



Precision Diamond/CBN Grinding Wheels



VITRIFIED BOND

# Vit CBN Wheels

## Advantages

Vitrified CBN Wheels can be trued and dressed in one operation without opening of the grit with dressing stick. This also facilitates 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.

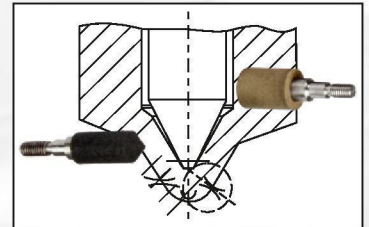
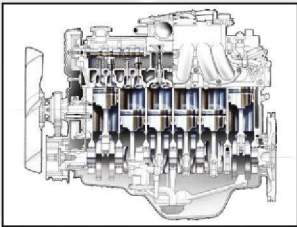
Grinds high alloyed hardened steels economically.

## 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.
- Both continuous rim & sequential type 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 160m/s.

Recommended wheel speeds for vitrified CBN applications is 25-160 m/s.

However machines with wheel speed as low as 30m/s have shown good G-ratios and cycle times when tooled up with vitrified CBN wheels.

## Grinding machine should be

- Rigid in construction.
- Completely enclosed.
- Vibration free.
- Short and rigid slide ways.
- High power hydrostatic spindles.

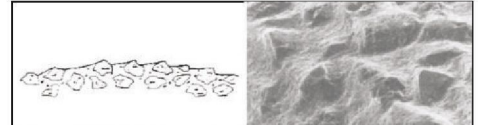
## Wheel preparation for Dressing

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.



Profiled wheel



Sharpened wheel

Balance the wheel to eliminate balance errors.

## Dressing of Vitrified CBN wheels

A Vitrified CBN Wheel requires two step (truing and dressing) conditioning process. 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.

In the second step, dressing, relieves 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, 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.

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

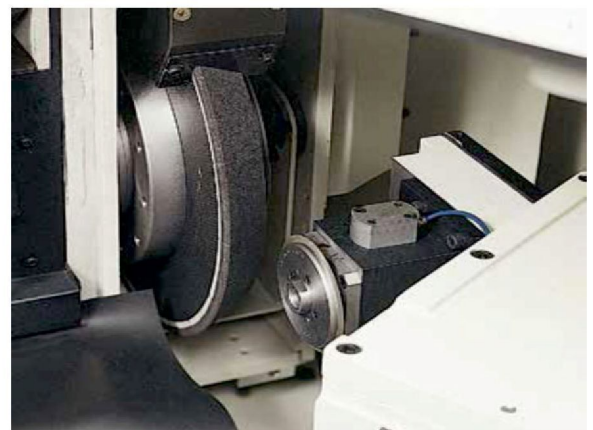
## Parameters for Dressing

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.

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.



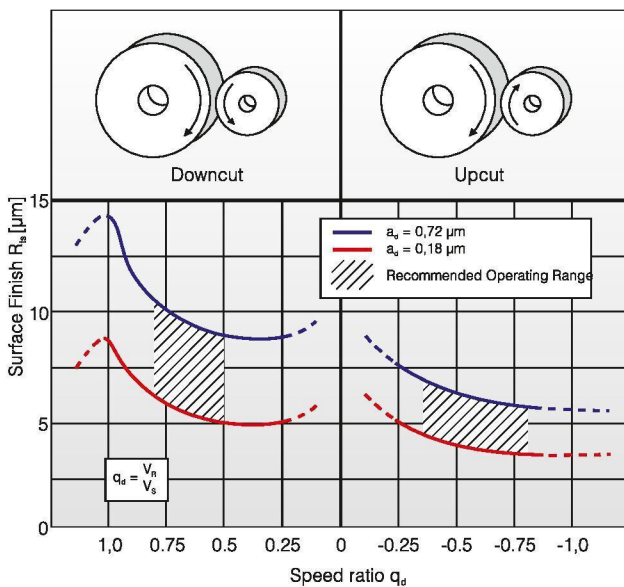
## Surface quality

FEPA grit size	US Mesh	Ra $\mu\text{m}$
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

