



THE BENEFITS OF USING BORON IN THE LADLE FURNACE FOR STEEL PRODUCTION

Research from Eti Maden Technology Development Department

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PROBLEM

During steel production, lime and fluoride are used to make slag in the ladle furnace in order to eliminate impurities in steel. After skimming the slag, it crumbles easily within days to become a fine material like powder.

This slag powder is hydrophobic and, hence, does not get wet nor is easily compressible. Therefore, it causes problems in storage and transportation, which lead to environmental concerns and added costs.

OUR PURPOSE

The aim of our applications research is to reduce the cost of steel production and lessen its impact on the environment.

SOLUTION

During trials at a steel plant, a boron product was added to the molten slag in the ladle.

The boron-treated slag developed a compact structure after it was skimmed, rather than the crumbly, friable structure of slag not exposed to boron.



Problem: Powder Slag



RESULT

The bulk density of the slag doubled, from 1.36 ton/m³ to 2.64 ton/m³ in its new compact state.

The boron content of the resulting steel averaged only 9 ppm.

The improved, compact slag is:

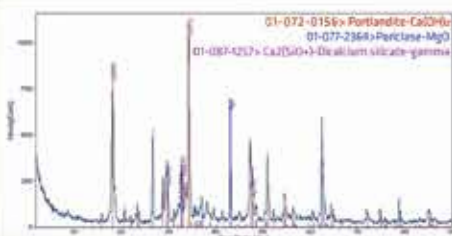
- more easily stored and transported
- reusable in the ladle furnace as lime
- recyclable as aggregate (filler material)
- less of an environmental concern

The use of boron in the furnace ladle creates a compact slag that can help producers to save money.

Solution: Compact Slag



%CaO	%MgO	%SiO ₂	%Al ₂ O ₃	%FeO	%S	%P
20.2	10.7	4.1	0.4			
Bulk Density ton/m ³		1,36				



%CaO	%MgO	%SiO ₂	%Al ₂ O ₃	%FeO	%S	%P
20.5	11.8	11.1	0.8			
Bulk Density ton/m ³		2,64				

