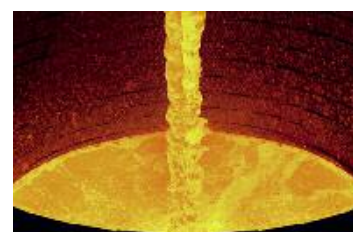


## **FEOS**

### Furnace Energy Optimization System





# FEOS

## An integrated approach to EAF process control

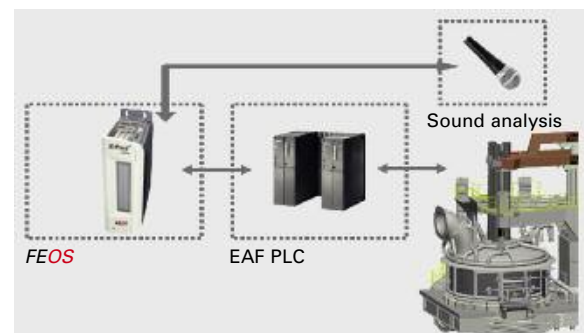
### THE CHALLENGE

The melt-down process in the electric arc furnace requires a particularly large amount of energy and thus especially has a financial impact on the plant owner. The cost pressure and increasing environmental protection conditions require intelligent solutions in order to make production processes more efficient and therefore more cost-effective. Here, the plant operator must be supported by suitable automation concepts. Because reduced melting times mean an increase in furnace yield.

A control system is required which measures all substantial processes in the arc furnace and the status of the furnace, and optimizes the energy input as a whole.

