

Oxy Combustion Global Offering

Non-Ferrous





BoostAL™ for Non-Ferrous

Looking to:

- Bring down atmospheric emissions?
- Reduce your carbon footprint?
- Increase your production rate?

Ten non-ferrous metals are running short in natural resources: copper, aluminum, lead, zinc, nickel, tin, antimony, mercury, magnesium and titanium). This drives the recycling of scrap metal which is less energy intensive than primary metal production. Scraps with different levels of contamination in terms of Volatile Organic Compounds (VOC) are typically melted in reverberatory and rotary kilns equipped with regenerative burners to reduce energy consumption by preheating combustion air. Air combustion generates atmospheric emissions that won't meet the environmental target of carbon neutrality by 2050.

We offer an oxy-fuel technology that consists of injecting pure oxygen instead of air into the charge to be melted. Oxy-fuel burners improve heat transfer efficiency, which accelerates the melting operation and increases productivity. With no nitrogen, the volume of combustion oxygen is less than that of the combustion air. This reduces the energy requirement and, consequently, NOx and CO₂ emissions.

BoostAL™ for Non-Ferrous provides you with a well-suited and eco-responsible alternative to regenerative air burners.

Applicable Industries

Primary smelting of non-ferrous metals
Foundries and secondary smelting and refining

Environmental Benefits

- Up to 90% NOx emission reduction.
- Up to 50% CO₂ emission reduction.
- Up to 50% fuel saving.

Operational Benefits

- Increase of production rate up to 50%.
- CapEx reduction for flue gas treatment with a volume to be treated divided by 5.
- Higher recycled metal yield.

Aluminium Case Study

13-tonne rotary furnace

Customer Requirement

Reducing carbon footprint and increasing production rate.

Solution

Oxygen combustion with oxy-fuel burner (3MW)

Benefits

50% less CO₂ emission



190 kg/t-> 95 kg/t

50% energy savings



1000 kWh/t -> 500 kWh/t

50% production rate increase



2.5 t/h -> 3.75 t/h

What We Offer:

- **Low-Carbon Oxygen Supply** in liquid storage.
- **Combustion equipment**

The **FLAMOXAL-B** is an automated valve train for controlling oxy-fuel burners and their gas supply.

OXYGEN INJECTION EQUIPMENT

- The **METAL BURNER, METAL BURNER-FC and ALJET ST** are oxy-gas or oil burners particularly dedicated to smelting where a wide flame, an automatic ignition system and/or a flame control are essential.
- The **METAL BURNER** is a non-water-cooled oxy-fuel burner especially designed for batch smelting furnaces. It produces a low momentum flame which minimizes particle emission and prevents any refractory aging. The system is based on a "pipe-in-pipe" design that generates a symmetrical flame.
- The **METAL BURNER-FC** is a version of the METAL BURNER in which fuel and oxygen are introduced into the melting zone of a glass furnace through a unique configuration of injectors. The fuel is distributed at the bottom of the refractory burner block via three fuel gas injectors that are positioned in a fan-shaped configuration. It produces a highly luminous flame up to three times wider than conventional oxy-fuel burners.

- The **ALJET ST** is a non-water-cooled oxy-fuel burner especially designed for batch smelting furnaces. The configuration of **ALJET ST** is of pipe-in-pipe type. The fuel pipe is located inside the oxygen pipe. As fuel and oxygen are mixed inside the burner block, they react immediately. The combustion is very intense, resulting in a high peak temperature flame, with a symmetric luminous flame of cylindrical shape.

All burners are Air Liquide patented.

• Expertise

Based on your specifications, our experts design the best BoostAL™ for Non-Ferrous technology.

