STUDER WireDress®

THE LATEST GENERATION OF MACHINE-INTEGRATED
DRESSING TECHNOLOGY FOR METAL-BONDED GRINDING WHEELS

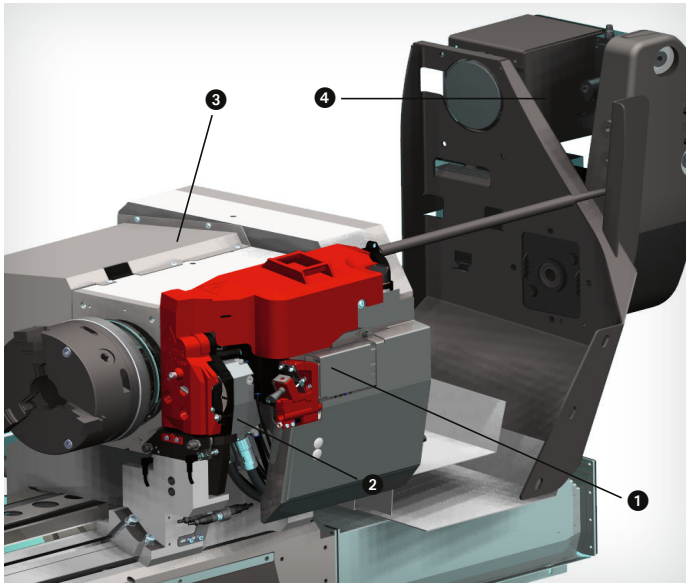
Facts Dressing, profiling and sharpening of diamond or CBN grinding wheels with a sintered metal bond using wire electrical discharge machining in the grinding machine.

STUDER

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.



1. WireDress® dressing unit in T-slot table interface
2. Wire guide at 2 adjustable positions automatically swiveling to max. ±8 deg
3. Workhead
4. Wire magazine and wire cutter module, fixed to machine table

PERFORMANCE CHARACTERISTICS OF THE SECOND WIREDRESS® GENERATION

WireDress® performance

Higher productivity
- At least +30% grinding power with metal bond compare to ceramic bond
- Highest grit free-stand > max. cutting ability
- Dressing in the grinding machine > higher OEE
- Low dressing tool costs
- Longer dressing intervals

Simple operation
- Full distance between centers can be used — No restriction due to dressing device
- Fully integrated into StuderWIN machine control
- Regular grinding oil can be used
- Touch dressing can be used
- Quick wire coil change without reacquisition

High precision
- No wear on the dressing tool
- Dresser swivels for left/right wheel shoulder ±8° automatically
- 20% faster metal bond dressing than first WireDress® generation
- Highest profile precision achievable in µm-range
- -75% wheel wear with metal bond
- -70% workpiece deflection
- $R_{internal}$ 0.2 mm $R_{external}$ 0.05 achievable on the workpiece
- Dressing at 120 m/s wheel peripheral speed possible

BASIC PRINCIPLE AND CHARACTERISTICS OF THE BOND SYSTEMS

BOND	CUTTING ABILITY	DIMENSIONAL STABILTY	TEMPERATURE RESISTANCE	THERMAL CON-DUCTIVITY	DRESSABILITY
RESIN	+	o	o	o	+
CERAMIC	+	o	+	–	+
METAL-VITRIFIED	+	o	+	–	+
METAL PREVIOUSLY	–	+	+	+	–
METALL WITH WIREDRESS®	+	+	+	+	+

+ Very good o Good – Unsatisfactory

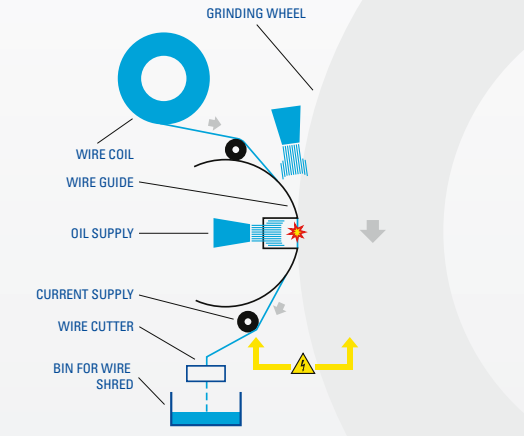


Diagram of wire electrical discharge dressing with WireDress®

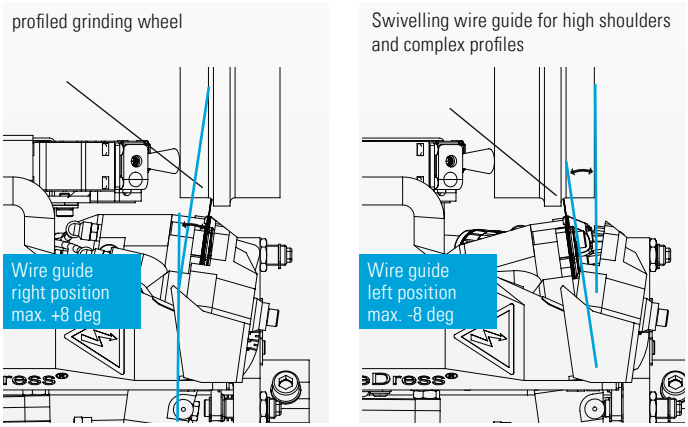
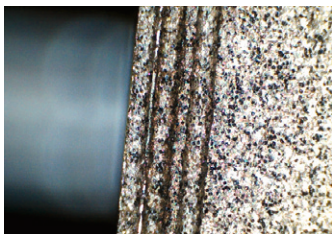
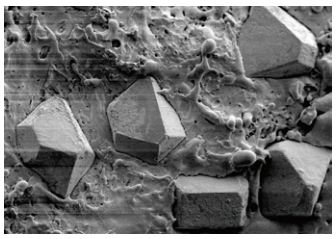


Diagram of swivelling wire guide

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.

