Contribution ID: **48**   Type: **Oral Presentation - Full Paper will be submitted**

Forging the Future: Advanced Automation in Converter Steelmaking for a Sustainable Twin Transition

Wednesday 21 May 2025 14:40 (20 minutes)

The steel industry is undergoing a transformative phase driven by digital and green transitions, known as the Twin Transition. Automation solutions are a core of the Twin Transition, seamlessly integrating digital innovations to enhance efficiency and precision while enabling sustainable practices that reduce emissions, optimize resource use, and drive decarbonization in industrial operations. This paper gives an insight in how Twin Transition in converter steelmaking is enabled by integrating condition monitoring, process optimization and expert systems to achieve the vision of an autonomous plant, improved efficiency, sustainability and reliability.

The concept of Autonomous Plant, meaning the acceleration of plant operation by minimizing human intervention, enabled by remote monitoring, merged control and one-person-operation with the Central Operation Cockpit, is introduced as an important step toward leaner and more agile operational frameworks. This approach combines intuitive human-machine interfaces and autonomous systems, with the future goal to empower a single operator to oversee multiple converters safely and efficiently.

Several automation solutions are applied to pave the way to an Autonomous Plant.

Expert Systems, like the BOF Tapping Expert, equipped with AI-based optical imaging and smart decision-making capabilities enabling automated functions, enhances operational safety through minimized human intervention and in parallel increases productivity.

Process Optimization combines dynamic simulation and data analytics to improve process accuracy and product quality, reduce consumption figures, fine-tune parameters, and lower emissions.

Condition Monitoring leverages data acquisition and predictive analytics to detect anomalies and prevent equipment failures, ensuring plant availability and product quality. The digital assistant ALEX provides intelligent support for setting fast actions to properly handle alarms and warnings. This is done with 24/7 available digitalized know-how of experienced operators and experts from Primetals Technologies, which can be continuously extended.

This paper highlights the potential of the Twin Transition supporting future steelmaking. Through the introduction of use cases and industrial applications, this paper offers insights into how automation in converter steelmaking can achieve a balance between economic profitability and environmental responsibility, positioning the industry at the forefront of innovation.

Author: Ms MAYRHOFER, Anna (Primetals Technologies Austria GmbH)

Co-authors: Mr VOGLMAYR, Bernhard (Primetals Technologies Austria GmbH); Mr VORABERGER, Bernhard (Primetals Technologies Austria GmbH); Mr HUBMER, Rudolf (Primetals Technologies Austria GmbH); Mr RADNER, Stefan (Primetals Technologies Austria GmbH)

Presenter: Mr RADNER, Stefan (Primetals Technologies Austria GmbH)

Session Classification: Industry 4.0: Automation, modelling and on-line process analyses

Track Classification: Industry 4.0: Automation, modelling and on-line process analyses