CERA DIA WHEELS

●Cera Dia Wheels

High-performance, porous wheels with diamond abrasive, which has the highest hardness of all materials and ensures excellent sharpness and wear resistance, retained with a rigid, fine ceramic bond.

Increasingly advanced grinding technologies require higher grinding accuracy and greater adaptability to hard-to-grind materials. In addition, there has been a demand for cost reduction through automation and unmanned operation.

The Cera Dia wheels make the most of diamond abrasive characteristics to meet those requirements.

●Characteristics

1. Higher retention force

Our original fine ceramic bond reinforces the chemical bond with diamond abrasive grains, ensures a higher retention force and prevents abrasive grains from falling off.

2. Sustainable sharpness

The porous Cera Dia wheels are superior in sharpness, rigidity and dressing properties, ensuring more accurate, efficient grinding than resin or metal bonded wheels. They are also useful for thin products that should not be distorted and, because of their sustainable sharpness, capable of successively grinding with less need for dressing.

3. Adaptable to various materials and conditions

Being filled with our original filler, aluminum oxide, silica carbonate or the like, the Cera Dia wheels are adaptable to a variety of materials and grinding conditions.

4. All products made to order

They are specially designed for each application to support the customer's requirements.

Having desirable characteristics as mentioned above, the Cera Dia wheels prove excellent performance in grinding various materials other than ferrous metals. Especially for medium to fine finishing, their characteristics are apparent and effective to reduce the cost. They are now applicable to mirror grinding of ferrous metals.

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●Bond

The optimal bond is selected depending on the conditions of use.

Type	Characteristics	Grinding method	Work materials
CRD1	Standard	Tool, surface, cylindrical, internal, etc.	PCD / PCBN / glass / ceramics Tungsten carbide / combinations of tungsten carbide and steel
CRD3	High-efficiency grinding	Tool, surface, etc.	PCD / PCBN / glass / ceramics
CRF1	Abrasion resistance	Tool, cylindrical, etc.	PCD / PCBN
CRF3	Mirror grinding	Tool, surface	PCD / PCBN / ceramics
CRM1	Soft material grinding	Generic	Aluminum / plastic / ferrite
NF02	High-efficiency NANOFIX	Tool, surface, cylindrical, internal, other	Semiconductor parts / optical parts / glass Tungsten carbide / PCD / etc.
NF08	Super-finishing NANOFIX		

●Concentrations

Generally used concentrations:

Work materials	Concentration
PCD / PCBN	150 - 200
Ceramics	75 - 125
Tungsten carbide	50 - 125
Ferrite / aluminum	75 - 125
Various kinds of glass	50 - 125

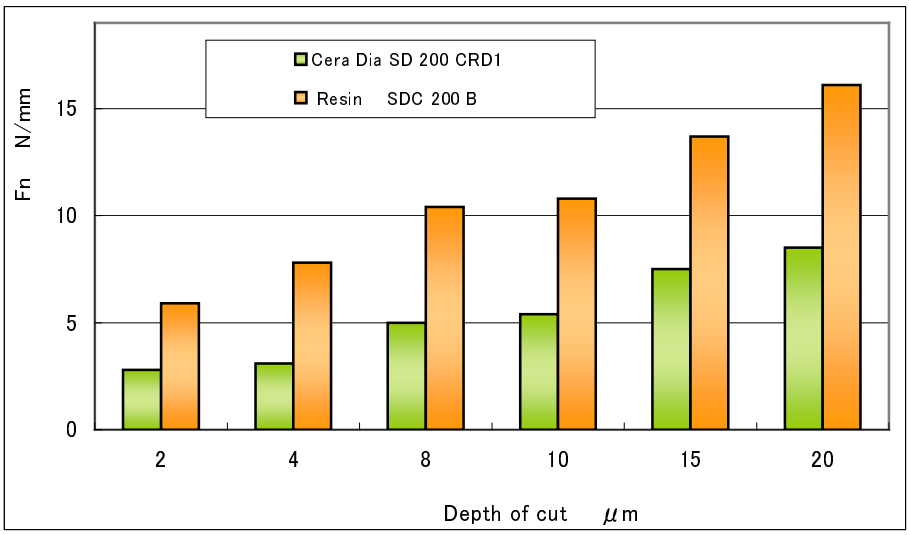
●Data

Work material : Silicon Nitride (5% Yttria, 5% Alumina, Weibull coefficient 11.8)

Wheels : Cera Dia SD 200 concentration: 100 CRD1
Resin SDC 200 concentration 100 B (competitor)
14A1 200D×20T×50.8H×10U×3X

Grinding method: Wet, up cut plunge grinding (Okamoto Machine Tool Works CGM-63)

Grinding conditions: Wheel speed: 40 m/s
Depth of cut: 2 - 20 µm
Table speed: 12 m/min



The Cera Dia wheels have a less grinding resistance (= better sharpness) than resin bonded wheels. (Test results: Japan Fine Ceramics Center (JFCC))

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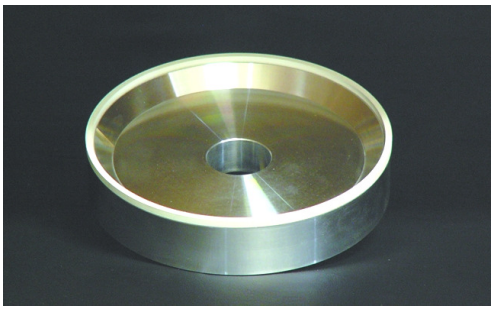
■Applications

Based on many grinding cases, the Cera Dia wheels can be effectively adapted to various grinding styles and materials by optimizing the combination of abrasive, bond, filler and porosity and adequately selecting the grade and concentration.

