Contribution ID: **100** Type: **Oral Presentation**

Driving efficiency in stainless steel production: Demonstrated impact of electromagnetic stirring on a 65-ton AC electric arc furnace at Walsin Lihwa

Wednesday 13 May 2026 11:00 (20 minutes)

The steel industry is under continued pressure to enhance efficiency to satisfy financial and sustainability goals. In stainless steel production, higher alloying costs and more complex process control requirements create additional challenges. At Walsin Lihwa's Yenshui plant, two persistent issues - non-uniform bath temperature distribution and bottom skull formation - were limiting melting efficiency and increasing energy consumption for their 65-ton electric arc furnace (EAF). To address these challenges, electromagnetic stirring (EMS, ArcSave®) technology was implemented in 2025 and evaluated through hot commissioning and performance testing. EMS improved thermal homogeneity and melt flow, reducing electric energy consumption by 2.5–3.5% for standard stainless steels, with additional savings for high-alloy grades. Electrode consumption decreased by 5.6% and gunning refractory usage on the slag-line area was reduced by 45%, owing to improved heat distribution and minimized cold spots. Oxygen demand was lowered by approximately 100 Nm^3 per heat, while scrap yield increased by 1–2%. All contractual performance guarantees were met, confirming EMS as an effective metallurgical solution for process optimization and sustainability. The paper also presents EMS system tailor-made design, installation challenges, and control strategies, supported by electromagnetic field simulations using Dassault Opera® and CFD modeling in ANSYS Fluent®. The stirring velocity and energy within the melt are illustrated in Figure 1. These simulations guided the optimization of stirring profiles, demonstrating EMS's capability to accelerate scrap and ferroalloy melting, enhance metallic yield, and improve productivity in stainless steel smelting. The EMS system features an automated whole bath stirring profile, intelligently adjusting stirring direction and velocity to match the requirements of each EAF process step, very low maintenance and reliable operations.

Speaker Country

Sweden

Speaker Company/University

Walsin Lihwa Corporation

Primary authors: Mr LAI, Larry (Walsin Lihwa Corporation); Dr TENG, lidong (ABB Metallurgy, ABB AB)

Co-authors: Mr CHEN, Chunhao (Walsin Lihwa Corporation); Mr KACZMAREK, Kasper (ABB Corporate Technology Center, ABB Sp. z o. o.); Mr CHU, Tony (ABB AB in Taiwan)

Presenters: Mr LAI, Larry (Walsin Lihwa Corporation); Dr TENG, lidong (ABB Metallurgy, ABB AB)

Session Classification: Energy Efficiency and Consumption Reduction

Track Classification: EEC 2 - Process Optimization: EEC 2.A Energy efficiency and consumption reduction strategies