

EAF Optimization & Safety

Integrated Solutions for Electric Arc Furnaces

AMI Automation, a Resonac Company, is a global leader in automation and control solutions. We specialize in designing, manufacturing, and implementing innovative technologies to enhance process safety and efficiency across industries such as steel, mining, cement, pulp & paper, and power generation.

Electric Arc Furnace Optimization & Safety

Our advanced solutions enhance EAF performance, efficiency, and safety through artificial intelligence, real-time monitoring, and precision control. From arc regulation and raw material input to emissions tracking and power optimization, our technologies improve productivity, reduce energy consumption, and ensure process stability.



EAF OPTIMIZATION & SAFETY DIAGRAM



GRAPHITE ELECTRODES MELTING SCRAP

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.

- **DigitARC®:** Forms the foundation of AMI's optimization solutions for all EAFs, providing state-of-the-art electrode control and advanced monitoring tools for heat performance, all within a practical and user-friendly interface.



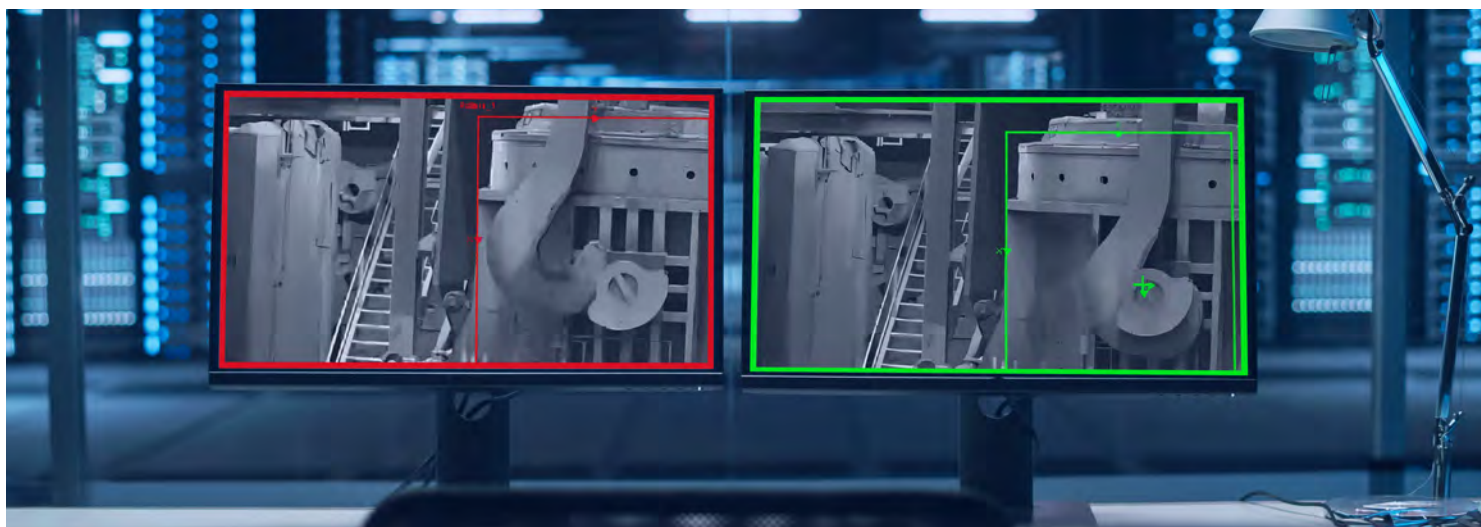
AMI ENGINEERS ON SITE

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.

- **SmartARC®:** Determines optimal voltage and current setpoints based on heat stage, slag level, arc stability, and scrap mix, providing precise operating points.

- ▶ **Oxygen Module:** Uses real-time electrical data from DigitARC® PX3 and SmartARC® to regulate gas, oxygen, and carbon flow, considering heat conditions and bath composition for accurate endpoint prediction and combustion control.
- ▶ **Slag Module:** Implements an online mass balance to model slag composition, recommending and controlling flux additions to achieve target basicity and MgO saturation.
- ▶ **Feeding Module:** Optimizes the feeding speed of raw materials to be melted using metallurgical modeling to maintain stable power input, temperature profiles, and bath composition. It can be used to control the feeding of scrap or DRI/HBI.
- ▶ **Off-gas Module:** Analyzes real-time Off-gas data with laser on infrared technology to optimize chemical energy use in the EAF, improving efficiency and reducing waste.
- ▶ **CO₂ Emissions:** Monitoring of the real time emissions of CO₂ using Off-gas analyzer in the furnace exhaust. Identification and calculation of the individual emissions contributions.
- ▶ **AWVD™:** Uses AI and machine learning to differentiate normal water content in the Off-gas from abnormal water vapor conditions, enabling early detection and prevention of potential issues.



IOHOOK™ MONITORING FOR GOOD LADLE HOOKING

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.

- ▶ **IoTap®:** Optimize clean and safe steel production with online slag carryover and ladle fill level measurement. Our high-speed, high-resolution infrared cameras enhance EAF tapping operations, reducing spill risks and slag reversion consumption.
- ▶ **IoHook™:** Sends a good to lift signal to the crane operator when hooks are correctly on the ladle handles, preventing unsafe lifts.
- ▶ **IoTrode®:** Monitors, regulates, and optimizes graphite electrode consumption using advanced AI-driven classification and Industry 4.0 technologies. Enables dynamic electrode cooling control based on real-time oxidation feedback to reduce electrode consumption.
- ▶ **IoConveyor®:** Utilizing sensor fusion devices and a deep learning algorithm, our system measures real-time scrap speed and volume to optimize continuous charging in EAF. It also classifies scrap types and detects unwanted materials for enhanced efficiency and safety.
- ▶ **IoBucket®:** Improves bucket charging by using Machine Vision and AI to identify scrap type and volume distribution in real time before entering the EAF.



MV HARMONIC FILTER

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.

- ▶ **DigiFCR® X4:** Is AMI's next generation retrofit solution for DC Electric Arc Furnace rectifier controls, designed to extend the life of existing systems while dramatically improving performance and reliability. Instead of replacing the entire power rectifier, DigiFCR® X4 allows for a seamless upgrade of obsolete control boards, enhancing current control, arc stability, and furnace protection. Available as a retrofit for any rectifier brand or as part of a new rectifier system built by AMI.
- ▶ **DigiSVC®:** Is AMI's high-performance Static VAR Compensator solution, engineered to regulate voltage stability, correct power factor, and mitigate reactive power and flicker in demanding industrial environments such as Electric Arc Furnaces. Whether implemented as a completely new installation or as a retrofit through our DigiFCR® SVC platform, the system delivers precise dynamic compensation, advanced diagnostics, and high-speed trending to improve process stability and reliability.
- ▶ **SmartSVC®:** Integrates SmartFurnace® with our DigiSVC® to balance reactive power, minimize electrical harmonics, and optimize system coordination for improved efficiency and reliability.

DigitARC®, SmartFurnace®, SmartKnB®, SmartARC®, AWVD™, IoTap®, IoHook™, IoTrodé®, IoConveyor®, IoBucket®, DigiFCR®, DigiSVC® and SmartSVC® are trademarks of AMI International SAPI de CV. All other products mentioned are registered trademarks and/or trademarks of their respective companies. All specifications in this document are subject to change without notice.