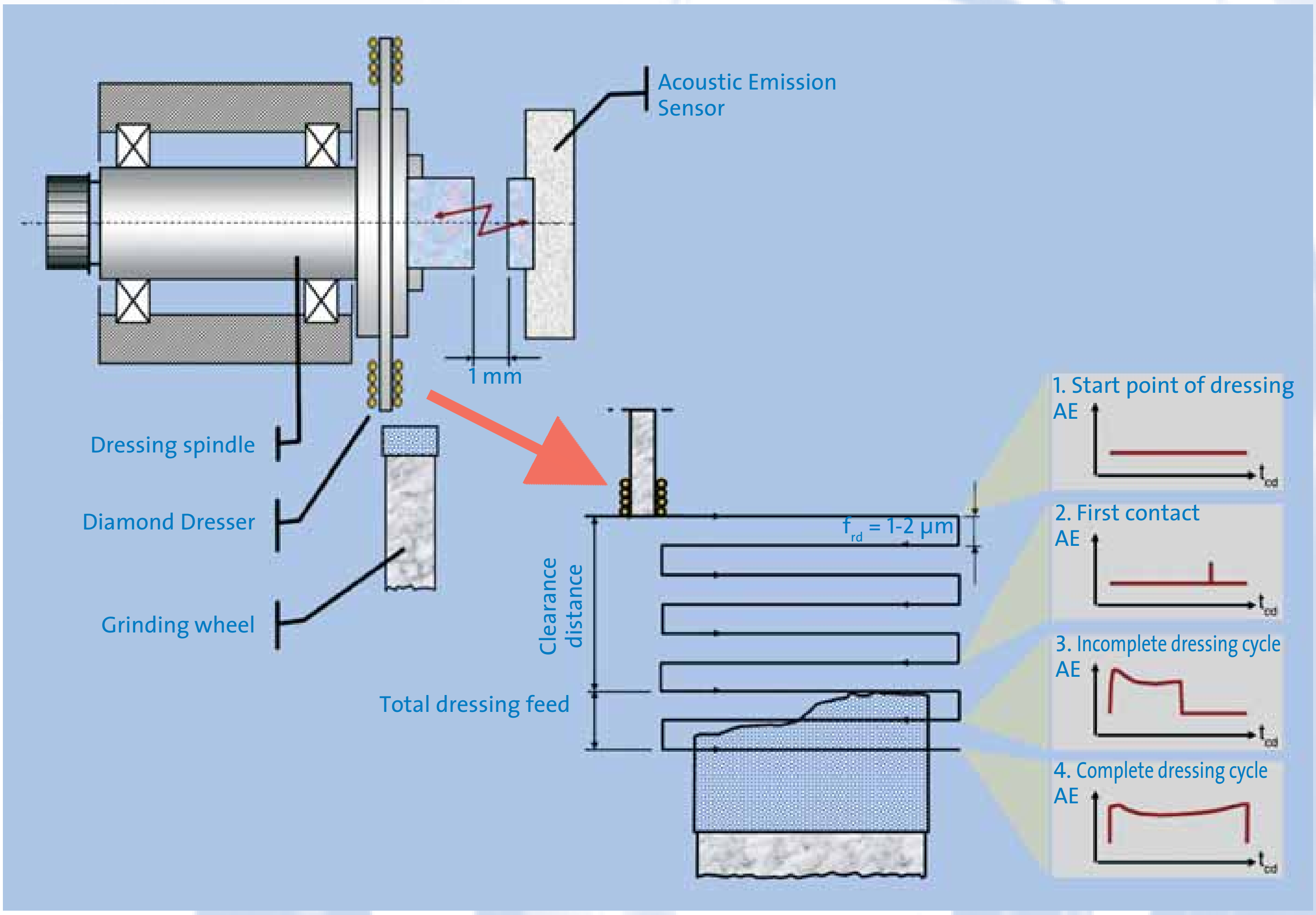
Grinding with vitrified CBN grinding wheels



Dressed topography
Grit protrusion low
Active surface roughness low
Grinding forces high

Worn topography
Grit protrusion high
Surface roughness high
Grinding forces low

Acoustic Emission Systems

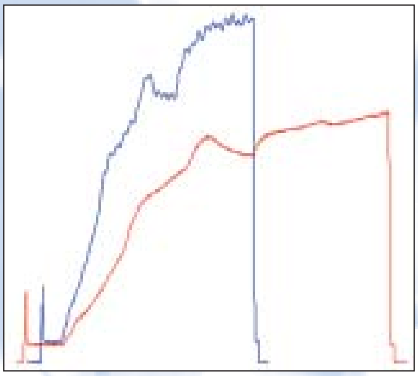


When using diamond form dressers for dressing vitrified CBN or vitrified diamond wheels, a high precision dressing spindle is recommended.

