Contribution ID: **270** Type: **Oral**

Optimization of Process Control and Energy Consumption in Hot Flat Ring Rolling Using Interactive Real-Time Software

Wednesday 8 October 2025 17:10 (20 minutes)

Hot Radial Axial Ring Rolling is a crucial process in seamless ring production for various industrial sectors, ranging from oil & gas to aerospace. To configure and optimize this complex process, modern rolling mills rely on computerized controls, where operators must input process parameters derived from multiple sources-including tables, formulas, experience, and time-consuming FEM simulations. The process requires highly accurate and consistent input, as many parameters are interdependent through complex correlations, making it challenging to predict the outcome when modifying one or more settings. At the same time, optimizing energy consumption has become a key priority in both industry and research, as it significantly impacts production costs and environmental sustainability.

The proposed real-time software package assists operators by automatically determining all necessary parameters for controlling the rolling process based on final ring dimensions, material properties, temperature, and machine settings. It interactively suggests blank ring dimensions,suitable tools, rolling curves, and ring growth strategies to minimize process time and energy consumption. Through a graphical user interface, operators can modify or compute any parameter, gaining a faster yet deeper understanding of the production process while optimizing rolling time and total energy requirements. The software communicates the optimized process parameters directly to the rolling mill's control requipment and generates a post-process log file for verification. It has been validated through multiple industrial production runs and FEM simulation replicas, confirming its effectiveness in minimizing energy consumption while maintaining process efficiency.

Primary authors: PERIN, Mattia (Università di Padova); Mr CASINI, Mirco (Project Group s.r.l.)

Co-authors: Prof. BERTI, Guido A. (Project Group s.r.l.); Mr MUNARI, Marco (Project Group s.r.l.)

Presenter: Mr MUNARI, Marco (Project Group s.r.l.)

Session Classification: Forging

Track Classification: Forging