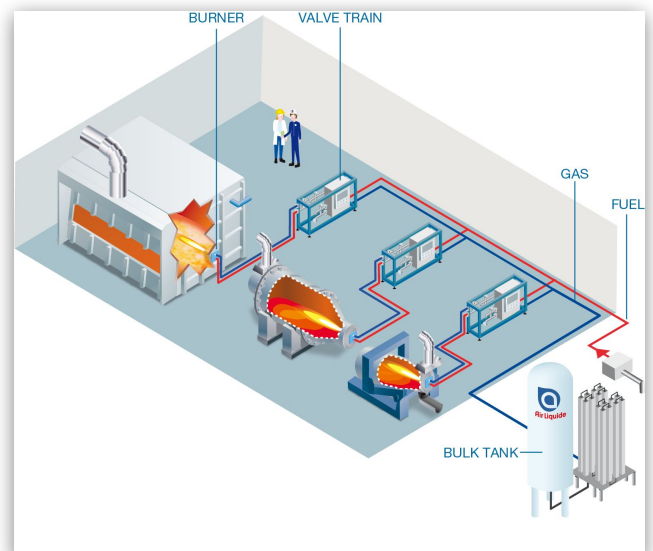
They provide you with full support all along your project:

- from the preliminary and detailed design of the suitable oxy-fuel solution to your project;
- the installation, start-up and commissioning of combustion equipment;
- and for the optimization of operating process parameters.

Our experts are also available to help you with your risk analysis if necessary.

Related Offers

- BoostAL™ Control for Non-Ferrous Melting
- BoostAL™ for Ladle Heating



Process Diagram of BoostAL™ for Non-Ferrous



BoostAL™ COntrol for Non-Ferrous

Looking to:

- Bring down atmospheric emissions?
- Reduce your carbon footprint?
- Save scrap costs?

Traditionally, oxy burner control in a melting furnace is based on the measurement of oxygen and CO₂ concentrations in the flue gas. The flue gas is extracted through a self-cleaning sampling probe into an enclosed chamber before being vented out into the atmosphere. As the flue gas is full of dust, this is not a reliable way of doing and the cost maintenance of the probe is high.

BoostAL™ COntrol is an Air Liquide patented application for non-ferrous melting which uses scrap metal in batch and rotary furnaces. Fat content in the scrap does not burn in the furnace but with air intakes in the chimney. This post combustion phenomenon makes the flue gas temperature increase.

The innovative **BoostAL™ COntrol** solution reduces the fuel injection by controlling the flue gas temperature when it goes up in the chimney. It forces the fat in the scrap to burn in the furnace and not in the chimney, which saves fuel and reduces exhaust emissions.

Applicable Industries

Secondary metallurgy

Environmental benefits

- Up to 90% NO_x saving.
- Up to 50% CO₂ saving.
- Up to 60% fuel saving.
- Up to 90% CO & Volatile Organic Component saving.

Operational benefits

- Up to 65% production rate increase.
- Low cost fatty scrap supply up to 15% less expensive.
- High metal yield > 95%.

Aluminium Case Study

12-tonne rotary furnace

Customer requirement

Reducing carbon footprint and optimizing oxy combustion

Solution

METAL BURNER 3MW and BoostAL™ COntrol system

Benefits

7% less fuel



54 m³/t -> 50 m³/t

5% less oxygen



125 m³/t -> 118 m³/t

What we offer:

- **Low-Carbon Oxygen Supply** in liquid storage.

- **Combustion equipment :**

The **FLAMOXAL-B** is an automated valve train for controlling oxy-fuel burners and their gas supply.

A Programmable Logic Controller module set up with the software Air Liquide has developed to adjust automatically the burner settings.

OXYGEN INJECTION EQUIPMENT

- The **METAL BURNER, METAL BURNER-FC and ALJET ST** are oxy-gas or oil burners particularly dedicated to smelting where a wide flame, an automatic ignition system and/or a flame control are essential.
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Related Offers

- BoostAL™ for Non-Ferrous Melting
- BoostAL™ for Ladle Heating

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In addition to burners, a thermocouple is placed in the flue gas to detect a temperature spike and reduce fuel injection to force the fat content in the scrap to burn instead. The more fatty scrap the better and the cheaper to save more fuel. When the flue gas temperature drops, the burner settings are automatically set to adjust the fuel injection.

• Expertise

Based on your specifications, our experts design the best **BoostAL™ Control for Non-Ferrous** technology.