●Super-fine abrasive grinding

In recent years, requirements are increasing for surface quality and grinding accuracy and grinding wheels with super-fine abrasive are needed to satisfy those requirements. Among all super-fine grinding wheels in the world, the Cera Dia wheels ensure efficient, accurate grinding with its excellent sharpness and sustainability. They are also useful in transitioning from loose to fixed abrasive.



Example 1

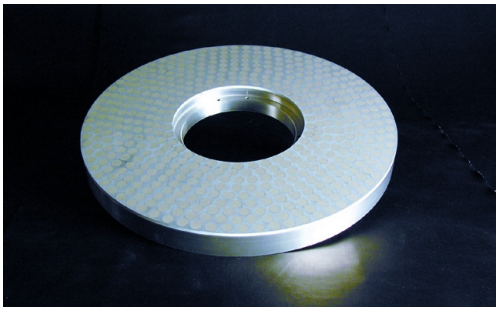
Work piece	Lens molds
Material	Tungsten carbide
Allowance	0.01 mm or less
Grinder	Spherical grinding type (curve generator)
Grinding Fluid	Water solution
Wheel Speed	16 m/s
Cutting Speed	2 m/min
Wheel	SD 10000 M 75 NF08 (NANOFIX)
Type	1E8
Dimensions	16D×3T×4H
Results	Excellent profile holding Ra 0.01 or less.

Example 2

Work piece	Ceramic Sheet
Material	Silicon Carbide
Grinder	Surface Grinder
Grinding Fluid	Water Solution
Wheel Speed	33 m/s
Wheel.	SD 8000 N 125 NF08 (NANOFIX)
Type	6A2
Dimensions	250D×20T×25.4H×100W×3X
Results	Mirror finish: excellent

●Vertical spindle parallel-surface honing / lapping

With excellent sharpness and sustainability of the Cera Dia wheels, the grinding cost can be improved with radically improved efficiency and longer dressing intervals in vertical spindle double-sided grinding at a lower wheel speed. They are especially useful for thin products.



Example 1

Work piece	Throw-away tips
Material	Cermet
Allowance	0.4 mm on both sides
Grinder	Vertical spindle parallel-surface grinder
Grinding Fluid	Water solution
Wheel Speed	1.1 m/s
Wheel	SD 600 P 100 CRD1
Type	1A2T
Dimensions	350D×48T×145H×100W×3X
Results	Surface roughness Ry 2.0. The cycle time does not exceed 360 seconds in 14 cycles after dressing. The same results can be obtained in 7 cycles for existing resin bonded wheels. The doubled sharpness will be sustained.

Example 2

Work piece	Cemented carbide boards
Material	Tungthten carbide
Allowance	0.2 mm
Grinder	Parallel vertical spindle grinder
Grinding fluid	Water solution
Wheel Speed	1.35 m/s
Depth of cut	0.003 mm/min
Wheel	SD 140 N 75 CRD3
Type	1A2T
Dimensions	430D×45T×165H×130W×3X
Results	Surface roughness Ry 6.3 Flatness 30μm. The dressing intervals are 60% longer than those for existing wheels.

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Example 3

Work piece	Ceramic Sheet
Material	Alumina
Allowance	0.4 mm on both sides
Grinder	Double-disc surface grinder
Grinding Fluid	Water solution
Wheel .	SD 325 N 100 CRD3
Type	1A2
Dimensions	635D×60T×232H×200W×3X
Results	Thickness ±3μm The dressing intervals is 60 pieces compared with current wheel 10 to 20

●Surface grinding

The Cera Dia wheels are used for ceramics or simultaneously grinding cemented tungthten carbide and steel products. They are especially useful for thin products requiring sharpness.

