



SIAM YAMATO STEEL



OXYGON[®] XL.

For maximising efficiency in ladle preheating.



Customer.

Siam Yamato Steel Co., Ltd. (www.syssteel.com) is the largest producer of structural steel in Thailand. The company manufactures and distributes hot-rolled structural steel products for the domestic construction industry and for export. SYS specialises in H-beams, I-beams,

channels, angles, cut beams and sheet piles. At the company's two plants in Mueang, Rayong, Thailand (SYS1 and SYS2), with melt shops and hot rolling mills, SYS fabricates approximately 1 million tonnes of steel every year.



A Linde engineer explains the OXYGON® safety concept to a SYS process engineer.

Challenges and solutions.



On the left, the old air-fuel preheating station and, on the right, the new OXYGON® flameless oxyfuel preheating station, both firing at full power.

Challenge.

The conventional air-fuel burners originally used by SYS for preheating the 95-tonne ladles consumed a large amount of fuel and resulted in slow heat-up times. In addition, the original control systems did not deliver the improved levels of safety that SYS was aiming for. SYS was thus keen to reduce fuel consumption, speed up heating times and enhance safety. The company turned to Linde for assistance.

Solution.

In consultation with Linde, SYS realised that Linde's flameless OXYGON® XL ladle preheating technology was the most effective way to meet these challenges. SYS decided to retrofit the two horizontal ladle preheating stations in use at both its plants with OXYGON flameless oxyfuel technology. At the beginning of 2015, Linde thus installed OXYGON XL ladle preheating combustion

burners and supporting flow control equipment at SYS1 and SYS2. Linde delivered the equipment with guaranteed performance levels. In addition to the compact 1500 kW OXYGON XL oxyfuel burner, this included:

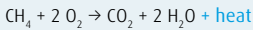
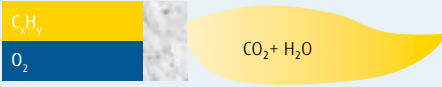
- PLC-based control system for natural gas, oxygen and burner operation management
- Remote operator interface in the preheating station control room
- Flowtrains for natural gas and oxygen
- Installation support and full commissioning

Building on the success of these two installations, SYS placed a follow-up order for four additional OXYGON XL ladle preheating systems, two vertical and two horizontal.

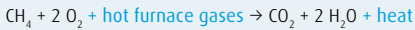
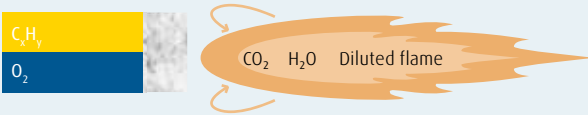
Technology and benefits.

A schematic comparison between flameless and conventional oxyfuel

Conventional oxyfuel



Flameless oxyfuel



The principle of flameless oxyfuel.

OXYGON flameless oxyfuel combustion works by diluting the flame with the flue gases – which are free of the nitrogen ballast in ambient air. The flame dilution also disperses the combustion gases throughout the ladle for more effective and uniform heating. This helps to avoid hot spots and local overheating. The flame contains the same amount of energy as conventional oxyfuel flames, but has a lower flame temperature. This substantially reduces the creation of nitrogen oxides (NOx).

OXYGON burners can be started up quickly and thus give operators the flexibility to ramp up or down capacity on demand. They also benefit the plant operators as the ladle preheating station is quieter. In addition, the elimination of flames around the ladle lid creates a safer and cooler workplace.

Benefits at a glance.

- 60% reduction in fuel consumption
- 25% acceleration of heat-up times
- 60% drop in carbon dioxide emissions (corresponding to approximately 100 tonnes per annum per installation)
- Lower NOx emissions
- More homogeneous heat distribution and improved temperature uniformity in the ladle
- Safe, user-friendly operator interface for easy selection of heat/program mode
- Dry firing cycles performing precisely according to specification
- Management information system reporting capabilities



“With OXYGON® flameless technology from Linde, we increased productivity by 25 percent and reduced fuel consumption by 60 percent. Which is of course good news for climate mitigation – each of the six retrofit stations emits around 100 tonnes less carbon dioxide every year.”

Khun Trakune Arjkhumwongsa, Steel Plant 1 Department Manager of Siam Yamato Steel Co., Ltd.

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 GmbH

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