Diamond Dressing System

for CNC-controlled dressing of vitrified bonded diamond grinding wheels (V+) and other types
Examples of Profiles

With this new dressing system you can create a broad range of different profiles in a single working step.

The Diamond Dressing System allows V+ grinding wheels to be used cost-effectively for a wide variety of different applications.

Considerably better degrees of roughness and cutting edge chippings can be achieved with CNC-dressed V+ grinding wheels. Various application examples are given on the following pages.

1. Major cutting edge of carbide drill processed with K-plus (conventional dressing), showing thermal subsurface damage.

2. Major cutting edge of carbide drill processed with new DDS method, no thermal subsurface damage.

3. Minor cutting edge of carbide drill processed with K-plus, with chipping along cutting edge.

4. Minor cutting edge of carbide drill processed with new DDS method, improved cutting edge quality.
### Profile dressing: Rough grinding

**Machine parameters**
- Machine: Cylindrical grinder
- Cooling lubricant: Emulsion
- Workpiece: Carbide K10

**Grinding parameters**
- Grinding wheel: 1VG 3A1-500-5-4.5
- Cutting speed: \( v_c = 75 \text{ m/s} \)
- Axial feed rate: \( v_{fa} = 40 \text{ mm/min} \)
- Depth of cut: \( a_e = 0.2 \text{ mm} \)

**Dressing parameters**
- Dressing tool: WINTER DS profile roller
- Dressing amount: \( a_{ed} = 4 \times 2 \mu \text{m} \)
- Speed ratio: \( q_d = 0.7 \text{ Counter rotation} \)
- Overlap factor: \( U_d = 4 \)

**Results**
- Surface quality:
  - \( R_z = 0.17 \mu \text{m} \) at \( v_{fa} = 5 \text{ mm/min} \)
  - \( R_z = 0.74 \mu \text{m} \) at \( v_{fa} = 40 \text{ mm/min} \)

### Profile dressing: Shaped grinding

**Machine parameters**
- Machine: Tool grinder
- Cooling lubricant: Sintogrind oil (Oel-Held)
- Workpiece: Bioceramic material

**Grinding parameters**
- Grinding wheel: 99VG 700-15 / D64
- Cutting speed: \( v_c = 60 \text{ m/s} \)
- Depth of cut: \( a_e = 0.2 \text{ mm} \)
- Overmeasure: \( a_{e,\text{tot}} = 1 \text{ mm} \)

**Dressing parameters**
- Dressing tool: WINTER DS profile roller
- Dressing amount: \( a_{ed} = 2 \mu \text{m} \)
- Speed ratio: \( q_d = 0.3 \)
- Overlap factor: \( U_d = 3.9 \)

**Results**
- Surface quality:
  - \( R_z = \leq 3 \mu \text{m} \)

### Profile dressing: Centerless grinding

**Machine parameters**
- Machine: Cylindrical grinder
- Cooling lubricant: Emulsion
- Workpiece: \( \text{Si}_3\text{N}_4 \)

**Grinding parameters**
- Grinding wheel: 1VG 3A1-400-15
- Cutting speed: \( v_c = 120 \text{ m/s} \)
- Overmeasure: \( a_{e,\text{tot}} = 0.7 \text{ mm} \)

**Dressing parameters**
- Dressing tool: WINTER DS profile roller
- Dressing amount: \( a_{ed} = 3 \mu \text{m} \)
- Cutting speed: \( v_{cd} = 40 \text{ m/s} \)
- Speed ratio: \( q_d = 0.4 \)

**Results**
- Roughness:
  - \( R_z = 2.02 \mu \text{m} \)
- Diameter tolerance:
  - \( \pm 2 \mu \text{m} \)
- No measurable wear after 400 pieces
### Profile dressing: Drill flute grinding

**Machine parameters**
- Machine: WALTER Helitronic
- Power: 
- Cooling lubricant: Sintogrind oil (Oel-Held)
- Workpiece: Carbide K10

**Grinding parameters**
- Grinding wheel: 99VG 700-125-10
  - D76 V+ 3438 J1SC C100
- Cutting speed: $v_c = 18-44$ m/s
- Feed rate: $v_f = \text{up to 200 mm/min}$
- Depth of cut: $a_e = 3.5$ mm
- Material removal rate: $Q'_{\text{max}} = 8.75$ mm$^3/(\text{mm} \cdot \text{s})$

**Dressing parameters**
- Dressing tool: WINTER DS profile roller
- Dressing amount: $a_{ed} = 3$ µm
- Cutting speed: $v_{cd} = 18$ m/s
- Speed ratio: $q_d = 0.7$
- Overlap factor: $U_d = 3$