Example 1

Work piece	Ceramic Products
Material	Silicon Carbide
Allowance	0.1 mm
Grinder	Surface grinder
Grinding Fluid	Water solution
Wheel Speed	33.3 m/s
Depth of cut	20μm/pass
Wheel	SD 230 P 150 CRD1
Type	14A1
Dimensions	250D×19T×50.8H×10U×3X
Results	Surface finish Ry 3.2 - excellent

Example 2

Work piece	Metal Parts
Material	Tangthten Carbide
Hardness	HRc 64 – 80
Allowance	0.2 mm
Grinder	Surface grinder
Grinding Fluid	Dry
Wheel Speed	31 m/s
Work Speed	2 - 10 m/min
Depth of cut	10 μm/pass
Wheel	SD 500 P 100 CRD3
Type	1A1
Dimensions	180D×12T×51H×7U×3X
Results	Excellent in both sharpness and efficiency

Example 3

Material to be Ground	Plate
Material	FCD, SCM, etc.
Hardness	Hv500 or more
Allowance	20μm
Grinder	Rotary surface grinder
Grinding Fluid	Water solution
Wheel Speed	25m/s
Work Speed	90m/min
Depth of cut	1μm/pass
Wheel	SD 2000 N 100 CRF3
Type	14A1
Dimensions	350D×50T×127H×20U×5X
Results	Pretreated with CBN#325. For ferrous metals, lapping can be omitted by mirror grinding (6 times high efficiency). Surface finish Ra0.03.

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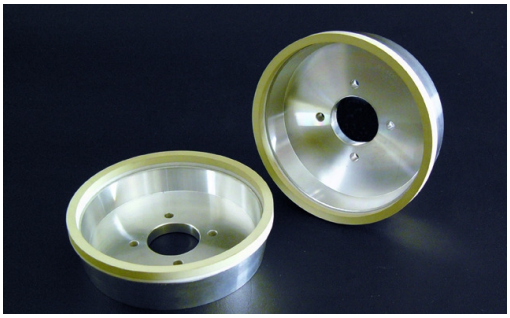
●Tool grinding

The Cera Dia wheels are suitable for higher efficient, accurate grinding of cutting tools. They are used for PCD PCBN, ceramics, etc.



Example 1

Work piece	Cutting tools
Material	Fine particules PCBN
Allowance	0.2~0.5 mm
Grinder	Tool grinder
Grinding Fluid	Water solution
Wheel Speed	20 m/s
Depth of cut	F 0.2
Wheel	SD 1000 P 175 CRD1
Type	6A2BT
Dimensions	350D×90T×260H×15W×3X
Results	Chipping 10 to 20μm

Example 2

Work piece	Tool tips
Material	PCD
Allowance	0.07 mm
Grinder	Tool grinder
Grinding Fluid	Water solution
Wheel	SD 1000 Q 150 CRD1
Type	6A2BT
Dimensions	350D×90T×260H×5W×6X
Results	Chipping 20μm - 50% increased service life

Example 3

Work piece	Cutter
Material	PCD
Allowance	0.05 - 0.1 mm
Grinder	Tool grinder
Grinding Fluid	Water solution
Allowance	0.1 mm
Wheel	SD 800 U 150 CRF1
Type	6A2
Dimensions	125D×18T×16H×5W×5X
Results	Surface finish / sharpness / excellent life

Example 4

Material to be Ground	Tools
Material	PCD
Allowance	0.02 mm
Grinder	Tool grinder
Grinding Fluid	Water solution
Wheel Speed	7.9 - 23.6 m/s
Feed rate	20 oscillations/min
Wheel	SD 1500 O 150 CRD3
Type	11B2
Dimensions	150D×50T×50.8H×15W×5X
Results	30% improved grinding

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Example 5

Work piece	Tool tips
Material	PCD
Allowance	0.3 mm
Grinder	Tool grinder
Grinding Fluid	Water solution
Wheel Speed	10.5 m/s
Depth of cut	0.15 mm
Feed rate	Oscillation width 19mm – 50 osc./min
Wheel	SD 1500 R 200 CRD1
Type	11A2B
Dimensions	200D×40T×60H×20W×5X
Results	Chipping 10 µm excellent

Example 6

Work piece	Single-flute DC gun reamer
Material	PCD & tungsten carbide
Allowance	0.05 to 0.1 mm
Grinder	NC tool grinder
Grinding Fluid	Water solution
Wheel Speed	16.7 m/s
Depth of cut	0.003 mm(Total 0.15 mm)
Feed rate	20 oscillations/min
Wheel	SD 600 Q 150 CRD1
Type	11V9BT
Dimensions	100D×17T×38.1H×5U×3X
Results	Chipping 20 - 30 µm depth of cut improved 60%

●Cylindrical grinding

The Cera Dia wheels are used for simultaneously grinding cemented tungthten carbide and steel and for various ceramics. Especially useful for thin products requiring sharpness.

Example 1

Work piece	Lathe center
Material	Tungthten carbide + SK5
Allowance	2.0 mm
Grinder	Cylindrical grinder
Wheel Speed	33.3 m/s
Wheel	SD 400 M 100 CRD1
Type	14A1R
Dimensions	300D×30T×127H×8U×3X
Results	Slightly uneven surface compared with resin wheel, improved performance

●Internal grinding

Excellent finishing accuracy and grinding efficiency are realized by the higher rigidity and superior sharpness.

Example 1

Work piece	Ceramics
Material	Zirconia
Allowance	φ0.03 mm
Grinder	Internal grinder
Wheel Speed	30 m/s
Wheel .	SD 800 N 200 CRD1
Type	1A1
Dimensions	8D×6T×1.5X
Results	Surface finish Ra 0.2 - excellent