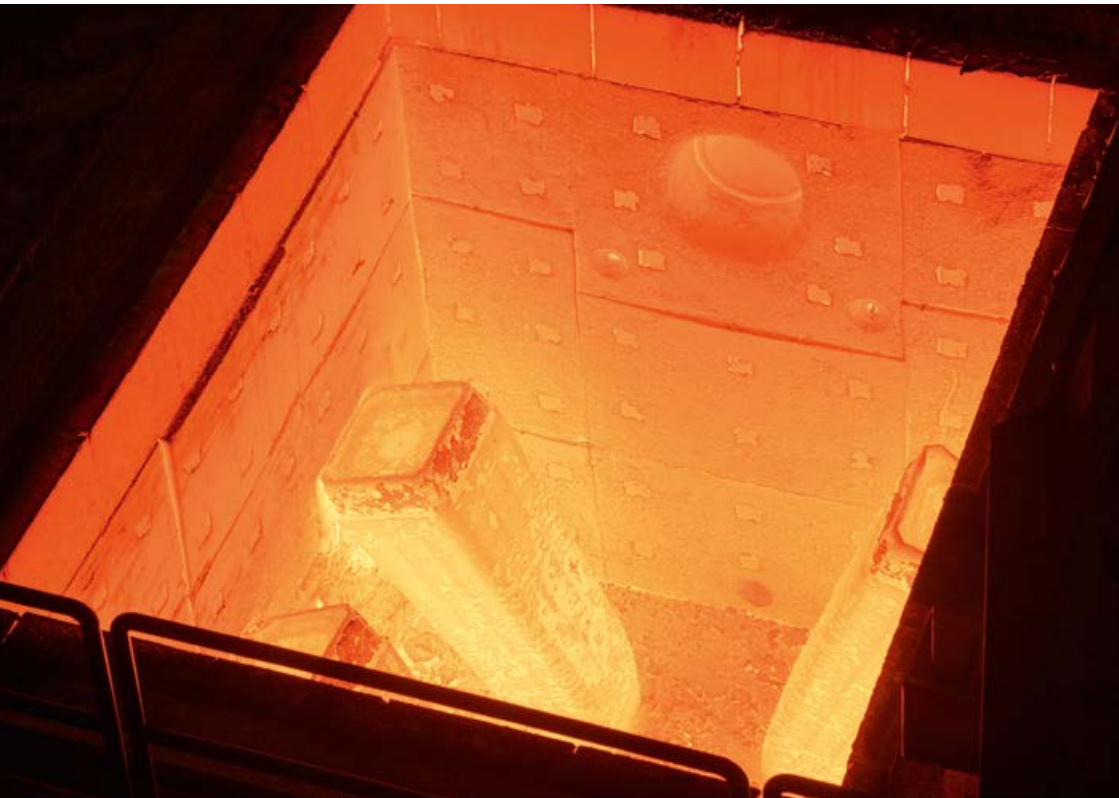




REBOX[®] flameless oxyfuel technology.

Sandvik maximises production capacity with focus on environmental benefits.



Customer.

Sandvik Materials Technology is a world-leading developer and manufacturer of advanced stainless steels, special alloys, titanium and other high-performance materials for the most demanding industries. The company's aim is to increase the efficiency, profitability and safety

of industrial processes, also by fully integrating sustainability into its offerings and operations. Sandvik specialises in tubes, pipes, wires, strip and metal powders as well as industrial heating products.



Peter Andersson, Senior Advisor Investments at Sandvik (right), and Anders Carlsson, Linde Steel expert (left), discussing the REBOX solution.

Challenge and solution.



Challenge.

Sandvik was keen to modernise its reheating operations by adding four new pit furnaces. It wanted to improve environmental performance by reducing fuel consumption along with emissions of harmful substances such as nitrogen oxides (NOx). Sandvik also wished to increase heating capacity and create a more uniform heating effect for better product quality.

Solution.

Sandvik decided to install four new soaking pit furnaces. It turned to its trusted partner Linde, who had already successfully executed several projects for Sandvik. Linde was asked to design and deliver the new furnaces. In 2016, Linde installed the four furnaces, fitting two REBOX® flameless oxyfuel burners in each pit. At the same time, Sandvik decided to switch from LPG to LNG supplied by Linde. Linde delivered the full project scope – from the REBOX furnaces through the flowtrains for oxygen and fuel to the gas supply schemes, based on deliveries of natural gas and on-site generation of oxygen.

Technology and benefits.



Technology.

Building on its long-standing and close ties with customers in the steel industry, Linde developed REBOX flameless oxyfuel technology to significantly boost furnace efficiency. It is designed to give operators of reheating furnaces maximum production capacity while optimising energy consumption.

REBOX flameless oxyfuel replaces the nitrogen ballast in air (around 78 %) with pure oxygen. As nitrogen is not combustible and is also poor at radiating heat, it only makes a marginal contribution to the heating process at high temperatures. By comparison, combustion gases such as carbon dioxide (CO₂) and water vapour (H₂O) are good at radiating heat. Consequently, nitrogen results in low thermal efficiency and high volumes of exhaust gases and emissions. The REBOX flameless oxyfuel combustion system replaces the existing air/fuel burners with burners that run on 100 % oxygen.

This improves heat transfer by increasing the concentration of radiating compounds such as CO₂ and H₂O. By improving heat transfer, REBOX flameless oxyfuel can reduce CO₂ emissions and cut fuel bills by up to 50 %.

In addition, the flameless combustion creates a more uniform temperature inside the furnace by distributing radiating gases more evenly. Lower peak flame temperatures reduce the formation of NO_x and lower the risk of refractory damage caused by hotspots.

Benefits at a glance.

- More than 50% increase in throughput
- Fuel consumption down by 35%
- More uniform temperature
- Lower NO_x emissions
- Drop in fuel-based sulfur oxide (SO_x) and CO₂ emissions
- Lower fuel gas volumes and temperatures



“REBOX flameless oxyfuel allowed us to maximise production capacity with fewer furnaces, less fuel and lower emissions – all of which translates into lower investment and operating costs.”

Peter Andersson, Senior Advisor Investments at Sandvik

Getting ahead through innovation.

With its innovative concepts, Linde is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

Linde offers more. We create added value, clearly discernible competitive advantages, and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardised as well as customised solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimisation, and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

Linde – ideas become solutions.

Linde AG

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