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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 reduce 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.

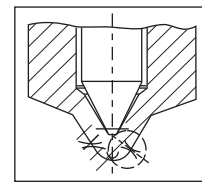
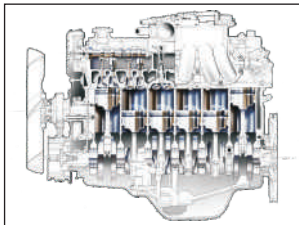
Grinds high alloyed hardened steels economically.

Materials that can be ground

Hardened steel ranging from 35 to 70 Hrc: in particular austenitic high alloy tool 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.

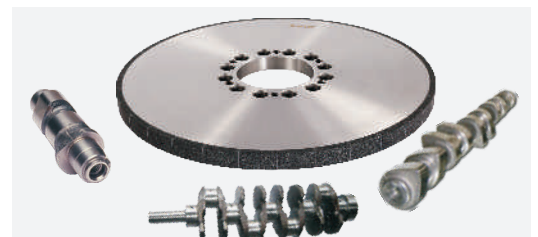
Continuous rim construction of the wheel.

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 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.

Short and rigid slide ways.

Completely enclosed.

High power hydrostatic spindles.

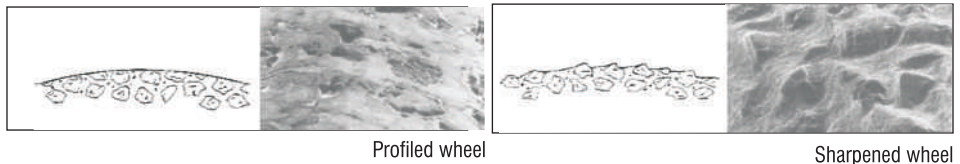
Vibration free.

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.



Profiled wheel

Sharpened wheel

Dressing of Vitrified CBN wheels

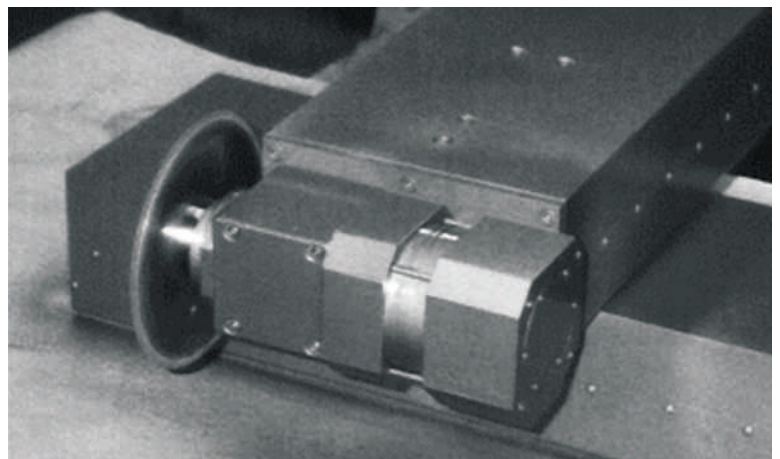
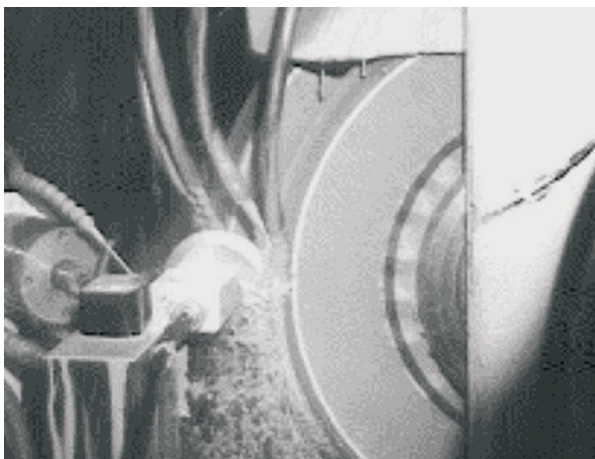
A Vitrified CBN Wheel requires two step (truing and dressing) conditioning process. **First Step** is carried out to form the wheel into ultimate profile required to grind the part. While achieving the desired shape or form, this process usually leaves the working surface of the wheel smooth, with insufficient 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.