**Result**
- Considerably better roughness and cutting edge quality compared to K-plus

### Profile dressing: Cylindrical surface plunge grinding

**Machine parameters**
- Machine: Cylindrical grinder
  - STUDEr S32 CNC
- Cooling lubricant: Emulsion
- Workpiece: Carbide K10

**Grinding parameters**
- Grinding wheel: 99VG 700-400-5
  - D91 V+ 2046 J1SC C125 E
- Cutting speed: $v_c = 40$ m/s
- Feed rate: $v_f = 4$ mm/min
- Depth of cut: $a_e_{\text{tot}} = 3.5$ mm (radial)

**Dressing parameters**
- Dressing tool: WINTER DS profile roller
- Dressing amount: $a_{ed} = 3$ µm
- Speed ratio: $q_d = 0.7$
- Overlap factor: $U_d = 7$

**Result**
- Good profile stability, excellent shape precision and low roughness

### Profile dressing: Flat profile grinding

**Machine parameters**
- Machine: Flat profile grinder
  - BLOHM MT 408
- Cooling lubricant: Rotorol (Oel-Held)
- Workpiece: SiC

**Grinding parameters**
- Grinding wheel: 99VG 700-400-15
  - D46 V+ 2046 J1SC C100
- Cutting speed: $v_c = 45$ m/s
- Depth of cut: $a_e = 0.3$ mm

**Dressing parameters**
- Dressing tool: WINTER DS profile roller
- Cutting speed: $v_{cd} = 35$ m/s
- Dressing amount: $a_{ed} = 2$ µm
- Speed ratio: $q_d = 0.4$
- Overlap factor: $U_d = 2$

**Result**
- Good profile stability, excellent accuracy of shape and low roughness
Diamond Dressing System „DDS“

CNC-controlled dressing of vitrified bonded diamond grinding wheels with DS profile roller

Features of Diamond Dressing System „DDS“

The new development from SAINT-GOBAIN Abrasives allows newly developed vitrified bonded diamond grinding wheels to be dressed under CNC control on production grinders.

Despite the comparatively hard active partners, the physical correlations are the same as those for dressing softer types of hard material such as Al₂O₃, SiC, SG, TG and CBN.

The working results of dressing these vitrified bonded diamond grinding wheels with a diamond profile roller can also be influenced by

- contact ratio and
- speed ratio

as usual.

Existing experience and know-how is 100%-applicable!

Advantages of dressing diamond grinding wheels under CNC control

- Precise CNC dressing on the production machine
  - greater profile precision
  - very simple process automation
  - dressing at production speeds

- Grinding wheel does not need to be removed
  - reduced nonproductive times
  - highly precise axial and radial running of grinding wheel
  - improved workpiece quality

- Reproducibility of grinding wheel topography, improved process control

- Equipment same as that used for CBN dressing

SAINT-GOBAIN Abrasives offers a range of comprehensive dressing solutions.

Just ask us!

Special features of the new DS dressing profile rollers

The DS diamond profile roller consists of a single set layer of sintered diamond which is clamped in a two-piece steel holder.

This new development ensures a constant layer width with consistently high active diamond component throughout its entire service life.

The design permits the highest possible degree of flexibility when dressing different profiles in a single working cycle.

The only requirement is a grinding machine with CNC dressing spindle and an Acoustic Emission contact sensor (e.g. Dittel).
The new Diamond Dressing System from SAINT-GOBAIN Abrasives for dressing of:

vitrified bonded diamond and CBN grinding wheels
SiC grinding wheels and corundum grinding wheels of all types.

Just ask us!

SAINT-GOBAIN Abrasives has the right solution!
Available standard versions of WINTER DS profile roller
September 2003

Technical details

<table>
<thead>
<tr>
<th>Standard version</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer diameter</td>
<td>120 mm</td>
<td>150 mm</td>
</tr>
<tr>
<td>Layer (useful width)</td>
<td>approx. 1 mm</td>
<td>approx. 1 mm</td>
</tr>
<tr>
<td>Holder width</td>
<td>15 mm</td>
<td>15 mm</td>
</tr>
<tr>
<td>Bore</td>
<td>40 mm H3</td>
<td>52 mm H3</td>
</tr>
</tbody>
</table>

Special profiles are possible on request.
The illustration below will assist you in making the appropriate selection.

Possible version variations (required ordering information):
- Outer diameter: 90 mm to 160 mm
- Layer width (useful width): 0.5 mm–1.3 mm
- Holder width: ≥ 15 mm
- Bore: Specified by customer
- Assembly holes: Depends on outer diameter and assembly holes

All Winter DS profile rollers are balanced according to Q1 at n = 3000 rpm