



ALUMELT™ Low-temperature Oxyfuel Combustion

Even heating for higher output, no hot spots, and lower emissions



Low-temperature oxyfuel burner in the melt shop at SAPA Heat Transfer, Sweden.

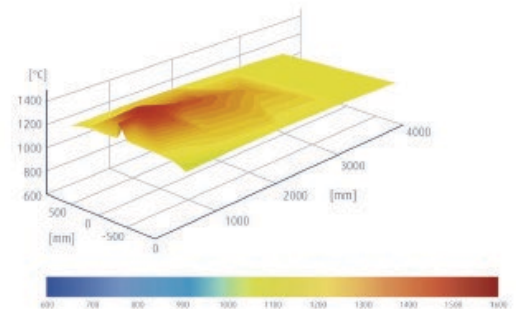
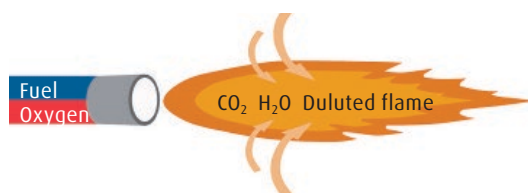
- Summary**
- Up to 100%, typically 30–50%, higher melt rate and up to 50% lower fuel consumption
 - Low flame temperature, comparable to that of airfuel technology, and uniform heat distribution to increase melt rates, cut emissions of NOX and reduce dross
 - Unique design for aluminium melting conditions

Customer SAPA Heat Transfer, Sweden.

Challenge With the increasing demands for non-ferrous metals, increasing the throughput of existing melting furnaces represents a challenge for the aluminium industry. Producers also need to constantly improve process yields, cut fuel consumptions and reduce emissions of gases, such as CO₂ and NOX. This market situation is a familiar one for Linde, with its extensive knowledge and experience of combustion and customer processes from over 130 oxyfuel installations in aluminium.

Low-temperature Oxyfuel Linde's ALUMELT™ low-temperature oxyfuel combustion technology is specifically designed to meet the unique challenges of the aluminum industry. It helps boost capacity by providing uniform furnace temperatures that prevent hot spots, while also reducing fuel consumption, improving yields, and lowering emissions. The combustion occurs under a diluted oxygen concentration by mixing the furnace gases into the combustion zone. This slows down the oxyfuel combustion reactions and results in lower flame temperatures, comparable to those of airfuel technology, which are below the point at which thermal NOX is created. The mixing of furnace gases into the flame also disperses the energy throughout the entire furnace for uniform heating and more efficient melting. The dispersed flame contains the same amount of energy but with a much more effective distribution. The overall result is more homogenous heating and melting, enabling not only a higher power input and thus higher melt rates, but also reduced formation of dross and NOX emissions.

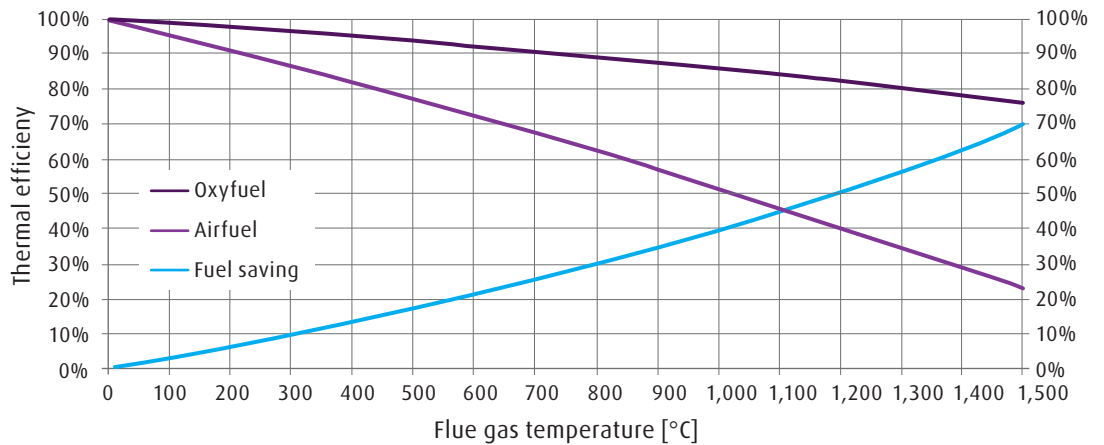
In-furnace temperature measurement shows a uniform and low flame temperature without peaks, which helps to achieve higher melt rates, avoiding hot spots and thermal NOx.



In so-called low-temperature oxyfuel, the flame is diluted with the furnace gases which lowers the flame temperature and promotes an effective heat distribution.

Oxyfuel combustion

With oxyfuel combustion, removing nitrogen from the combustion and heat transfer process has several advantages that enable higher production output in new or existing furnaces, reduced fuel consumption, improved process control and lower emissions. The thermal efficiency of low-temperature oxyfuel is equal to that of conventional oxyfuel.



Features

- Comparable flame temperature to that of airfuel technology
- Adjustable degree of flame dilution
- Suitable for all types of reverberatory furnaces
- Power: 0.2–3 MW
- Self-cooling ceramic burner stone, 300 mm burner diameter, weight 80 kg
- Compact, powerful and modular design of burner for easy installation and maintenance
- Integrated flame monitoring by UV cell and pilot flame for automatic ignition

Customer benefits

- Low-temperature oxyfuel for a homogenous melting, resulting in increased furnace throughput capacity Up to 100%, typically 30–50%, higher melt rate.
- Up to 50% lower fuel consumption
- Uniform furnace heating to avoid hot spots, so reducing dross formation
- Low maintenance, no need for recuperator, electrical air blower or regenerative solution
- Substantially reduced flue gas volumes, up to 80%, for a compact exhaust solution
- Major reductions in CO₂ and SO₂ emissions – up to 50%
- Ultra-low levels of NOX emissions, reduced by up to 90%



More capacity at SAPA

SAPA Heat Transfer, Finspång, Sweden is a producer of aluminium heat-exchanger strip for the automotive market. The company melts rolling mill scrap, wire mill scrap and primary ingots of various shapes and sizes. SAPA installed oxyfuel back in 1995 to increase production and to reduce NOX emissions. The 28-tonne melting furnace was optimized in collaboration with Linde in 2002. To further improve furnace performance, low-temperature oxyfuel was introduced in mid-2005. Since the switch from conventional oxyfuel, SAPA has seen a 10% increase in melt rate, a 10% reduction in energy consumption and a 90% reduction in NOX emissions, while dross formation has been reduced by 9%.

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