STUDER WireDress®

The latest generation of machine-integrated dressing technology for metal-bonded grinding wheels

Facts

Dressing, profiling and sharpening of diamond or CBN grinding wheels with a sintered metal bond using wire electrical discharge machining in the grinding machine.
WireDress® components

Grinding wheels with ultra-hard diamond or CBN cutting materials are used for grinding ceramics, tungsten carbide and hardened steel. In previous grinding processes such grinding wheels often had a resin or ceramic bond. One way of increasing precision and cost effectiveness in these grinding applications is to use grinding wheels with a sintered metal bond. However, their use has previously only been of limited value, as metal bonds can only be dressed to a very limited extent and only have an average cutting ability.

With the new STUDER-WireDress® dressing technology metal-bonded grinding wheels can now be easily dressed, i.e. profiled and sharpened, with the highest precision in the grinding machine, at full working speed. This also gives the grinding wheel a high cutting ability with a high proportion of grain space.

WireDress® is available as a dresser option on the STUDER cylindrical grinding machines S22 and S41.

Performance characteristics of the second WireDress® generation

- At least +30% grinding power
- Longer dressing intervals
- Highest grit free-stand > max. cutting ability
- Dressing in the grinding machine > higher OEE
- Dresser swivels for left/right wheel shoulder ±8° automatically
- No wear on the dressing tool
- 20% faster metal bond dressing than first WireDress® generation
- Touch dressing can be used
- Highest profile precision achievable in μm-range
- Simple operation
- Fully integrated into StuderWIN machine control
- Quick wire coil change without reacquisition
- No wear on the dressing tool
- Full distance between centers can be used
- Regular grinding oil can be used
- -75% wheel wear with metal bond
- -70% workpiece deflection
- Dressing at 120 m/s wheel peripheral speed possible
- Regular grinding oil can be used
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The removal of the bond material is based on the fundamental principles of wire electrical discharge machining with a few specific modifications. In principle a dielectric medium, i.e. a grinding oil (not water-based emulsions) is required. There is no mechanical contact between the wire (the dressing tool), the grain and the bond, and no changes in the abrasive grain.

With metal-bonded grinding wheels dressed in this way it is possible to increase productivity by at least 30% in individual cases, in comparison to grinding with resin or ceramic bonds. In addition, this precise dressing process in conjunction with the performance parameters of the metal bond, such as e.g. the high dimensional stability, enables workpieces with very challenging geometries to be reproducibly produced, which was previously not possible or was not possible cost effectively.

### Basic principle and characteristics of the bond systems

<table>
<thead>
<tr>
<th>BOND</th>
<th>CUTTING ABILITY</th>
<th>DIMENSIONAL STABILITY</th>
<th>TEMPERATURE RESISTANCE</th>
<th>THERMAL CONDUCTIVITY</th>
<th>DRESSABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIN</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>CERAMIC</td>
<td>+</td>
<td>+</td>
<td></td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>METAL-VITRIFIED</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>METAL</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>METAL WITH WIREDRESS®</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

+ = Very good  ○ = Good  - = Unsatisfactory

Swivelling chart, with example wheel profile

### Application examples with different workpieces and materials

- **D64 wheel with small grooves**
- **REM image of D126 grit**
- **D25 wheel with complex profile**
- **Photograph of high degree of grit free-stand**

- **Carbide, machine tools**
- **SiN ceramic**
- **Ceramic, medical component**
- **Hard steel, ball screw**
Example: Selected wheel profiles

<table>
<thead>
<tr>
<th>Radius convex</th>
<th>Prof. for rolling elements</th>
<th>Prof. for seat with 2 shoulders</th>
<th>Prof. for machine screw tap</th>
<th>Prof. for fine thread</th>
<th>3-tooth profile for ball screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius concave internal</td>
<td>Radius concave external</td>
<td>Profile for Peel grinding</td>
<td>Profile for creep feed grinding with small radii</td>
<td>30° wheel with shoulder</td>
<td>Wheel with cutout</td>
</tr>
</tbody>
</table>

The STUDER-WireDress® system is configured on the table interface as a customer-specific option. It also includes a wire cutter integrated into the machine room and an additional external electric cabinet.

**S22**

**S41**

Arrangement of the WireDress® system in the machine room

<table>
<thead>
<tr>
<th>Grinding wheels</th>
<th>Prerequisite for WireDress®: Steel base body with electrically conductive, directly sintered abrasive coating OD dia. 400 to 500 mm / ID on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usable distance between centers</td>
<td>up to 720 mm</td>
</tr>
<tr>
<td>Wheel head</td>
<td>all standard wheel head variants, internal grinding wheels on request</td>
</tr>
<tr>
<td>Dressing wire</td>
<td>special high-performance EDM wire - STUDER-DressWire W64</td>
</tr>
<tr>
<td>Installation plan</td>
<td>For WireDress® an additional electric cabinet is required next to the machine, mounting area approx. W 1 m × D 0.6 m × H 1.2 m</td>
</tr>
</tbody>
</table>

Fritz Studer AG
3602 Thun
Switzerland
Tel. +41 33 439 11 11
Fax +41 33 439 11 12
info@studer.com
www.studer.com