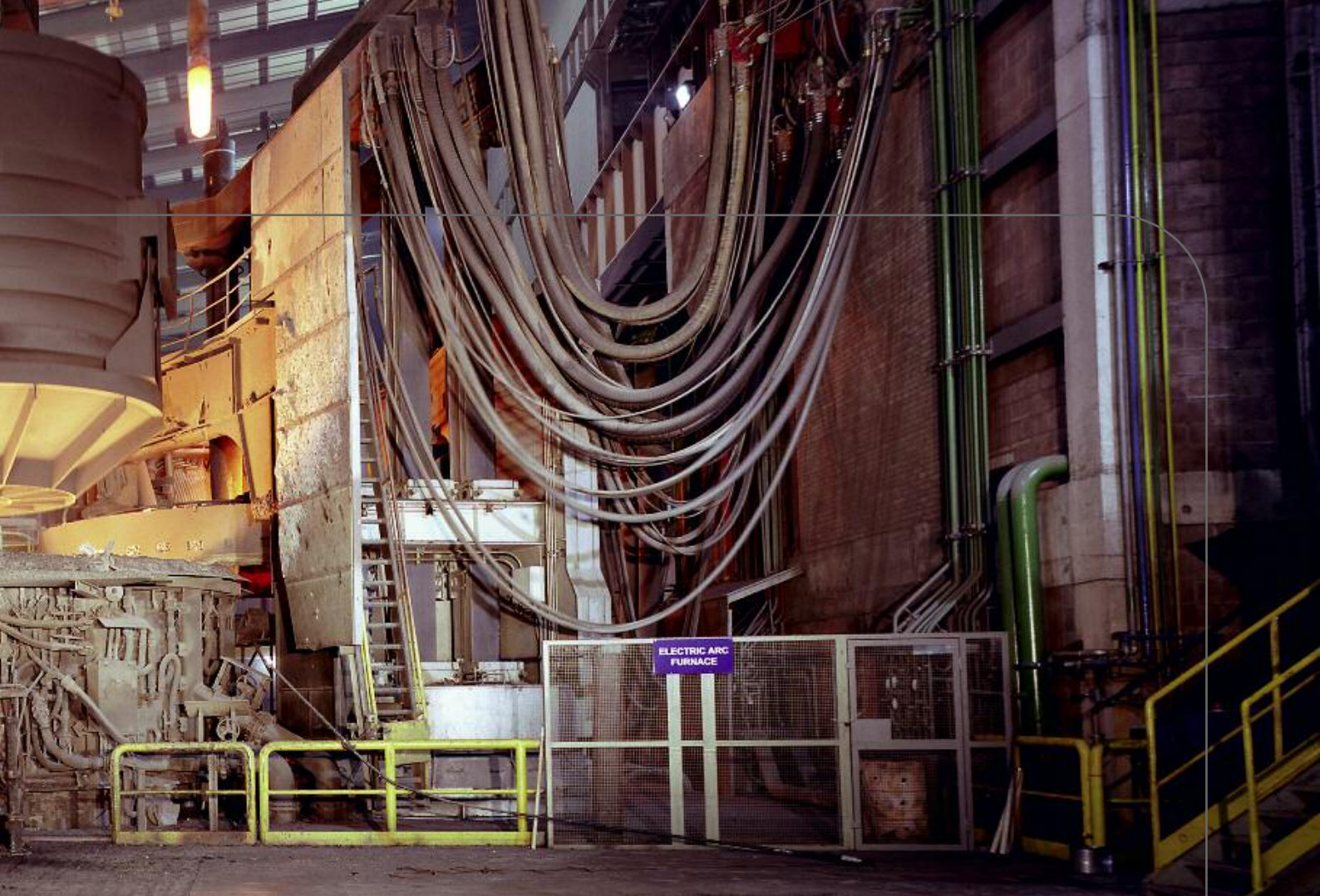
### OUR SOLUTION

SMS Siemag has set itself the task of measuring all substantial processes in the arc furnace and controlling them with an energy optimization system (FEOS). When designing the FEOS, care was taken to ensure that all parameters are easily adjustable and that the melting strategy can be adapted appropriately to the experience of the customer service engineers. Furthermore, FEOS can very easily be integrated into existing systems as a supplement within the scope of a modernization project.



FEOS as a supplement to the automation system.



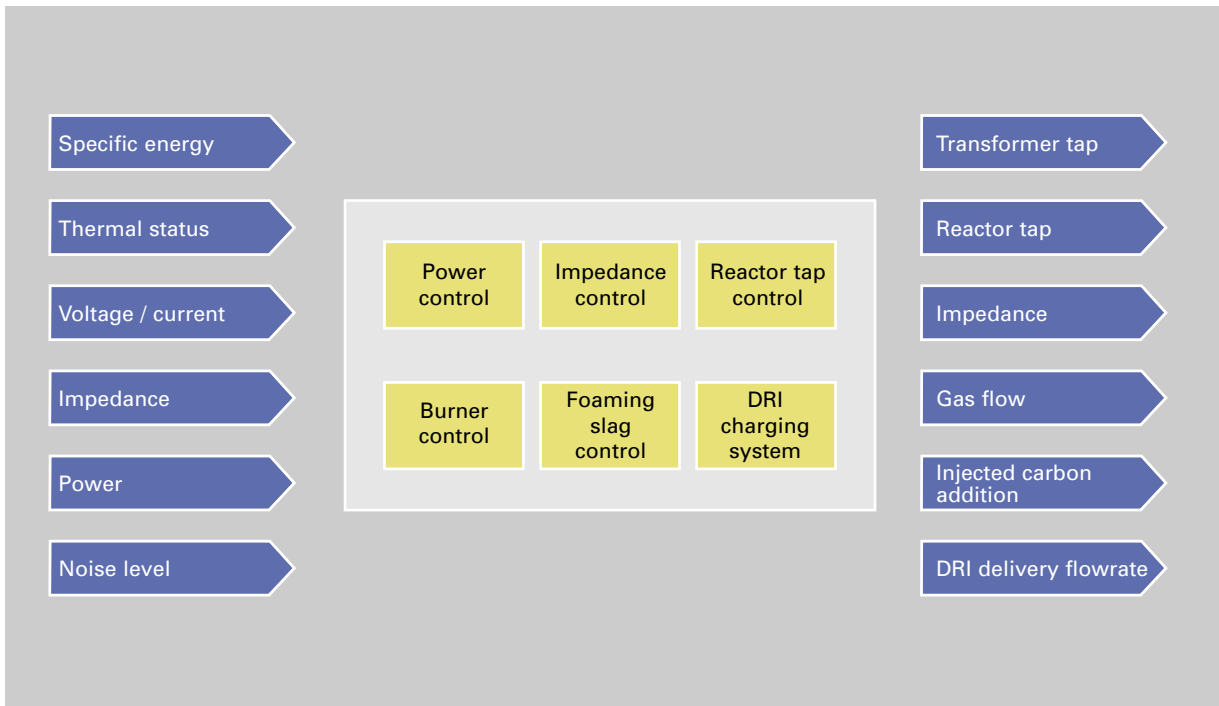


## ENERGY OPTIMIZATION SYSTEM

FEOS (Furnace Energy Optimization System) analyzes, monitors and controls the EAF melting process in order to ensure efficient energy input. To achieve this, FEOS provides for an optimal foaming slag, process-orientated control of switching steps, an optimal arc length, efficient burner use and energy-efficient addition of DRI/HBI.



SIS - SMS Siemag Injection System and carbon injection (left).



