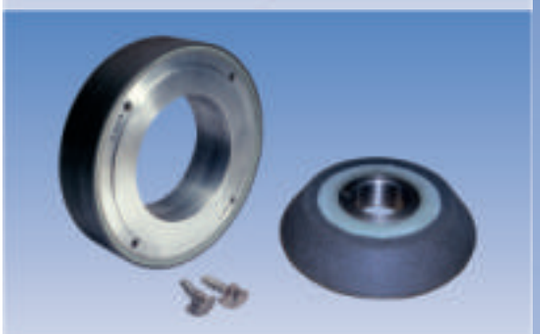
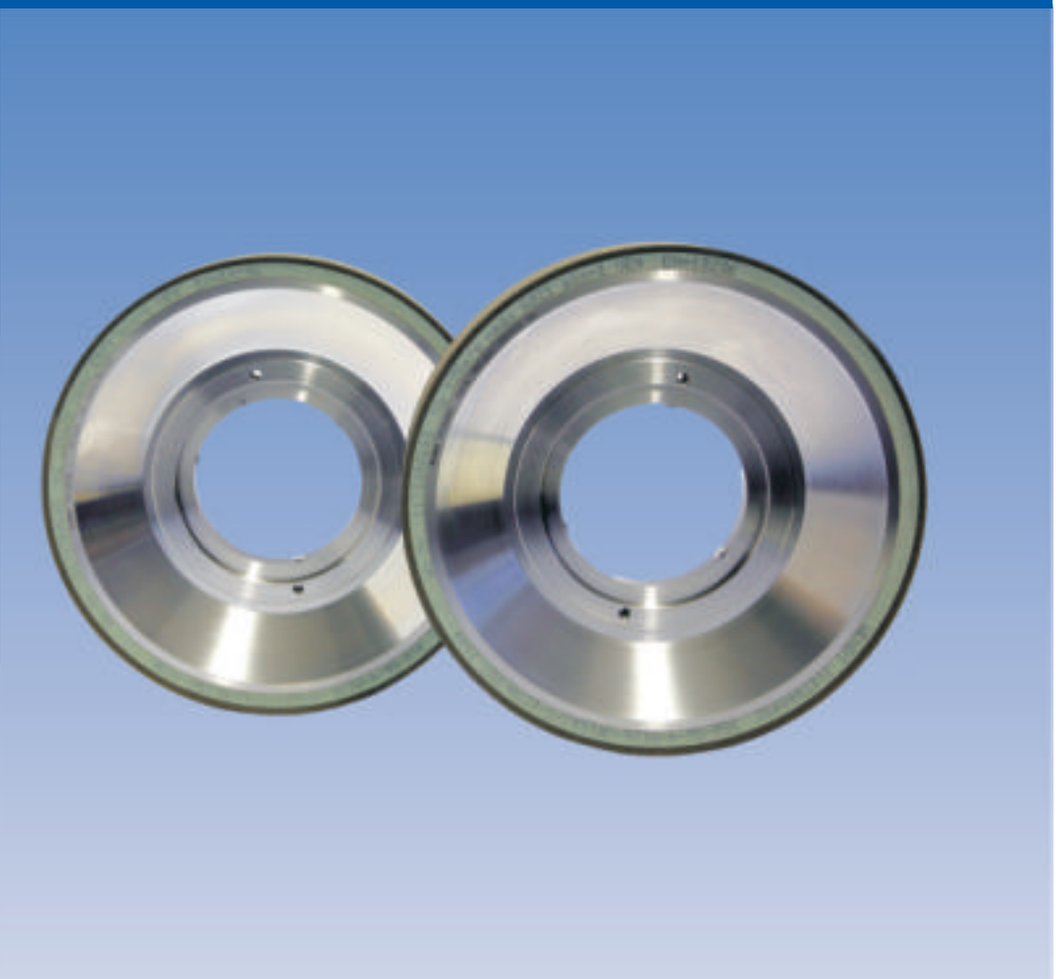
Vitrified CBN
Grinding Wheels





