

» Grinding Solution: Cam lobe Grinding

In order for an engine to achieve high power output and low fuel consumption, the cam's concave profile is becoming more crucial. Grinding issues, such as grinding cracks and residual stress, are more likely to occur compared to traditional shapes. In addition, materials that have high strength and toughness, such as ductile cast iron, will be more difficult to grind compared to the gray cast iron because of the high heat buildup. This issue will lead into the problem mentioned previously, which will be prone to occur more easily. In these types of applications, utilizing a CBN wheel with a high cutting ability is favorable. But these types of wheels tends to have a short wheel life, which means there will be more frequent wheel changes. This will lead to production loss, and end up increasing the cost per part, due to machine down time. We would need to look into a CBN wheel for cam lobe grinding that has both high cutting ability and long wheel life. Noritake would like to introduce Sharp Kaiser as the Vitrified bonded CBN wheel suited for such cam lobe grinding.

Fig. 1 Outline of Cam lobe grinding



Sharp Kaiser (Vitrified-bond CBN wheel)

Feature: Good balance between cutting ability and wheel life due to the homogeneous structure and increased grain protrusion.

The cam lobe grinding test of ductile cast iron material was carried out under the test conditions in Table 1. Fig. 3 shows the power consumption of the Sharp Kaiser and the traditional products. The power consumption of the Sharp

Fig. 2 Sharp Kaiser



Table 1 Test conditions

[Grinding wheel]

Specifications	CBX140-V
Dimensions	ø350×T35×ø20mm

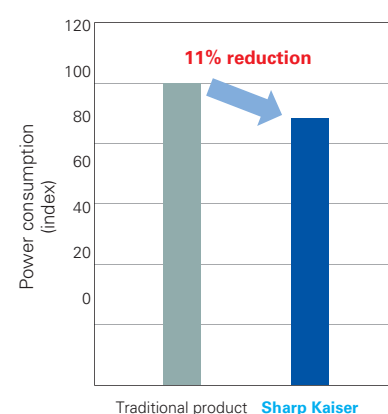
[Grinding conditions]

Grinding method	Cam lobe grinding
Grinding wheel speed	140m/s
Grinding efficiency	110mm ³ /mm·s
Dresser	Rotary dresser (SD30)
Coolant	Water base coolant

[Workpiece]

Material	FCD700
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Fig. 3 Power Consumption



Kaiser is lower than that of the traditional product, which shows that the cutting ability is improved. In addition, Fig. 4 compares the grinding results between Sharp Kaiser and the traditional product when grinding with equivalent power consumption. After dressing both wheels so that they each produce the same quality, the Sharp Kaiser had held its surface finish by 1.9 times longer, and the roundness by 2.9 times longer than the traditional product. The surface roughness is 12% finer and the residual stress is 75% lower, thus improving the overall workpiece quality. Sharp Kaiser is able to achieve such long life because of the improved bond structure uniformity and the improved cutting ability due to its higher grain protrusion (Fig. 5). In other case studies, not only does the Sharp Kaiser improve the work finish quality and reduce scratches, but it also increased its dressing interval by 1.5 to 2 times compared to the traditional product.

Fig. 4 Test results

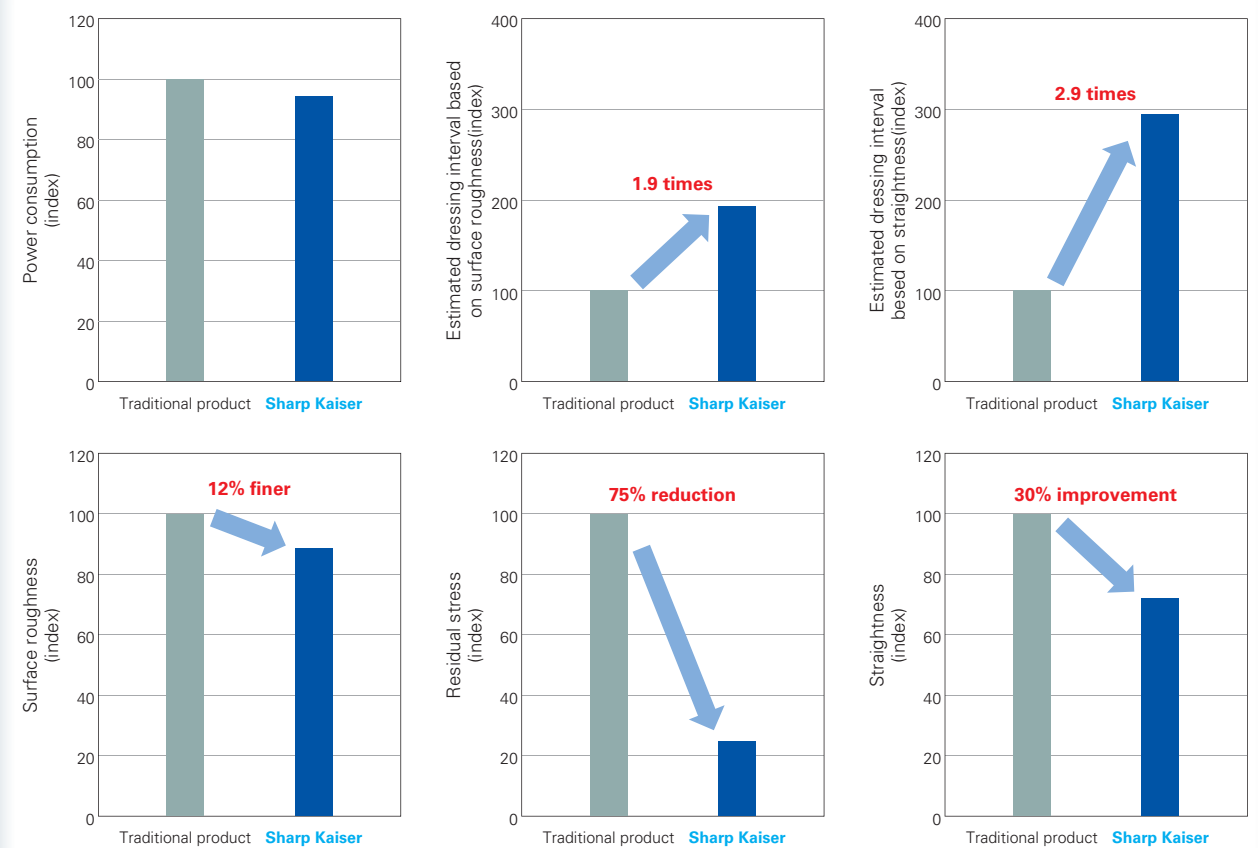


Fig. 5 Abrasive grain protrusion condition on grinding wheel surface