## Speed ratios and surface finish

$a_d$  = Depth of Cut  $V_s$  = Wheel peripheral speed

$q_d$  = Speed ratio  $V_r$  = Dressing Roll peripheral speed

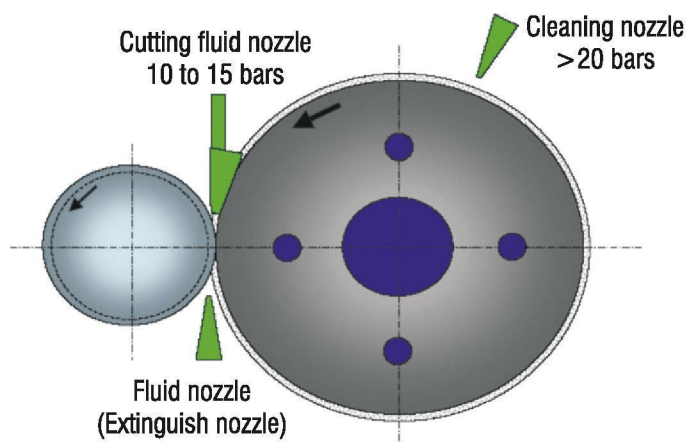


## Grinding fluids

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.



## Vit Diamond Wheels

### Advantages and Characteristics

- Porous & free cutting bond
- High material removal rates
- Cool cutting
- Easy to dress and profile
- 35% reduction in grinding time

### Truing

- Sharpen with  $\text{Al}_2\text{O}_3$  and  $\text{SiC}$  dressing tools
- CNC Profiling with Diamond Form Rolls (SM type recommended)

### Dressing parameters

Speed ratio  $q_d = 0.6 - 0.8$  (downcut)

Infeed per stroke  $a_e = 2 - 4 \mu\text{m}/\text{stroke}$

Feed rate  $V_{fd} = \text{grit size} \times \text{grinding wheel rpm}$

### Applications

- Grinding super of hard materials - PCD & PCB
- Profile grinding of tungsten carbide
- Grinding of ceramics
- Grinding of steel / tungsten carbide composites
- Grinding of glass

### Tool Manufacturer

- Grinding of PCD + PCBN inserts and plunging tools
- Profile grinding of TC tools
- Grinding of PCD guides of reamers
- Flute grinding of milling cutters
- Surface grinding of punches and matrixes
- Internal grinding of TC tools

### Mechanical Engineering

- Grinding of TC coated paper rolls
- Cylindrical grinding of shafts and wear parts
- Cylindrical and internal grinding of ceramic work pieces

### Glass industry

- Profile grinding of flat glass plates
- Cylindrical grinding of quartz  $\text{SiO}_2$  square blanks

# Designation

## 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

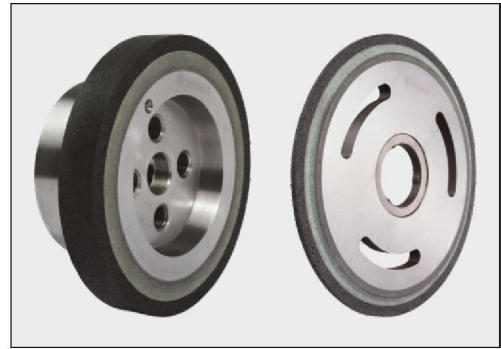
Wendt – Type

(10A = 1A1)