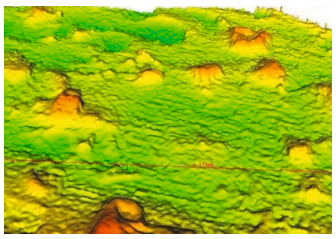


D64 wheel with small grooves



REM image of D126 grit

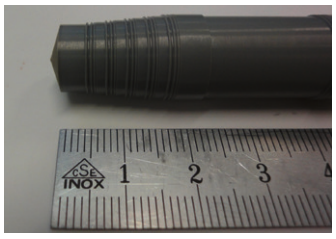
D25 wheel with complex profile



Photograph of high degree of grit free-stand

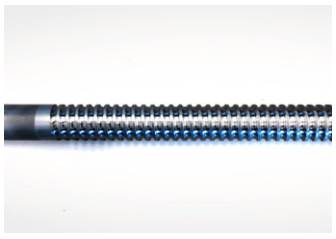
APPLICATION EXAMPLES WITH DIFFERENT WORKPIECES AND MATERIALS

Carbide, machine tools



SiN ceramic

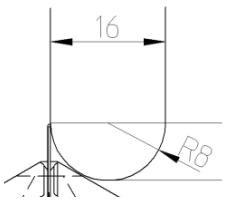
Ceramic, medical component



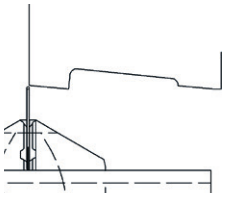
Hard steel, ball screw

EXAMPLE: SELECTED WHEEL PROFILES

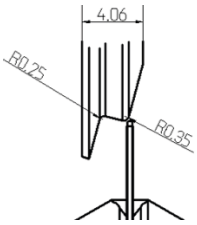
Radius convex



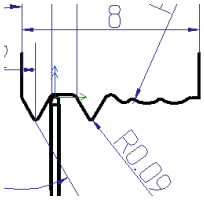
Profiled for rolling elements



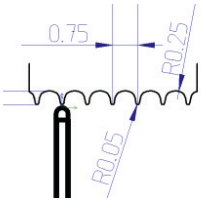
Profiled for seat with 2 shoulders



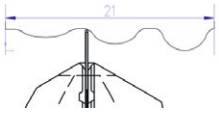
Profile for machine screw tap



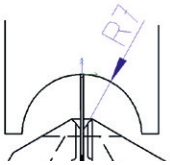
Profile für fine thread



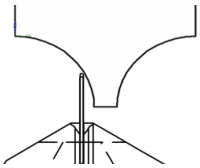
3-tooth profile for ball screw



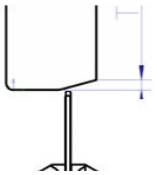
Radius concave internal



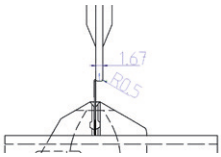
Radius concave external



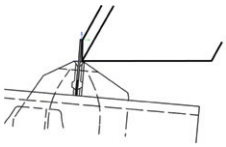
Profie for Peel grinding



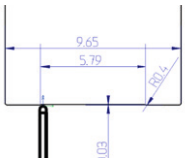
Profile for creep feed grinding with small radii



30° wheel with shoulder

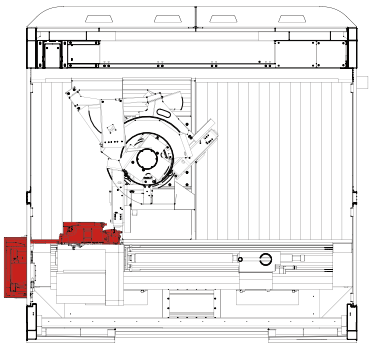
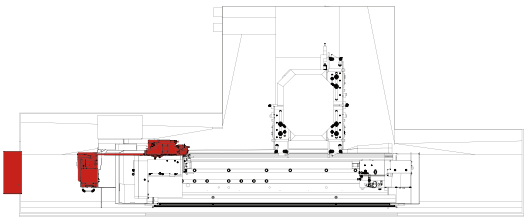


Wheel with cutout



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		
Grinding wheels	Prerequisite for WireDress®: Steel base body with electrically conductive, directly sintered abrasive coating OD dia. 400 to 500 mm / ID on request	
Usable distance between centers	up to 720 mm	up to 1600 mm
Wheel head	all standard wheel head variants, internal grinding wheels on request	
Dressing wire	special high-performance EDM wire – STUDER-DressWire W64	
Installation plan	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	

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