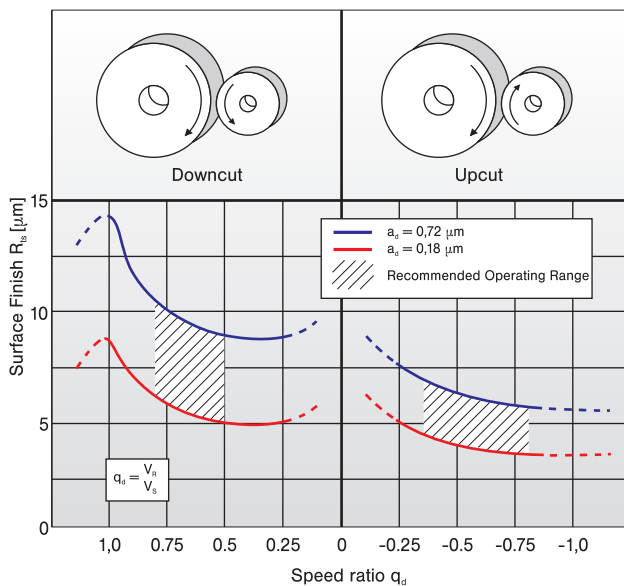
Never dress the wheel face without depth of cut as this will close the wheel structure. Use a minimum depth of cut of 2 microns to 5 microns. Without depth of cut in the CBN grit will be blunted and the CBN wheel will lose its cutting ability.

Surface quality

FEPA grit size	US Mesh	Ra 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

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

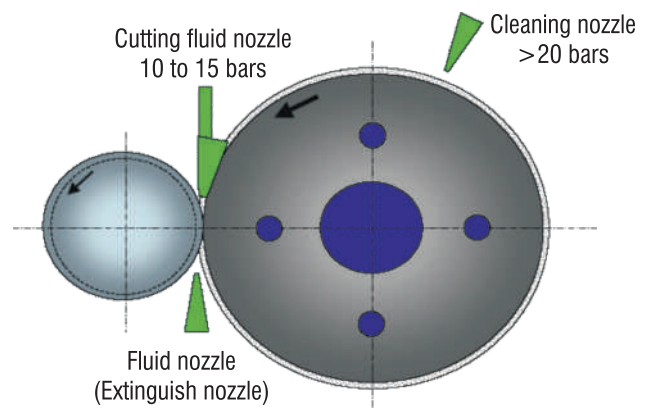


Grinding fluids

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 Al_2O_3 and 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

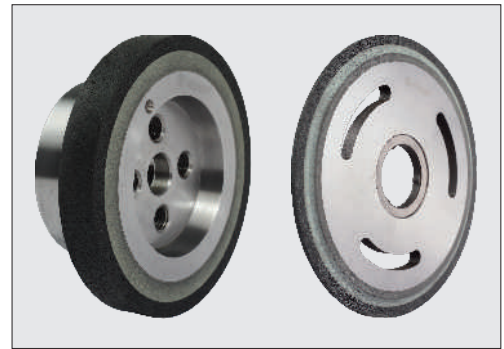
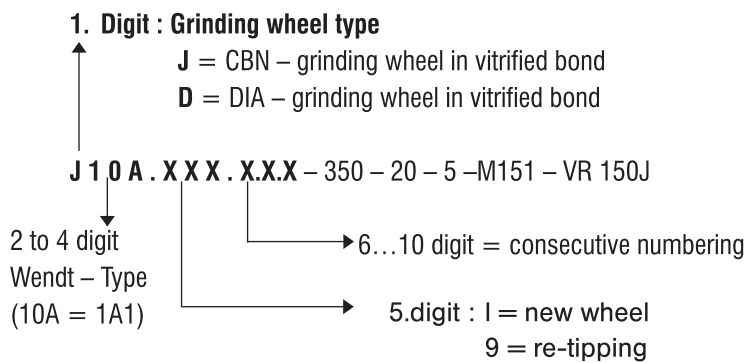
Grinding of TC coated paper rolls
 Cylindrical grinding of shafts and wear parts
 Cylindrical and internal grinding of ceramic work pieces