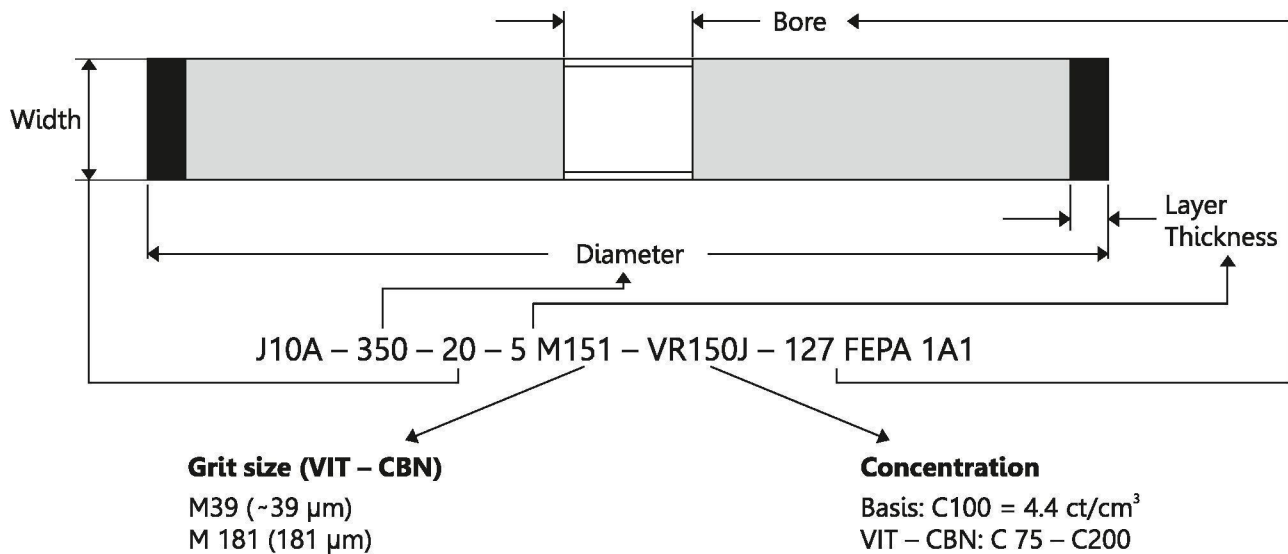
6...10 digit = consecutive numbering

5. digit : 1 = new wheel

9 = re-tipping



## Specification



# Trouble Shooting

Trouble	Cause	Remedy
	<b>Coolant</b>	<b>Check coolant supply/Nozzle adjustment</b>
	Cutting speed	Reduce cutting speed
	Low cutting power	Dressing / change dressing parameters
Burnings	Work piece	Increase work piece speed
	Wheel over loading	Reduce Q' W
	Wheel specification	Adjust grinding wheel specification
	<b>Wheel run out</b>	<b>Dressing</b>
	<b>Wheel out of balance</b>	<b>Balancing</b>
Chatter – Marks	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



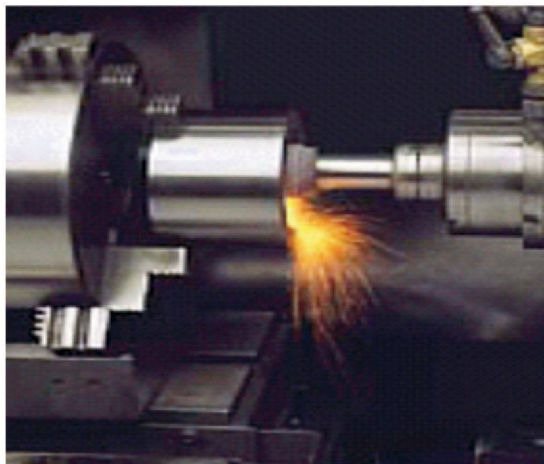
## Typical Applications



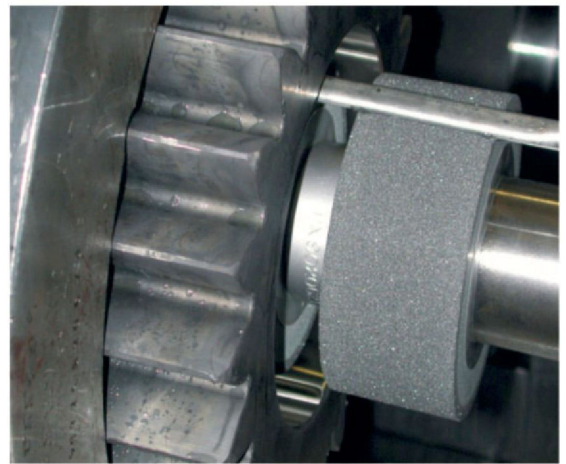
**Camshaft**



**Crankshaft**



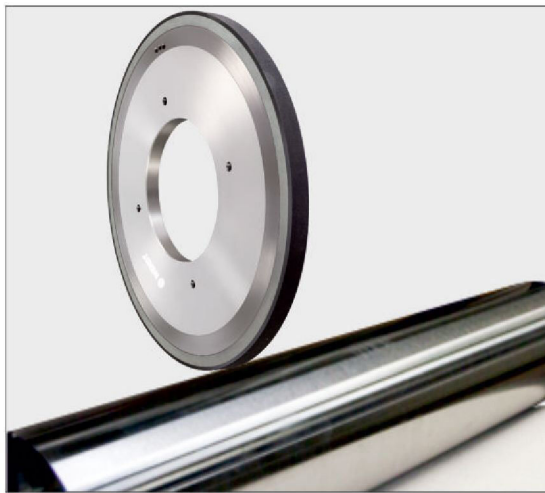
**Bearing Bore**



**Gear Bore & Face**



**Gear Shaft**



**TC coated / Chilled Cast Iron Paper Roll Grinding**

## WENDT AMERICA

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