

EAF SLAG PROCESSING IN MOBARAKEH STEEL COMPANY (MSC) IN IRAN

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ABSTRACT

Iran is one the main players of steel production and consumption in MENA and Mobarakeh Steel Company (MSC) is one of the largest steel producers in Iran and in the middle east. In this company, EAF technology is used for steel production with a total capacity of about 7.2 MT per year. Annually, around 1.8 MT of EAF slag is produced as a by-product which is mainly dumped without any processing but a small part of slag is processed in cold and hot (molten) forms . So far about 20 MT of EAF slag has been dumped (from the time that the company is put in operation) and it is planned to valorise it by metal contents recovery and use of processed slag in different applications such as road construction, cement industries and so on.

INTRODUCTION

In steelmaking plants, slag is not a waste material but it is a valuable by-product which could be reused by suitable processing. Slag is actually the secondary resource of metel and its metal contents could be recovered and the remaining slag is applicable in different purposes. In MSC, for having a sustainable steel production, we are going to apply proper technologies for cold slag processing and also molten slag processing. To this end, many efforts have been done to identify technologies as well as companies which could help us to valorise our slag by metal recovery.

METHODS AND MATERIALS

In MSC there are 8 EAFs in steelmaking shop with the capacity of 200 tons each. Each 200 tons heat contents about 50 tons slag (25%). so annually about 1.8 MT of slag is produced and dumped. Table 1 shows a typical chemical analysis of EAF slag in MSC. At the existing situation slag is discharged into slag pits by slag pot carriers and after water and air cooling process, transferred to slag yard for dumping. Currently, there are two huge mountains of slag with the approximate capacity of 20 MT (Fig. 1). Of course, a small part of slag is cooled and granulated in hot stage, using water injection technology (Slag Granulation Process) and also a small portion of dumped slag is processed using crushing, size reduction, screening so that it can be used as aggregares in road construction. Because of high contents of FeO and Fe metal in slag, the application of slag in cement industries has been limited.

RESULTS

1. According to experimental investigations, the MSC slag is basic and its composition is similar to the composition of portland cement.



Figure 1: Slag dumping area and slag pot carrier

- 2. The MSC slag possesses good hydraulic activity. ($\text{CaO}/\text{SiO}_2=2$)
- 3. According to various cooling methods applied to re-melted EAF slag, more rapid cooling increased the amounts of glass phase.
- 4. From XRD pattern of granules created from all the various cooling methods, no free lime is present. This can prevent latent decomposition of it in the cement and concrete.
- 5. Cooling of molten slag by the mixture of water and air, results more uniform granules and a higher amounts of glassy phase, making it more suitable as replacement of Portland cement.

SiO2	MnO	MgO	CaO	Al2O3	FeO	Slag Contents
16-17	2-3	10-13	32-35	3-4	25-35	Percent (%)

SUGGESTIONS

- ✓Possibility of high contents metal recovery (Fe, V)
- ✓Readiness of MSC for negotiation and joint cooperation with qualified companies for slag valorisation.
- ✓Collaboration for marketting of recovered metals and also valorised slag.
- ✓Readiness of MSC for signing contract based on BOT terms and conditions for slag processing
- ✓ Possibility for MSC slag valorisation as a replacement of portland cement

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