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Wear behaviors of boron-bearing new hardfacing alloys

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High chromium cast irons (HCCIs) are excellent wear-resistant materials and have been widely used as a hardfacing alloy for wear-affected equipment operated under extreme conditions, such as facilities in the slurry pumping systems used in the oil sands handling, mineral processing, coal and cement industries. In the previous research, we fabricate hardfacing alloys AlCrFeMnNiMoBCNb with abrasive wear resistance of 12.5 m/mm³, which was beyond six times the abrasive wear resistance of HCCIs. In this study, based on the previous study on AlCrFeMnNiMoBCNb alloy, we research the effect of each element of the AlCrFeMnNiMoBCNb alloy by eliminating each element independently. In addition, we utilize Taguchi methods by adjusting the content of Al, Mn, and Ni (by decreasing Cr) elements to further improve the wear resistance, which found that Cr was the key element to the wear characteristics of new hardfacing alloys. Furthermore, by increasing Cr element, we significantly enhance the abrasive wear resistance of new hardfacing alloys up to 24.5 m/mm³, which beyond 12 times of HCCIs.

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