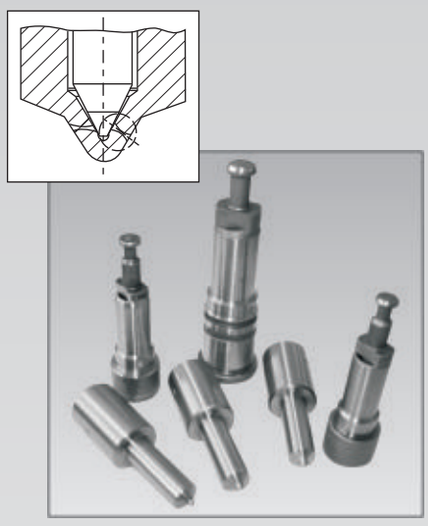
WENDT

Advantages

- Vitrified CBN Wheels can be trued and dressed in one operation without opening of the grit with dressing stick. This also felicitates automated dressing.
- These wheels are manufactured in standard and controlled induced porosity ranging from closed to very open bond structures. Induced porosity structures reduces grinding forces, allow efficient chip removal and superior coolant supply to the grinding zone. This enables the work piece to be free from thermal damage and excessive tensile stress.
- Grinds high alloyed hardened steels economically.

Materials that can be ground

- Hardened steel ranging from 35 to 70 Hrc: in particular austenitic high alloy tools steels which have tendency to form carbides in steel matrix. Steel alloyed with tungsten and /or vanadium often form carbide if hardened around 63 Hrc.
- Can be used to grind soft steel specially ID grinding of deep bores.
- Case hardened steel, cold working steel, hot working steel and high speed steel.



When and where

- Where conventional grinding Metal/Resin/ Galvanic bonded CBN wheels cannot be applied economically.
- When grinding wheels are to be re-profiled on the machine.
- Where long wheel life and simple wheel profiling are required for economical grinding operation.

Wendt Strengths

- Manufacturing range from 2 mm to 750 mm Diameter.
- Continuous rim construction of the wheel.
- Preformed and near-net shape for optimal CBN usage.
- Wheel bodies with steel, ceramic, aluminum-steel fitting.
- Bores designed for all mounting systems.
- Wheel certification for balancing and speed testing.

Support and Service

- CBN wheel diamond dresser designs are engineered to optimize grinding process.
- Vitrified bond selections are specific for each application.
- On site grinding for process optimization.
- Wheel repairs, re-coat of OD wheels, re-mount of ID wheels.

Wheel speed for applications

- Usage of hydrostatic spindles increases, rigidity reduces vibrations and at the same time gives wheel speeds as high as 160mts/sec.
- Recommended wheel speeds for vitrified CBN applications is 60-120 mts/sec.
- However machines with wheel speed as low as 37mts/sec have shown good G-ratios and cycle times when tooled up with vitrified CBN wheels.

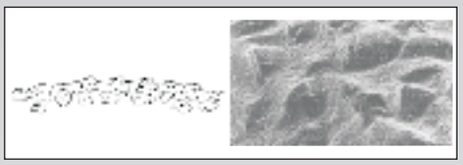
Grinding machine should be

- Completely enclosed.
- Vibration free.

Wheel preparation for Dressing

- Inspect the machine and wheel to ensure safety.
- Mount the wheel by clamping the grinding wheel directly on the machine spindle or on the flange.
- Balance the wheel to eliminate balance errors.
- Conditioning – form change of the abrasive layer surface.
  - Dressing – generation of the geometrical shape.
  - Profiling - generation of the macro-geometry profiling concentric running.
  - Sharpening – generation of the cutting volume structure topography, degree of sharpening.
- Clean the Grinding wheel by removing particles like abrasion, chips.

Profiled wheel



Sharpened wheel

Surface quality

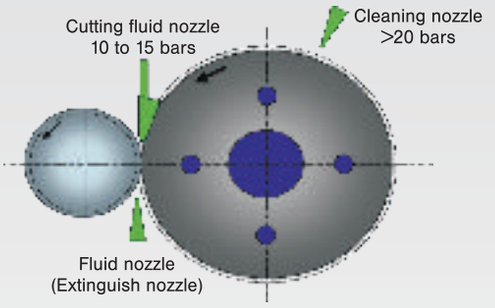
FEPA grit size	US Mesh	Ra μm
M64	230/270	0.2
M91	170/200	0.3
M126	120/140	0.4
M151	100/120	0.5
M181	80/100	0.6

Grinding fluids

Vitrified CBN wheels are meant to be used with grinding fluids. **Neat** grinding oil is the most suitable choice. Shop floor reality, however, dictates the use of other grinding fluids. Soluble oils with a high percentage of mineral oil in the concentrate (40 to 50%) mixed with water (1 part soluble to 20 parts of water) are also well suited in conjunction with CBN synthetic fluids are not recommended.

