Slag Splashing technique in Converter Operation:

Slag splashing has become a powerful tool to be used by the steelmaker to increase furnace life, maximize production from existing equipment and reduce refractory and gunning costs.

Slag splashing is a very effective means of improving the furnace, it is through the impact of high-speed jet of nitrogen left after a steel furnace slag, the slag (the slag composition is adjusted) in the shortest possible evenly spray coating the time the converter lining in the whole surface and form a certain thickness and a dense layer of slag splashing, splashing slag layer prevents the converter slag, furnace gas erosion of the lining, so to play the role of improving the furnace.

Process

Process steps are as follows:

During the slag splashing process three main stages have been identified in the formation of the slag protective coating: transport of molten slag to the converter walls, adherence of the molten slag to the sidewalls, and freezing and hardening of the slag layer. When the molten slag is transported to the converter sidewalls, two transport mechanisms are present: wash coating and ejection coating. The first one occurs due to the bulk movement of the molten slag to rise above the initial level and the second one due to the ejection of slag droplets which adhere to the vessel sidewalls.

The influence of the slag density on the slag splashing process is analyzed using computational fluid dynamics simulations. Values of the slag density ranging from 2000 to 3000 kg m$^{-3}$ are considered. This range is typical of CaO–SiO$_2$ molten slags found in steelmaking. Physical dimensions of the converter correspond to an actual industrial steelmaking converter of 150 metric tons. The volume fraction of slag in the converter sidewalls is employed for quantitative evaluation of the slag splashing efficiency. In order to detect spitting of slag from the converter mouth, the global mass balance is determined. Besides, the effect of the nitrogen jet Mach number on the slag splashing is simulated.
Factor affecting the Slag Splashing Technique

Main factors which affect the splashing process are: operating parameters (jet speed, angle of injection, lance height, molten slag height), and slag properties (viscosity, density, surface tension).

Shear forces required to break the molten slag bath to form drops which are ejected and adhered to the furnace walls are strongly dependent on jet speed and viscosity of molten slag. In this work the influence of slag viscosity on the splashing efficiency is analyzed by means of Computational Fluid Dynamics (CFD) simulations. An industrial furnace is geometrically modeled, and several values of viscosity are employed in the computer 2D transient simulations. First, the mathematical models employed to represent fluid flow, continuity, turbulence, boundary conditions, multiphase flow and a parameter to quantify the efficiency of the slag splashing process are presented. Then, the parameters employed in the CFD computer simulations are defined.
**Advantage of Slag Splashing Technique**

1. Slag splashing helps in recycling of the steel making slag.
2. The melting of the low melting phase of the slag lining results in the rapid formation of a basic slag and the rapid dissolution of the CaO from slag coating by SiO2 in converter slag. This leads to rapid de-Phosphorisation.
3. Lesser consumption of flux because of dissolution of basic slag during the steel making process.
4. Yield improvement due to lesser slopping because of increase in the converter volume.
5. Increase in the lining life of the converter.