### POWER CONTROL

The module determines the transformer tap. The special features are:

Dynamic calculation of limit values, taking into account the overall thermal flow and actual status of the process, the forecast of the temperature curve and the avoidance of frequent tap changes.

### IMPEDANCE CONTROL

The impedance control allows for operation of the furnace with a constant current level without frequent tap changes. This is achieved through the optimal selection of the impedance operating point.

### REACTOR TAP CONTROL

In contrast to conventional model control, the throttling control indicates fewer system disturbances depending on the desired switching operation and, in cases of equal system disturbances, increased active power.

### BURNER CONTROL

Burner control ensures starting without any problems at the beginning of bucket charging and subsequent-

ly monitors the operating efficiency of the burner. If, for example, the scrap located above the burner is melted down very quickly, the burner is shut down at an early stage of the process, thus ensuring the optimal use of natural gas.

### FOAMING SLAG CONTROL

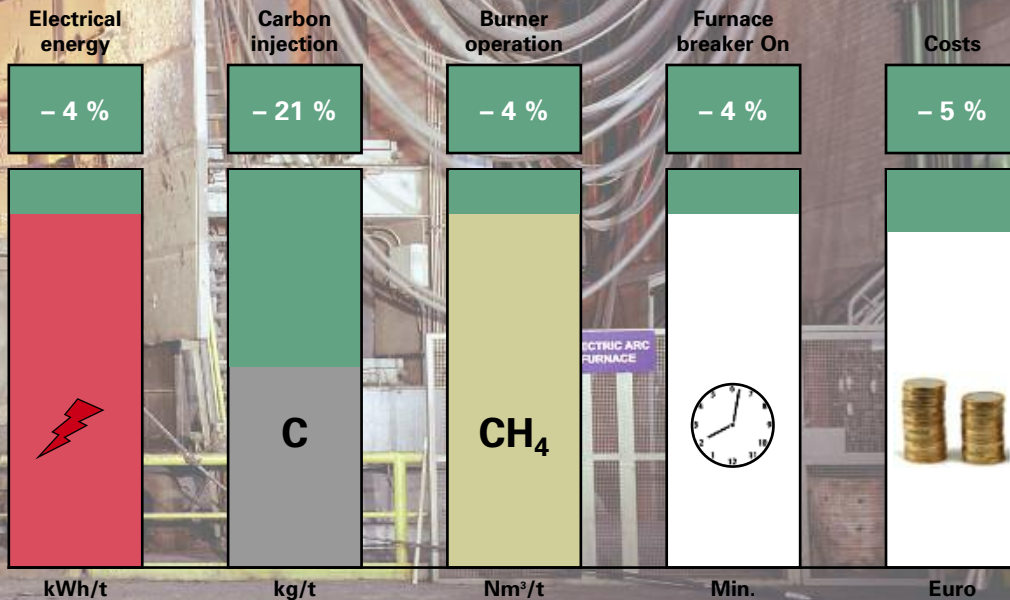
Foaming slag control determines the correct amount of carbon to be injected to produce a foaming slag. The foaming slag shields the electric arc and thus minimizes thermal radiation to the walls. The sound energy that is reflected by the arcs is also reduced, making the measurement of sound intensity highly relevant for evaluating the shielding of the electric arc.

### DRI CHARGING SYSTEM

The control concept for continuous charging is based on the electrical active power as well as on each existing furnace status and provides for a melt surface that is free from DRI build-up. As a result, the foaming slag practice and hence also the energy input remain unaffected.



# FEOS SAVES ENERGY AND MONEY



Reference plant: Aress EAF, AC, 125 t, 150 MVA

## SUCCESS IN PRACTICAL APPLICATION

FEOS has proven its suitability for practical application. Reference installations show that electrical and chemical energy consumption as well as carbon injection could be reduced. The melting time was reduced at the same time. This means that the furnace yield can be increased by means of these software components alone.

The following goals are achieved with FEOS:

- High melting power
- No interruptions due to shutdowns in the temperature limit range
- Quick response while simultaneously reducing the switching frequency
- Efficient and reproducible input of electrical and chemical energy
- Shorter tap-to-tap times
- Control of injectors
- Process-dependent and not time-dependent input of consumables

## CONVINCING ARGUMENTS FOR THE USE OF FEOS

- Lower energy consumption due to optimized and reproducible furnace operating practices
- Increase in production due to shorter tap-to-tap times
- Faster return on investment (< 12 months)
- Short commissioning of modernization projects thanks to simple integration into the existing automation system



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**MEETING your EXPECTATIONS**