Glass industry

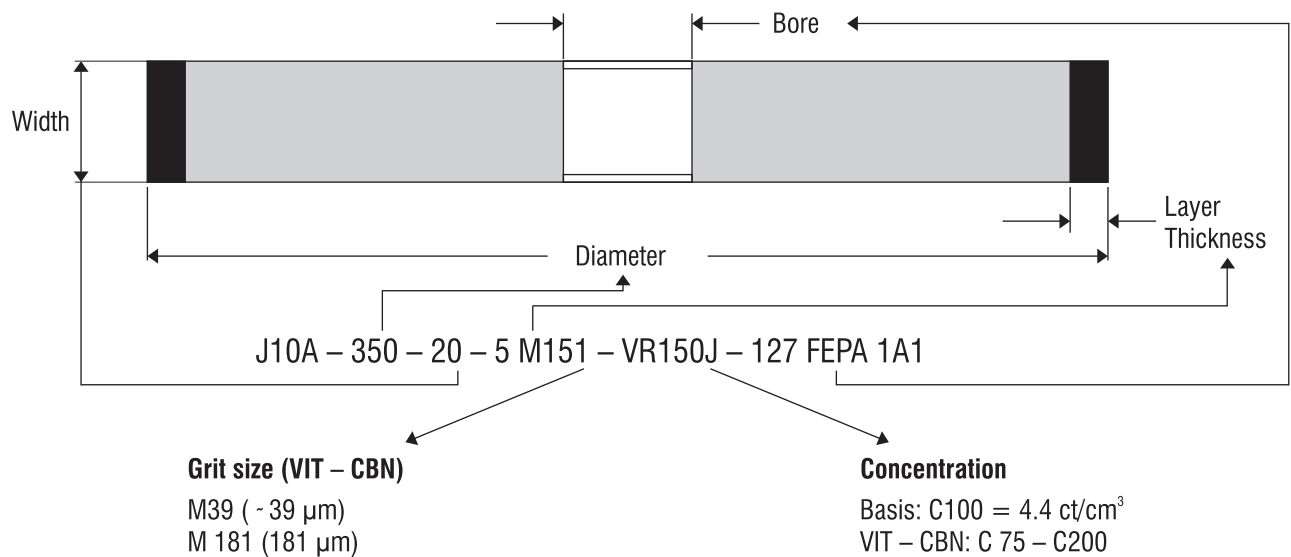
Profile grinding of flat glass plates
 Cylindrical grinding of quartz SiO_2 square blanks

Designation

Article Code



Specification



Trouble Shooting

Trouble	Cause	Remedy
	Coolant	Check coolant supply/Nozzle adjustment
	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
	Wheel run out	Dressing
Chatter – Marks	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 / change dressing parameters
	Dressing parameters	Change dressing parameters
	Comma –marks	Coolant
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

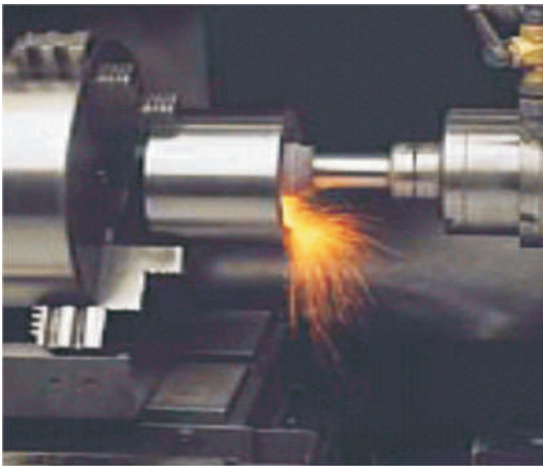
Typical Applications



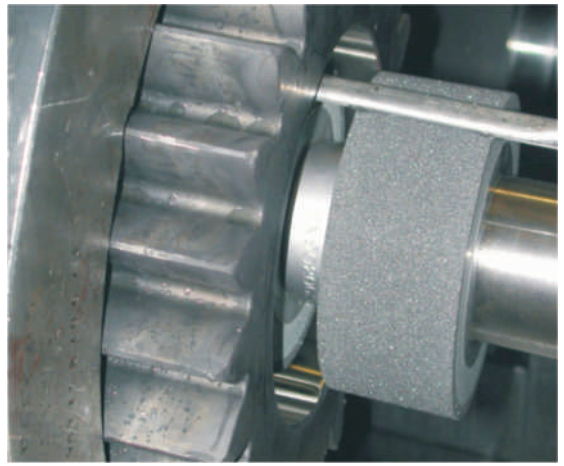
Camshaft



Crankshaft



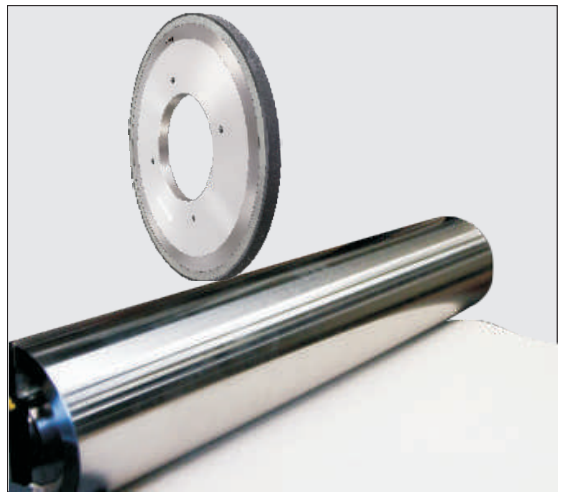
Bearing Bore



Gear Bore & Face



Gear Shaft



TC coated / Chilled Cast Iron Paper Roll Grinding

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