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From Concept to Continuous Improvement – Stahlwerk Thüringen as a Lighthouse for RHI Magnesita's 4PRO Business Model

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Stahlwerk Thüringen (SWT) represents one of the most advanced real-world implementations of RHI Magnesita's 4PRO business model, demonstrating how the pillars **Performance**, **Partnership**, **People**, and **Planet** converge to drive continuous improvement and deliver measurable metallurgical, environmental, and economic value.

This success is rooted in a 30-year partnership, during which RHI Magnesita progressively established a commercial, fully digitalized Full Line Service (FLS) at SWT. Through professional refractory management, continuous monitoring, and structured maintenance concepts, specific refractory wear and total refractory costs in the EAF were reduced by approximately 50%. Further efficiency gains were achieved through closed casting practices, the introduction of tundish slide gate systems, and a shift toward monolithic lining concepts, significantly reducing refractory service-related OPEX.

Following these strong past achievements, the cooperation continues toward circular metallurgical additives and advanced slag engineering, provided by MIRECO, the joint venture of RHI Magnesita and HORN & Co.

The introduction of Circular Metallurgical Additives (CMA) and data-driven slag engineering, embedded in MIRECO's CERO Waste philosophy, established a holistic sustainability approach. This concept is transferable to regions where MIRECO operates, supported by local recycling and processing infrastructure. Through the incorporation of Refrattari Trezzi in the Milan region serves as one example of how such solutions can be enabled locally.

From a **Performance** perspective, replacing conventional EAF and ladle additives with CMA generated six-digit annual Total Cost of Ownership savings, complemented by additional six-digit savings through optimized slag practice and reduced manganese alloy consumption. Overall, SWT unlocked a value creation potential of approximately €1 million per year. Additional benefits include reduced refractory wear through the complete elimination of CaF_2 and shorter desulphurisation times enabling productivity gains.

The **Partnership** pillar is reflected in decades of trust-based collaboration and strong cross-functional integration. Direct on-site coordination by experienced technicians remains a key success factor.

From a **People** perspective, a Slag Engineering and Circular Additives Specialist supported implementation across all shifts, while teams from RHIM, MIRECO, and SWT—spanning Sales, Technical Marketing, R&D, Recycling, and Operations—ensured rapid adoption and stable execution.

From a **Planet** perspective, CMA substitution delivers CO_2 savings of approximately 11 kg per tonne of steel. Additional benefits include landfill avoidance, improved operator health, and groundwater protection.

This case demonstrates how 4PRO creates multi-level added value and is transferable to other regions. In particular, refractory recycling provides a proven pathway toward circular, high-performance steelmaking wherever MIRECO infrastructure is available.

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