

Off-gas Module

Maximize Chemical Energy with Off-gas

SmartFurnace®

The SmartFurnace® System enhances productivity and reduces energy use per ton of steel. As an advanced AI-driven expert system, based on the SmartKnB® platform developed by AMI, it dynamically adjusts electrical and chemical energy inputs based on real-time heat conditions. Recognizing that every EAF is unique, we provide the tools and expertise needed to optimize performance. With a modular design, the system enables coordination between energy input controls, while its open architecture allows for seamless customization, ensuring maximum efficiency.

AMI products are compatible with these two Off-gas sensors types:

- ▶ **Laser Off-gas sensor:** A laser-based sensor uses Tunable Diode Laser Absorption Spectroscopy (TDLAS) measuring the absorption of laser light by specific gas molecules (O_2 , CO , CO_2 , H_2O), directly retrieving gas temperature and their respective concentrations in real time.
- ▶ **IR Off-gas sensor:** A non-intrusive instant measurement device for CO , CO_2 , and H_2O concentration, as well as gas flow and temperature. The latest technology on infrared light emission detection of the EAF exhaust gases.

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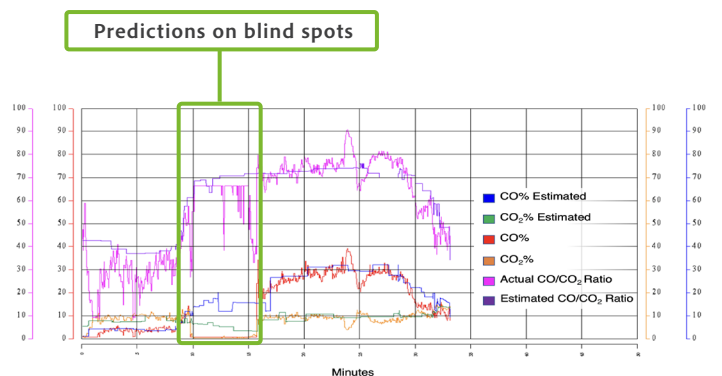
Using real-time Off-gas analysis to enable closed-loop chemical energy control in EAF operations while detecting abnormal water vapor levels for enhanced safety and efficiency. Utilizing the described sensor technology, and advanced algorithms, the system measures CO , CO_2 , temperature, flow, and H_2O in real time to optimize combustion, carbon injection, and oxygen use, synchronizing it with other sources of energy, reducing CO_2 emissions and improving process control.

Key Features

- ▶ Closed-loop control with the Oxygen Module for optimized carbon injection and oxygen lancing.
- ▶ Off-gas mass flow estimation enables calculation of carbon leaving the EAF for accurate bath ppm predictions.

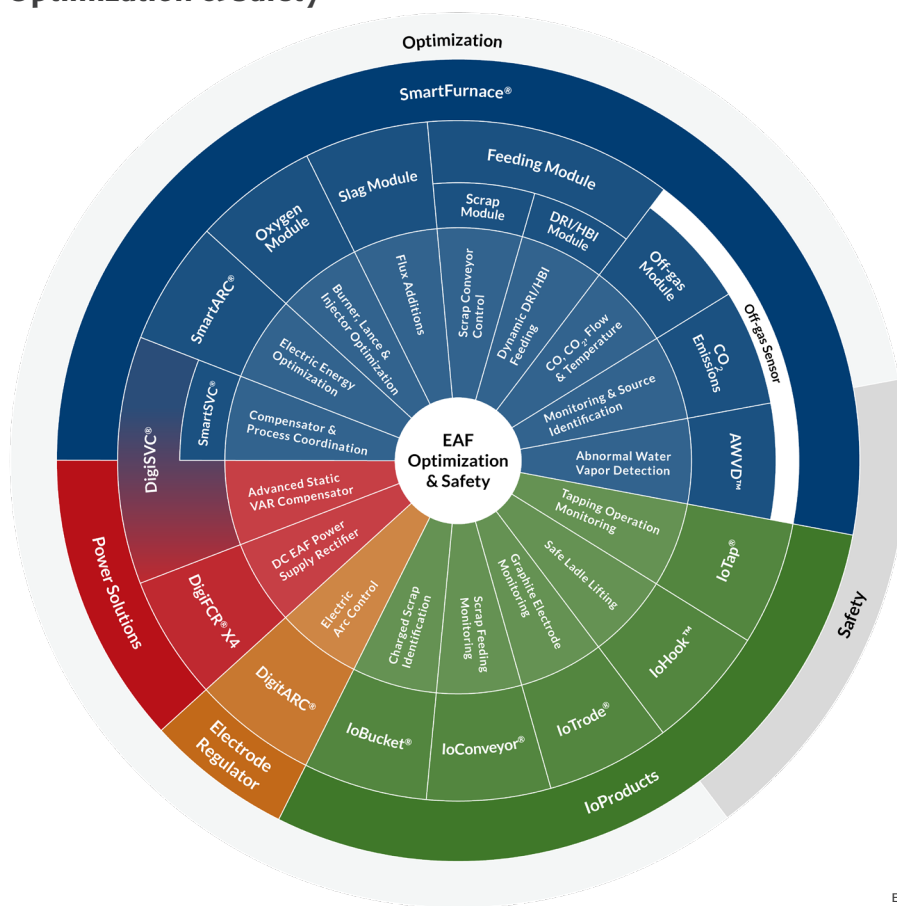
Benefits

- ▶ Enables accurate, real-time chemical energy optimization in EAF operations.
- ▶ More efficient post combustion control for better energy transfer.
- ▶ Improves carbon and oxygen injection control, reducing waste, melting time, and optimizing energy use.
- ▶ Helps prevent elevated temperatures on the Off-gas ductwork.



PREDICTION OF CO/CO₂ RATIO FOR EAF OPTIMIZATION

Electric Arc Furnace Optimization & Safety



EAF OPTIMIZATION & SAFETY DIAGRAM

Electrode Regulation System

The DigitARC® PX3 Electrode Regulation System is the core of AMI's EAF optimization solutions. With over 35 years of expertise and implementation in 275+ Furnaces worldwide, it delivers proven reliability and efficiency for even the most demanding EAF and LF applications. Our advanced electrode control technology ensures optimal arc stability, real-time performance monitoring, and seamless operator interaction through an intuitive interface. Today, more than 80% of the North American EAF steel capacity is melted with the AMI regulation systems.

IoProducts

Advanced solutions for monitoring and controlling critical aspects of the steelmaking process. Built on the SmartKnB® graphic development platform, they provide advanced customization within an open, user-friendly architecture. By integrating Artificial Intelligence, and Image Processing, these modules accelerate digitalization, improving efficiency, safety, and overall process optimization.

Power Solutions

We provide power electronic solutions that play a key role in enhancing Meltshop performance. The DigiFCR® X4 is our Firing Circuit Replacement system, designed to fully upgrade the controls of existing DC EAF power rectifiers. It improves current regulation while also extending protection for the furnace. Meanwhile, the DigiSVC® is our advanced Static VAR Compensator that stabilizes voltage, improves power factor, and compensates for reactive power in industrial electrical systems. Both solutions can be delivered with new power electronic hardware or as retrofits for existing systems, regardless of the original manufacturer.

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