Years ago, the task of an electrode control system was limited to moving the electrode and achieving a pre-defined set point only. Further developments by manufacturers of electric arc furnaces (EAF) resulted in several innovations, which boosts the efficient operation of a modern EAF.

Your challenge:
In order to meet the requirements for maximizing efficiency and reducing energy consumption for electric arc steelmaking, accurate process analyzing and control tools are essential. To achieve better process effectiveness, a modern electrode control system dynamically reacts to the actual process demands. An enhanced foaming slag control strategy is also required for complete immersion of the arcs and to increase their efficiency.

All relevant process data have to be visualized, recorded and reported in order to support the operator. Sophisticated analyzing tools provide instant feedback about furnace melting performance.

The electrode control system is responsible to control the process stability in order to protect the furnace from damage.

Our solution:
SIMETAL Arcos is a highly sophisticated PC-based electrode control system for all kinds of three-phase EAF and ladle furnaces. SIMETAL Arcos uses a high performance computer together with intelligent measurement technology to compute highly sophisticated process control algorithms. Fast data acquisition and processing provides a much larger range of process information on which basis the electrode regulation can auto-adapt the control strategy.

The applied industrial PC platform is robust and ensures operational safety and reliability in a rough industrial environment.
Additional modules of SIMETAL Arcos

- **Automated process and arc stability control**
  Arc stability is consequently monitored and main regulation parameters such as arc length and control behavior are dynamically adapted to the melting progress. This significantly improves the process effectiveness and maximizes the energy input. At the same time, directed/targeted control of the process makes it possible to improve energy efficiency by means of a detailed melting program.

- **Management of foaming slag**
  SIMETAL Arcos incorporates a fully automatic smart foaming slag manager that guarantees sufficient immersion of the electric arc. The system also takes into account the essential protection of the water-cooled panels in the furnace vessel. Damages and downtime are avoided through thermal balancing of the electric arcs.

- **Monitoring and minimizing of flicker**
  Extensive flicker diagnostics are implemented in order to minimize the effects of the electric arc on the power supply network. These diagnostics can also be used to control the melting program. Automatic changes to the transformer or reactor tap can thus minimize for elevated flicker values. The diagnosis can be accessed online and provides operators with important information about recent network influences.

- **Elimination of oscillations**
  The modern control strategy of SIMETAL Arcos is designed to achieve the highest degree of stability. Individual adaptation to each EAF guarantees stable operation. The system effectively reduces oscillations that are caused mechanically.

- **Condition monitoring of mechanical system**
  All relevant production data as well as key performance indicators of auxiliary equipment are recorded and compiled in reports. Based on these records, long-term evaluations can be performed for diagnostics and troubleshooting activities in order to identify changes in control processes or mechanical problems that may have gradually crept into the system.

- **Integrated visualization system**
  A further feature is the integrated visualization system that provides an overview of the important parameters and simplifies parameterization.

Advantages of SIMETAL Arcos:

- Reduced energy consumption and increased melting efficiency due to auto-adaptive regulation algorithms.
- Increased process stability due to additional features that are monitored (e.g. flicker, oscillation, network stability).
- Higher productivity ensured by automatic melting profiles and process parameter adaptation.
- Sustainable CO₂ savings achieved by the integrated foaming slag management system.
- Highest reliability due to main focus on robustness and operational safety in an industrial environment.
- Ensured process quality due to integrated process visualization and highly sophisticated data recording and evaluation.