The Acoustic emission device is positioned in the dresser / grinding wheel zone.
The Sensor monitors and controls the complete dressing cycle.

The non-contact measuring and monitoring of the Acoustic Emission Signal ensures a low wheel wear and obtains the correct grit protrusion.

Minimal dressing amounts give optimised tool costs. This, combined with a continuous regulated dressing and grinding process, ensures a high process stability.



Advantages of an Acoustic Emission Device:

- ☑ Visualisation of a grinding process
- ☑ Optimisation of a grinding process
- ☑ Identification of “non productive” process time
- ☑ Process time reduction
- ☑ Increased tool life
- ☑ ‘Weak-point’ analysis

Process Analyser

It is important for every custumer to understand and analyse his production processes.
By doing this it is then possible to develop the optimal grinding process.
By using our FIS and MDress equipment we are able to identify potential improvements in your grinding process.
Conventional grinding wheels with white corundum or special corundum, as well as CBN or diamond grinding wheels, have to be dressed to achieve the tolerance limits for surface finish and profile accuracy.

FIS (Field Instrumentation System)

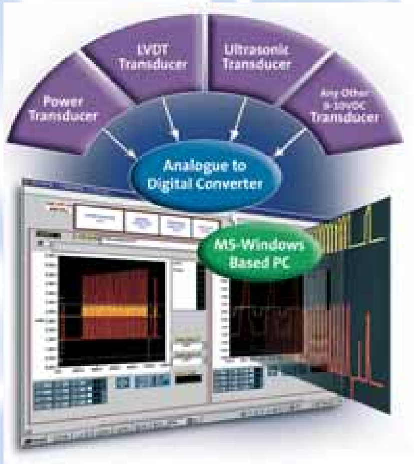
The Field Instrumentation System (FIS) from Saint-Gobain is a portable system for monitoring and measuring grinding processes. The FIS collects the critical data which contributes to the optimisation the grinding process. FIS can be used successfully in all dressing and grinding processes to reduce cycle time and wheel wear. Other applications are in machine and process studies as well as investigation and comparison exercises for benchmarking.

Instrumentation for process monitoring

- ☑ Easily transportable
- ☑ Modular design
- ☑ Connection to PC (laptop)

Measuring modules

- ☑ Spindle power
- ☑ Feed length and speed
- ☑ Acoustic Emission
- ☑ Up to 8 channels available



MDress – machine tuning for better grinding processes

Dressing of conventional and vitrified diamond and CBN wheels is now possible on production machines which are not equipped with dressing spindles and Acoustic Emission Systems.

With the mobile dressing unit “MDress” from Saint Gobain Diamantwerkzeuge, almost any conventional grinding machine can be can be re-tooled with a rotary dresser.
“MDress” is used at the customer, in order to be able to advise on a more efficient method of dressing and the optimisation of the dressing parameters.

The dressing spindle is optimised in consideration of concentricity, dynamic rigidity, spindle power and AE. The main features of the precision dressing spindle are very low noise levels, excellent concentricity and running. The Acoustic Sensor is integrated with the dressing spindle.

“MDress” consists of:

- ☑ Acoustic Emission System M 5000, Fa. Dittel, Landsberg
- ☑ Dressing spindle AS 72 x 225 F/015, Fa. Steinmetz, Karlstein
- ☑ DDS- form roller Ø 120 mm, Saint-Gobain Diamantwerkzeuge, Norderstedt

Services required are:
1) An air pressure line (1 bar) for positive pressure. (to keep out contaminants)
2) 230 volt supply

NOTES

Checklist for contour-controlled dressing tools:

Customer: ______________________________

Customer number.: ______________________________

Machine:

- **machine type:** ______________
- **maximum outer diameter of the roller dresser (mm):** ______________
- **present dressing tool:** ______________

Dressing device:

- **diameter (mm):** ______________
- **length dimension for mounting (mm):** ______________

Workpiece:

- **workpiece drawing:** ______________
- **surface finish required:** ______________
- **stock to be removed (mm / Ø):** ______________

Grinding wheel:

- **specification:** ______________
- **dimensions:** ______________

Application parameters:

- **profile or straight grinding:** ______________
- **Cutting speed (m/s)**
  or Numbers of revolutions (RPM/min^{-1}): ______________
- **Dressing roller speed (m/s):**
  or Number of revolutions (RPM/min^{-1}): ______________
- **Uni-directional (GL) / counter directional (GGL)** ______________
- **Radial dressing infeed each pass (a_{ed}):** ______________
- **Axial infeed speed (f_{ad}):** ______________

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