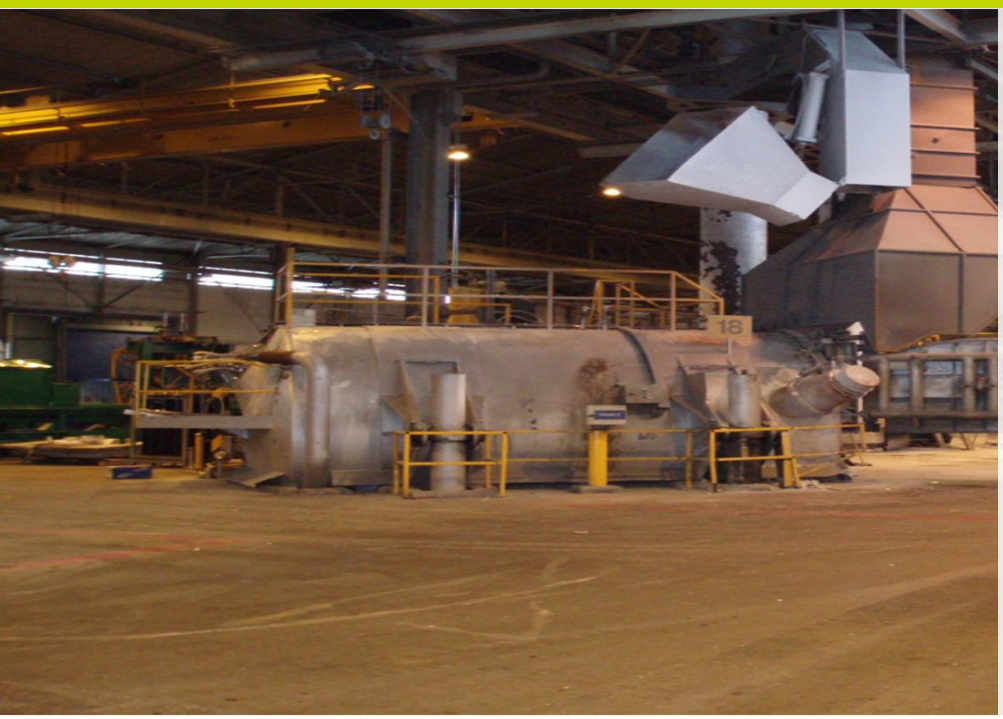
Heat Treatment
Hydro Aluminium
Årdal, Norway
Product: Foxboro T2550 PAC

invensys
Eurotherm



"By using Low-temperature Oxyfuel, we can melt 50% more cold aluminium in the same amount of time as we did previously.

In addition the propane consumption and CO_2 emissions have also been halved, which is also very positive"…

Wenche Eldegard
Cast House Manager
Hydro, Årdal

Hydro Aluminium, Norway
Pictures courtesy of Hydro and Linde

Cold Metal Melting Capacity up 50%. Waste now less than 2%.

Acting as a sub-supplier to Linde Gas, Invensys Eurotherm provided an intelligent burner control solution at Hydro Aluminium in Norway for control of Low-temperature Oxyfuel burners on a total of 4 aluminium furnaces.

By using the low temperature Oxyfuel technology Hydro Årdal can replace 20,000 tonnes of liquid primary aluminium, by re-melting cold metal. Previously, in PFA2, the charge mix was 8 tonnes cold and 22 tonnes liquid metal, and now the mix is 13 tonnes cold and 17 tonnes liquid metal. The overall average re-melting capacity increase is 50% for the four furnaces at the cast house.

This solution not only increased capacity on melting cold metal, but also provided large energy savings in the production process. The Foxboro T2550 Process Automation Controller combined with a Safety-PLC to comply with regulations and a HMI, in conjunction with Linde Gas Oxyfuel burners has provided significant economic savings and also supported Hydro's commitment to reduce greenhouse emissions and reduce dross.

In general the use of Oxyfuel combustion substantially increases the thermal efficiency of a furnace. This is due to the fact that radiant heat transfer of furnace gases produced by Oxyfuel combustion is significantly more efficient than those of air-fuel. Due to the absence of nitrogen in the combustion mixture, which does not need to be heated up, the volume of exhaust gas is also substantially reduced, thus lowering total heat loss through the exhaust gas.

Thanks to improved thermal efficiency, heating, melting rates and productivity are increased for a given process, while, at the same time, saving on fuel and reducing CO_2 and NOX emissions.
The two lines for primary foundry alloys production at Hydro Aluminium's Årdal works converted to Low temperature Oxyfuel resulted in a 60% increase in re-melting capacity and a 50% reduction of fuel consumption and significant reduction of CO_2 and NOX emissions

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The Challenge

- Accurate combustion control and smooth transitions
- Optimize energy output over melting cycle
- Economic and environmental savings

The Solution

- Eurotherm Intelligent Burner Control System
- Combined with Linde Gas Oxyfuel Burner

The Result

- Energy savings at 50%
- Re-melt capacity up 50%
- Dross less than 2%
- Reduced emissions

Production has now been increased by the control system, with cold aluminium melting capacity up 50% while waste is less than 2%.