Positioning of nozzle

If equal velocity fluid delivery has been achieved, the coolant jet will cling to grinding wheel position nozzle as illustrated, then run grinding wheel without in place to see whether coolant jet clings to the wheel.



Vitrified CBN Grinding Wheels

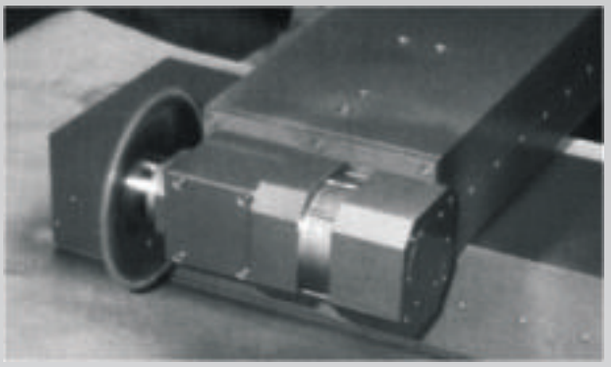
Dressing of Vitrified CBN wheels

A vitrified CBN wheel requires two step (truing and dressing) conditioning process, the **first step** is carried out to form the wheel into ultimate profile required to grind the part. While achieving the desired shape or form, this process usually leaves the working surface of the wheel smooth, with insufficient crystal protrusion or clearance for chip generation and removal. When attempting to grind in this condition, the wheel burns and / or burnishes the work piece and causes little, if any, material removal.

The **second step**, dressing, relives the wheel's working surface by eroding bonding material from around the abrasive grains allowing them to become chip-producing tools.

The result will be a wheel surface, while leaving original profile intact. When done properly, more than 90% of the abrasive grains contained in a bonded CBN wheel will eventually become productive, chip-producing tools. Compare this to conventional, aluminum oxide wheel, where fewer than 30% of the grains produce chips.

The rest are either dressed away or thrown way in the wheel stub.



Parameters for Dressing

To achieve a good surface finish and high removal rates use small depth of dressing cuts.

To increase grinding wheel surface roughness, vary the lateral dressing feed rates. Faster feed rates ensure rougher or more aggressive grinding wheels and vice versa.

- Use an ample flood of grinding fluid for dressing. Diamonds are very hard and heat sensitive. This is particularly important when using single point diamonds.
- Never dress the wheel face without depth of cut as this will close the wheel structure. Use a minimum depth of cut of 2 microns to 5 microns. Without depth of cut in the CBN grit will be blunted and the CBN wheel will lose its cutting ability.

