Grinding of wear-resistant coatings can be more efficient

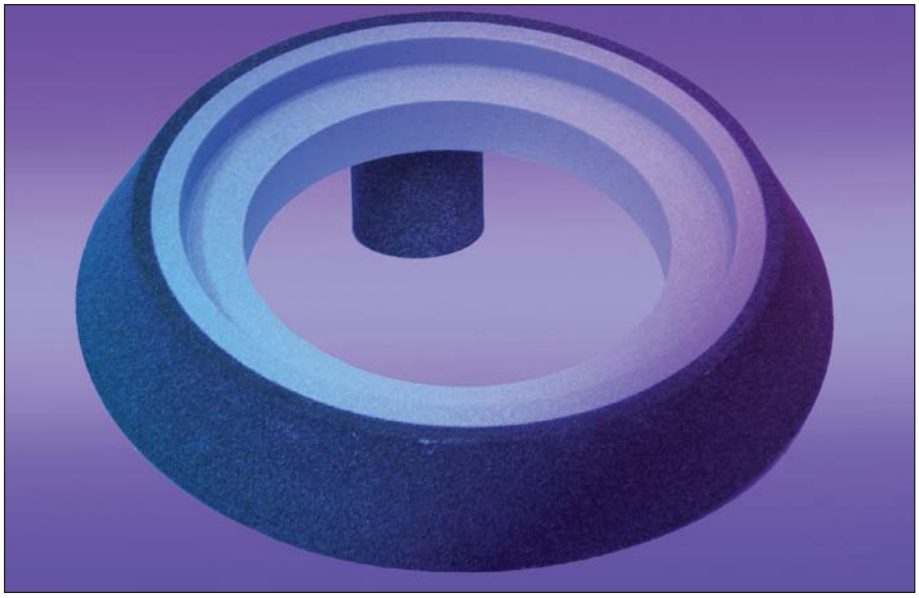
ILYICH Abrasive Company offers new decisions, increasing productivity by 200%

For almost 50 years ILYICH Abrasive Company has been at the forefront of grinding technology with CBN vitrified wheels in Russia. Based in St. Petersburg, Russia, the company produces a wide range of superabrasive wheels for different applications and successfully sells its products in domestic market and abroad. Practice showed that ILYICH CBN vitrified wheels is the best combination of the price and quality, proved their competitiveness and higher effectiveness in standard grinding applications.

The recent testing showed the greater productivity and higher efficiency of using CBN vitrified wheels in grinding of plasmatic and detonated wear-resistant coatings.

Professor Zinovy Kremen, Head of R&D Department, says: "Wear-resistant coatings (plasmatic and detonated) used for reconditioning of worn out machinery parts are rather hard, so the grinding with the conventional abrasive materials – White Alumina and Silicon Carbide – reveals considerable difficulties: appearance of burns and microcracks, too short wheel life and necessity of frequent dressings. This circumstance became the main reason for development of advanced technology for grinding of wear-resistant coatings with ILYICH CBN vitrified grinding wheels, including high-porous CBN vitrified wheels – AEROBOR TM".

Test results of CBN grinding of the coated parts showed that the grinding efficiency has been increased greatly by using of CBN (Elbor) wheels: the wheel life is 40 times longer, and the productivity is from 30-40% up to 200-300% higher. Moreover CBN wheels can provide non-defect grinding, i.e. allow to avoid burns and microcracks appearance in the surface layer of the coating. As a final result, significant cost-saving is achieved.



Application examples include:

1) External grinding of the crankshaft Ø 45x1200 mm, coated withplasmatic covering PG-SR4, HRC 55, by 1A1 600 x 50 x 305 x 10 LKV50 125/100 C100 wheel. Grinding conditions: V=35m/s, Vw=40m/min, t=0.03-0.02 mm/stroke, Vs.o= 1 m/min Grinding time of the CBN wheel is 10.8 min, and of the conventional abrasive wheel 25A 25C 18K - 55 min. CBN wheel life - 360 workpieces, 25A wheel life is only 27 workpieces.

2) Centreless grinding of a well pump plunge Ø52x1300 mm with plasma-sprayed coating PR-Ni78Cr17S4R4, HRC 50-52, performed with a set of the CBN vitrified wheels with OD 500 mm, total height 500 mm. The specifications of the wheels in the set were the following: LKV50 160/125 C125, LKV50 100/80 C100, LKV50 63/50 C100, LM 28/20 C100. Grinding conditions: V=30 m/s, Vw=38 m/min, t=0.05-0.01mm/stroke, Vs.o=1.7m/min. Obtained results: G-ratio=23, Ra=0.3-0.4 um; no burns or microcracks.

3) External grinding of a marine diesel engine valve stem Ø100x600 mm coated with DIAMALLOJ (plasma-sprayed), HRC 63; the basic ground material components Cr3O2, and NiC. As the result of the testing, the following wheel characteristics were defined: rough grinding – AEROBOR LKV50 160/125 C150 finish grinding - AEROBOR LKV50 50/40 C100. Grinding conditions: V=35m/s, Vw=30 m/min, t=0.05-0.01mm/stroke, Vs.o=1.5-0.7m/min. Results obtained: G-ratio=42, Ra=0.16-0.20 um, no burns and microcracks. Wheel life of 1A1 600 x 30 x 305 x 5 wheel for rough grinding is 200-220 workpieces, for finish grinding is 450 workpieces.

Summing-up the results of trials, CBN wheels showed a higher efficiency: G-ratio increased by 20-38 times (depending on the grinding operation) in comparison with the conventional abrasive wheels; the targeted stock allowance was completely removed, whereas for 25A and 64C wheels, it was 84-88%, i.e. additional time was required for the targeted stock allowance removal. It should be noted that CBN wheels, at the depth of cut up to 0.03-0.05 mm (depending on the coating type) and at creep feed grinding with t=0.5 mm, grind without any burns and microcracks; whereas 25A and 64C wheels allow grinding without defects only at a depth of t=0.01mm.

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