"The key element Hydro needed was increased capacity on melting cold metal, the solution gives them that alongside large energy savings, It was vital to provide accurate combustion control and a smooth transition between all aspects of the cycle, while optimizing the melting cycle and applying the maximum energy when the thermal efficiency is highest."

Lars-Göran Elfgren,

Eurotherm Project Manager.

Aerial view of Hydro, Norway—Pictures courtesy of Hydro and Linde

The Project

Linde's Low-temperature Oxyfuel technology has been proven to deliver higher melt rates with reduced oxidation, lower fuel consumption and ultra-low NOX emissions.

The Challenge at Hydro Aluminium was to optimize the amount of energy required in the production process when producing over 125.000 tons of foundry alloys every year. Re-melt capacity has now been increased, with capacity up 50% while dross is less than 2%.

Although Oxyfuel is accepted as state-of-the-art for rotary furnaces, the aluminium industry has been more cautious to adopt the technology in reverberatory furnaces. One reason for this is the risk of overheating the aluminium surface owing to the high flame temperature creating hot spots. This risk should be taken seriously, however it is managed by using Low-temperature Oxyfuel technology, based on the principles of flameless combustion, successfully employed in conjunction with the Eurotherm intelligent burner control solution..

Furnace at Hydro - Pictures courtesy of Hydro and Linde

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Developing the low-temperature Oxyfuel burner, by applying the principles of flameless combustion for aluminium melting, in conjunction with the Eurotherm intelligent burner control solution, Linde has taken a significant step towards enabling more efficient re-melting of aluminium in reverberatory furnaces.

By Integrating the T2550 PAC with PLC we are enabling high performance control that maximizes ROI by offering automatic dual redundancy options to guarantee process efficiencies and protect against controller or communications failures. This powerful, cost effective process automation controller also uniquely provides secure data recording with dual redundancy at point of measurement.

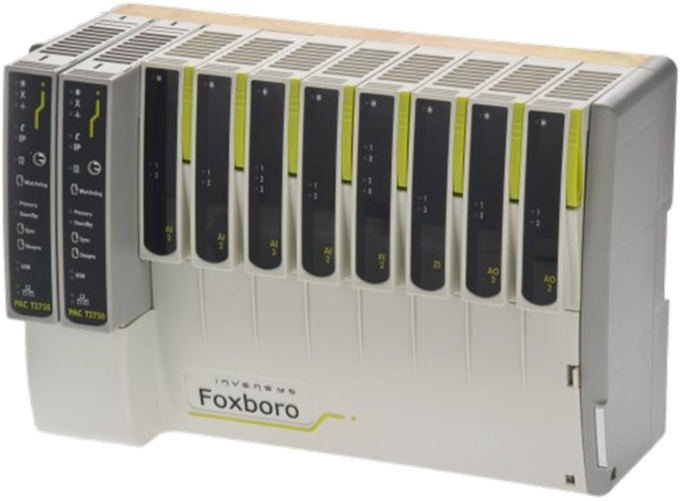
For more than 20 years, Linde has pioneered the use of Oxyfuel applications in the aluminium industry. They have invested extensive R&D efforts in Oxyfuel for aluminium melting and introduced solutions such as URTF, WASTOX®, AIROX® and FLEX -FLAME®.

Eurotherm has over 40 years experience in control technology and DCS solutions. As part of Invensys, the global automation, controls and process solutions group, our combined products, service, expertise and ongoing support enable intelligent systems to monitor and control processes in many different environments. Leading companies in a wide range of industries rely on Invensys to help them perform with greater efficiency, safety and cost-effectiveness.

Combining control and I/O technology into an expandable base plate or chassis is a winning formula for the T2550 Programmable Automation Controller (PAC), which, like a PLC, can be deployed independently, or as part of a centrally controlled network.

“The T2550 controller allows low-cost, multi-loop process control capability to be deployed right at a process unit and can be easily configured using Eurotherm LIN tools,” ..Product Marketing Manager of Invensys Eurotherm “While the T2550 PAC can be easily integrated into a control or plant network, it will continue to control the process even if a network link is lost. Combined with optional controller redundancy, this provides a high degree of fault-tolerance at a very low cost.”

Foxboro T2550 PAC combines PLC architecture and DCS functionality



- **Instant Redundant Capability**
- **Advanced control algorithms with Autotune**
- **Secure Redundant recording at point of measurement**
- **Setpoint programming**
- **Extensive features eg Zirconia probe and frequency outputs**
- **Logic & sequential control**
- **Hot swappable**
- **Auto I/O build functionality**
- **Personality flash card**
- **Clear status indication**
- **Intuitive toolkit**

All make the T2550 PAC simple to use, install, engineer and upgrade — networking couldn’t be simpler.

invensys
Eurotherm

*Authorised by: **Wenche Eldegard Cast house Manager Årdal Norway cc Ken Torvanger second approval Agreement to use as approved copy here**

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Written by Kate Merrick Invensys Eurotherm global marketing communications specialist. Email: kate.merrick@invensys.com

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