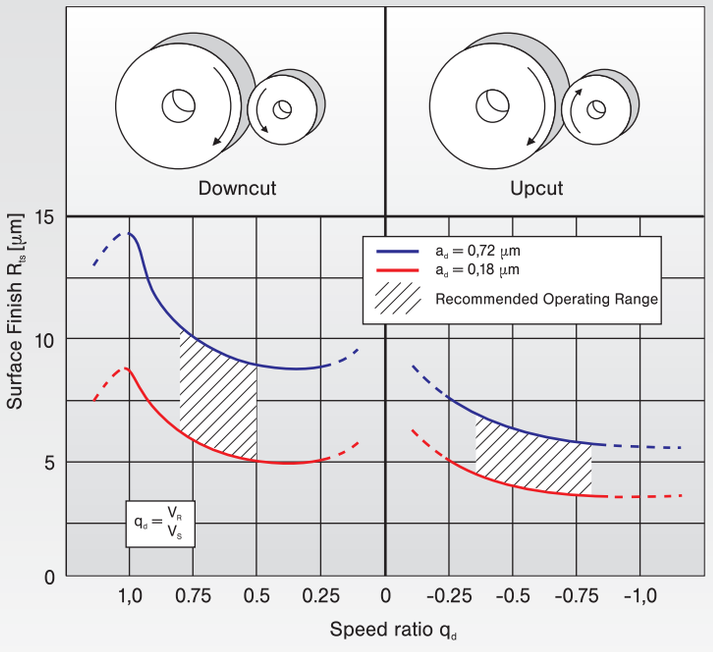
Speed ratios and surface finish

a_d = Depth of Cut

q_d = Speed ratio

V_S = Wheel peripheral speed

V_R = Dressing Roll peripheral speed



Article Code

1. Digit : Grinding wheel type

J = CBN – grinding wheel in vitrified bond

D = DIA – grinding wheel in vitrified bond

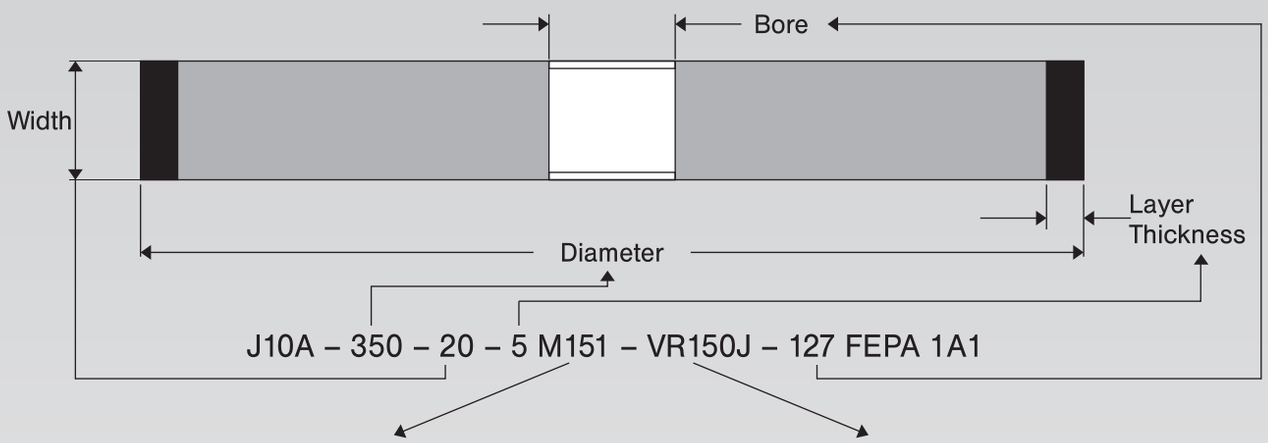
J 1 0 A . X X X . X.X.X – 350 – 20 – 5 –M151 – VR 150J

2 to 4 digit
Wendt – Type
(10A = 1A1)

6… 10 digit = consecutive numbering

5.digit : 0 = new wheel
6 = repair
9 = re-plating

Specification



Grit size (VIT – CBN)

M39 (~ 39 µm)
M 181 (181 µm)

Concentration

Basis: C100 = 4.4 ct/cm^3
VIT – CBN: C 75 – C200

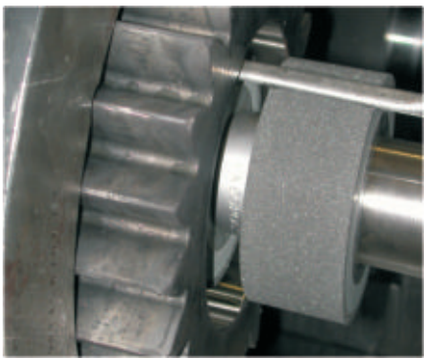
Trouble Shooting

Trouble	Cause	Remedy
Burnings	**Coolant**	**Check coolant supply/Nozzle adjustment**
	Cutting speed	Reduce cutting speed
	Low cutting power	Dressing / change dressing parameters
	Work piece	Increase work piece speed
	Wheel over loading	Reduce Q' W
	Wheel specification	Adjust grinding wheel specification
Chatter – Marks	**Wheel run out**	**Dressing**
	Wheel out of balance	**Balancing**
	Vibrations	Change grinding wheel or work piece rpm to get out of self-oscillation. Take prime – numbers
	Low cutting power	Dressing / charge dressing parameters
	Dressing parameters	Change dressing parameters
Comma –marks	Coolant	Check coolant cleanness/ Improve coolant filtering Clean the grinding wheel guard
Pattern	Dressing	Change dressing parameters
Surface quality	Dressing	Increase dressing in-feed depth or in-feed speed or speed ratio (down cut dressing) to raise the surface roughness
		To reduce the surface roughness – reduce those parameters

Typical Applications

Camshaft

Crankshaft



Gear Bore & Face

Bearing Bore

High Speed End Mill

Injector Pump Shaft

Gear Teeth

Gear Shaft

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