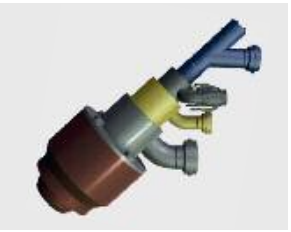
SMS group

Service

SIS Injection System

Maximum efficiency for electric arc furnaces



SIS – SMS Injection System

EAF tuning with SIS technology

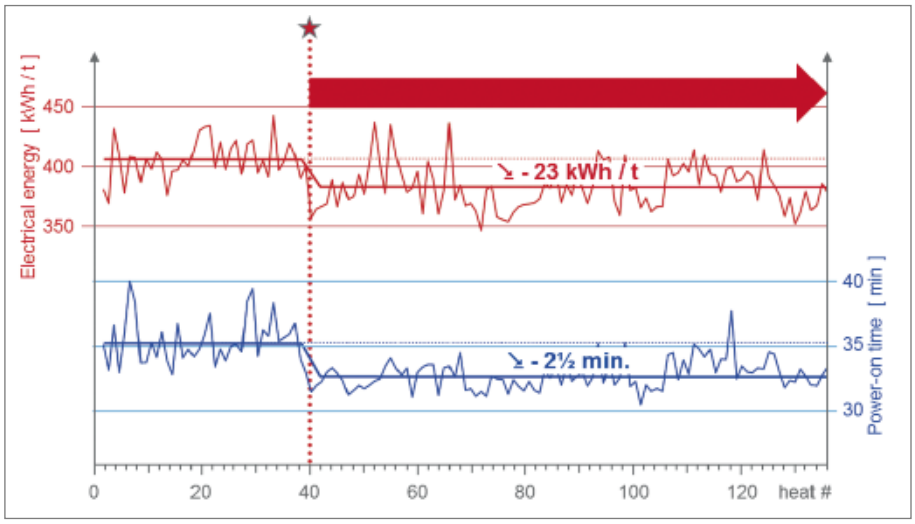
To achieve high steel quality in the electric-arc furnace (EAF), everything from melting the charge substances through decarburization to tapping must be precisely balanced. Yet, while oxygen injectors support this process, plant owners still face a number of challenges. That's because these systems are not only susceptible to blockages and insufficient oxygen application, they also generate high maintenance costs.

Unlike conventional solutions, the Injection System (SIS) of SMS group combines the burner and the injector. This means: it accelerates melting of the charge substances and decarburization of the heat, and even minimizes consumption of costly media such as oxygen. Next there is the advantage that you can integrate the SIS into new or existing EAFs.

Finally, immediately after installation, you save money with each ton of steel produced, guaranteeing a fast ROI.

Benefits of the SIS injector

- Maximized oxygen efficiency due to optimized nozzle design achieved using CARD[1)]
- Up to 40 percent increased efficiency thanks to optimum enveloping gas jet, designed using patented COAX[2)] software
- Cost savings of up to 70 percent for the generation of enveloping gas (compared to standard systems) by using compressed air
- High availability due to effective keep-clear mode
- No significant impact on the refractory material
- Easy handling due to low weight (18 kg)



Graphic of the melting process: Comparison of energy consumption and power-on time of a conventional nozzle (left) and a SIS burner-injector unit.

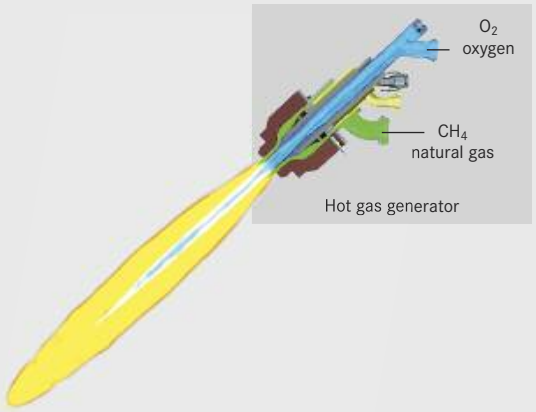
[1)]CARD: Characteristic Method for Rotational Symmetric Nozzle Design. Patented software for calculating the optimal O_2 nozzle contour developed jointly by SMS group and the Shock Wave Laboratory of RWTH Aachen University, Germany

[2)]COAX: Patented software for optimal adjustment of the enveloping gas jet to the nozzle contour developed using CARD. Crucially, the hot furnace atmosphere was taken into account in this joint project between SMS group and the Shock Wave Laboratory of RWTH Aachen University, Germany.

Efficient melting and decarburization

Burner mode

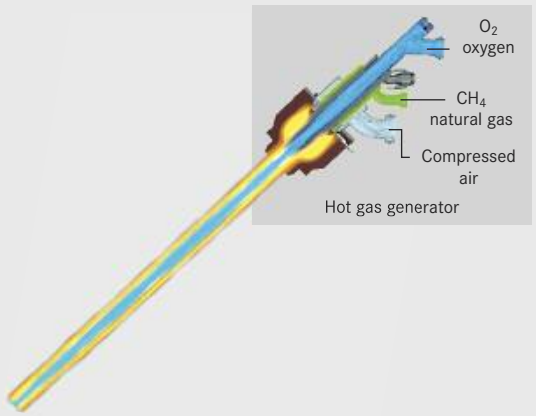
Using SIS burners ensures efficient pre-heating and melting of the steel scrap at lower electric arc. Furthermore, it reduces electrode consumption by avoiding breaks in the scrap column.



Effective and long flame, burner mode

Injector mode

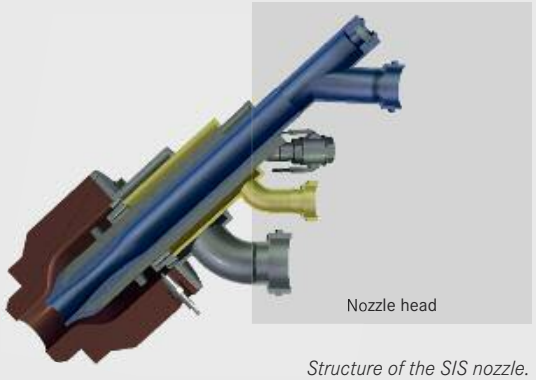
The SIS injector features a specially shaped Laval nozzle as well as a contour fine-tuned for the enveloping gas. These were designed with a dedicated software (CARD or COAX). What's special here is that the oxygen jet is effectively concentrated in injector mode as the gas exits through the ring gap between nozzle and housing. That ensures the oxygen jet is up to 40 percent longer. Compared to conventional systems, the jet penetrates the furnace atmosphere and slag layer with increased force. Consequently, the heat is decarburized more rapidly and foam slag forms faster. Here is what you gain from the shorter power-on time: faster production plus lower consumption of oxygen, natural gas, compressed air, and electricity.



Enveloping gas,
Ultrasonic oxygen jet, injector mode

Standby mode

Common to conventional systems is that burners in standby mode are kept permanently on a small flame to prevent slag from blocking the nozzle. This wastes valuable oxygen and natural gas. The SIS system uses cheaper compressed air instead of oxygen. Moreover, the Laval nozzle in the nozzle housing is offset to the inside by a precisely defined degree. It's an innovation that prevents nozzle blockages in standby mode, even in stainless steel furnaces. So you benefit from minimum wear and maintenance at maximum availability.



Structure of the SIS nozzle.

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