



Low-temperature Oxyfuel solutions in aluminum re-melting. 60% more re-melting capacity with 50% less fuel.



The two lines for primary foundry alloys production at Hydro Aluminum's Årdal works were converted to Low-temperature Oxyfuel in 2007 and 2008.

Summary

- Turnkey oxyfuel installations in four re-melting and mixing furnaces
- 60% more capacity to re-melt commodity metal
- 50% reduced specific fuel consumption
- 60% less emission of NO_x
- Trend towards reduced dross
- 2-7 dB(A) reduced noise level

Customer

Hydro Aluminum, Øvre Årdal, Norway

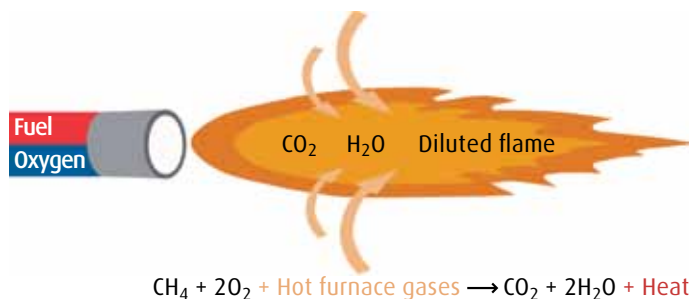
Background and customer objectives

Hydro Aluminum at Øvre Årdal produces 175,000t/y pot-room metal. There are two cast houses, one for sheet ingots and one for primary foundry alloys. The capacity for primary foundry alloys is 130,000t/y from two casting lines. Each casting line is fed by two mixing and re-melting furnaces. The primary foundry alloys are mainly AA4000 series in shape of either 8 kg ingots or 75x50 mm bars. The furnace batch is built up from a mix of hot liquid pot-room metal, solid commodity metal, silicon and alloys.

In year 2007 a 50,000 t/y pot-room was closed at Hydro Årdal. This meant that the cast house had to increase the re-melting of commodity metal in order to keep up the production of primary foundry alloys. The objective was to increase the amount of solid metal in the batch from 27% to 43% using the same furnace and casting equipment. Hydro and Linde conducted a feasibility study and concluded that the objective could be reached by replacing the air-fuel combustion systems with Low-temperature Oxyfuel.

Low-temperature Oxyfuel

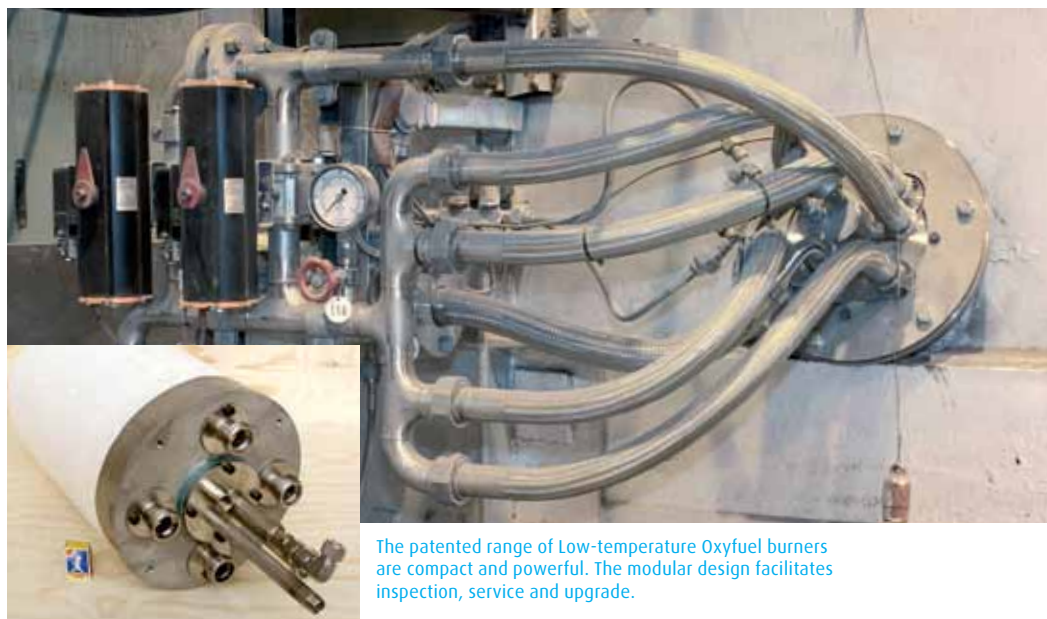
Low-temperature Oxyfuel is developed for the melting of aluminum in reverberatory furnaces. It is based on flameless oxyfuel combustion which is created by diluting the flame with the furnace gases which in oxyfuel combustion contain no nitrogen ballast. The flame dilution also disperses the combustion gases throughout the furnace for more effective and uniform heating and melting of the aluminum avoiding hot spots and dross formation. The flame contains the same amount of energy as with conventional oxyfuel but with a lower flame temperature, thus the creation of NO_x is substantially reduced.



In Low-temperature Oxyfuel combustion, the flame is diluted with the furnace gases. This lowers the flame temperature and promotes more uniform heat distribution.

Low-temperature Oxyfuel installation and scope at Hydro Årdal

- Turnkey project with performance guarantee
- Replacement of existing air-fuel burners, by ceramic self-cooled Low-temperature Oxyfuel burners in four furnaces, 3MW and 5MW installed power per furnace
- New combustion control system for fuel and oxygen, with interface to the cast house computer control
- Flow trains for LPG and oxygen
- New dampers for furnace pressure control
- Implementation support and full service contracts



The patented range of Low-temperature Oxyfuel burners are compact and powerful. The modular design facilitates inspection, service and upgrade.

Benefits for Hydro Årdal

- 60% increase in the capacity to re-melt commodity metal
- 50% fuel saving per ton of re-melted metal
- Improved temperature uniformity of the furnace lead to reduced dross formation
- A reduction in NO_x emissions by >60% with the same reduction in CO₂ as for fuel savings
- Better work environment owing to reduced noise emissions by 2–7dB(A)

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