



Realizing Even Higher Efficiency with Porous Vitrified Ceramic Grinding Wheels

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There is a great need for high efficiency in conventional grinding wheels, it is currently difficult to maintain both high-precision and high-efficiency simultaneously.

The newly developed "CZ wheel" uses a proprietary grain and homogeneous-structured bond system to maintain cutting ability and surface roughness for longer, increased efficiency.

Porous Vitrified Ceramic wheels for High Efficiency Grinding

CZ Wheel

[Scope of application and expected benefits]

Metallic material		Non-metallic material		Other
Ferrous material	Non-ferrous material (Al, etc.)	Inorganic material (glass, ceramics)	Organic material (rubber, plastic)	Advanced material
●				
Shorter cycle time	Improved tool life	Improved machining quality	Improved workability	Environmental consideration
●	●	●	●	



Market Trend toward High-Efficiency and Selective Use of Grinding Wheels

Vitriified grinding wheels are widely used for high-precision grinding. Recently, the demand for high-efficiency has led to increased use of Diamond/CBN wheels, enabling automated and unmanned grinding. However, the grinding machines and conditions that Diamond/CBN wheels can be used are severely limited. For this reason, there is still great demand for high efficiency conventional grinding wheels (conventional wheels), which have relatively fewer restrictions with grinding conditions and machine compatibility.

In order to meet the need for high efficiency in conventional wheels, Noritake has developed products such as Life King^[1] and CX wheels. But we are now undertaking the development of even higher efficiency grinding wheels, and have succeeded in commercializing the CZ wheel, a new vitriified ceramic porous wheel.

Workplace Difficulties and Breakthroughs Associated with Higher Efficiency

At the machining site, accuracy and shape (dimensions) of the workpiece are most important. Therefore, it is common practice to adjust the cutting rate of the grinding wheel and dressing conditions. Even where higher efficiency is sought, technicians may try to shorten machining times by increasing depth of cut and cutting speed. However, it can be inferred that this increases the grinding load which causes the wheel to exceed target surface roughness, and creates grinding burn, which lowers the machining surface quality of the workpiece, therefore preventing increases in efficiency.

To solve such problems, CZ wheels are made with a high cutting ability to lower process load and maintain surface roughness.

CZ Wheel Capabilities

In order to verify the performance of the CZ wheel, a surface grinding test (Table 1, Fig. 1) and a cylindrical grinding test (Table 2, Fig. 2) were conducted under relatively high grinding efficiency test conditions.

In surface grinding, the CZ wheel is 10% lower in power consumption value and 40% lower in wheel wear than the traditional CX wheel, so along with improved cutting ability, this also indicates extended wheel life. Additionally, surface roughness of the CZ wheel shows a lower (smoother) value than that of the CX wheel. Usually, grinding wheels with high cutting ability tend to have shorter wheel life and are prone to surface roughness problems, but CZ wheels have shown improved cutting ability and surface roughness, which makes it an excellent wheel for high efficiency grinding.

Additionally, the cylindrical grinding results show that compared to the traditional CX wheel, the CZ wheel is 10% lower

[Wheel]	
Dimensions	φ176 × T14 × φ76.2mm
Specification	CX-V104P (CX wheel)
	CZ-V700P (CZ wheel)
[Dressing conditions]	
Dresser	0. 8LL Single-Point Dresser
Dressing Lead	0.1 mm/r.o.w.
Cut Depth	10μm/pass
[Grinding condition]	
Grinding Method	Surface Grinding
Workpiece Material	SUS304(JIS)/304(AISI)/X5CrNi1810(DIN)(HRB 90)
Workpiece Dimensions	Length: 100mm, Thickness: 10mm
Wheel Speed	33.3m/s
Table Feedrate	0.33m/s
Grinding Efficiency	3.3mm ³ /mm·s
Spark-Out	None
Coolant	Water-soluble: SEC-700(×50)

Table 1 Test conditions (Surface grinding)

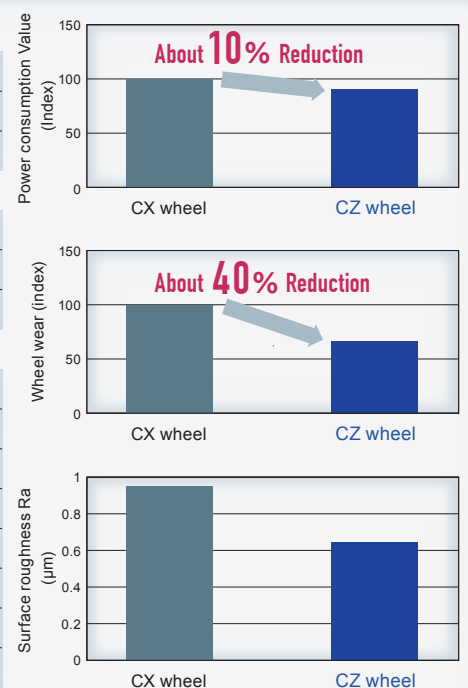


Fig. 1 Test results (Surface grinding)