They provide you with full support all along your project:

- from the preliminary and detailed design of the suitable oxy-fuel solution to your project;
- the installation, start-up and commissioning of combustion equipment;
- and for the optimization of operating process parameters.

Our experts are also available to help you with your risk analysis if necessary.



BoostAL™ for Ladle Heating

Looking to:

- Bring down atmospheric emissions?
- Reduce your carbon footprint?
- Increase your production rate?

Liquid metal transport ladles is preheated to:

- Minimize thermal shock when pouring molten metal;
- Prevent damaging the refractory lining;
- Reduce temperature drops of the metal in the ladle.

Ladle preheating is generally done using air combustion while limited to a maximum metal temperature of 1000°C and very fuel intensive.

BoostAL™ Ladle Heating is the Air Liquide complete offer for ladle preheating in steel mills and foundries.

We offer an advanced oxy-fuel technology which, thanks to a high radiative oxygen/fuel combustion, accelerates the heating and at the same time cleans the ladles from oxides accumulated on the refractory surface. This technology accelerates the heating of the refractory to a temperature (defined by the customer) that avoids overheating the metal at the furnace exit.

Moreover, by eliminating nitrogen in the oxidant, the NO_x formation is drastically reduced.

Applicable Industries

Steelmaking, cast iron and non-ferrous foundries.

Environmental benefits

- Up to 60% CO₂ saving.
- Up to 70% fuel saving.

Operational benefits

- Production rate increase:
Heat-up times divided by 4;
More uptime.
- Better quality of metal by eliminating thermal stratification in ladles.
- Lifetime increase of the refractory lining.

Case Study #1: 130t Ladle

Stainless Steel

Customer requirement

Reducing atmospheric emissions and carbon footprint

Solution

Oxygen combustion with oxy-fuel burner (1.5MW)

Benefits



52% fuel savings/cycle*
2850 m³ -> 1366 m³

1 cycle -> Heat-up time : 8 hours



52% less CO₂ emissions/cycle
5700 kg -> 2732 kg

Study #2: 40t Ladle

Carbon Steel

Customer requirement

Increasing production rate and improving metal quality

Solution

Oxygen combustion with oxy-fuel burner (1.5MW)

Benefits

- ↘
 Heat-up times reduce
3 hours -> 2 hours
 - ↘
 40% fuel saving
875 m³ -> 350 m³
- Improvement of metal quality by eliminating thermal stratification in ladles.
 - 100°C metal temperature increase (1100°C -> 1200 °C).

What We Offer:

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• **Combustion Equipment**

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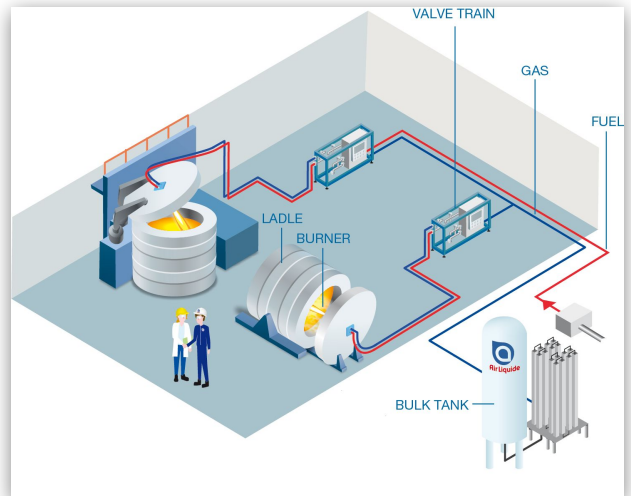
• Expertise

Based on your specifications, our experts design the best **BoostAL™ Ladle Heating** technology.

They provide you with full support all along your project:

- from the preliminary and detailed design of the suitable oxy-fuel solution to your project;
- the installation, start-up and commissioning of combustion equipment;
- and for the optimization of operating process parameters.

Our experts are also available to help you with your risk analysis if necessary.



Process Diagram for BoostAL™ Ladle Heating

OXYGEN INJECTION TECHNOLOGY

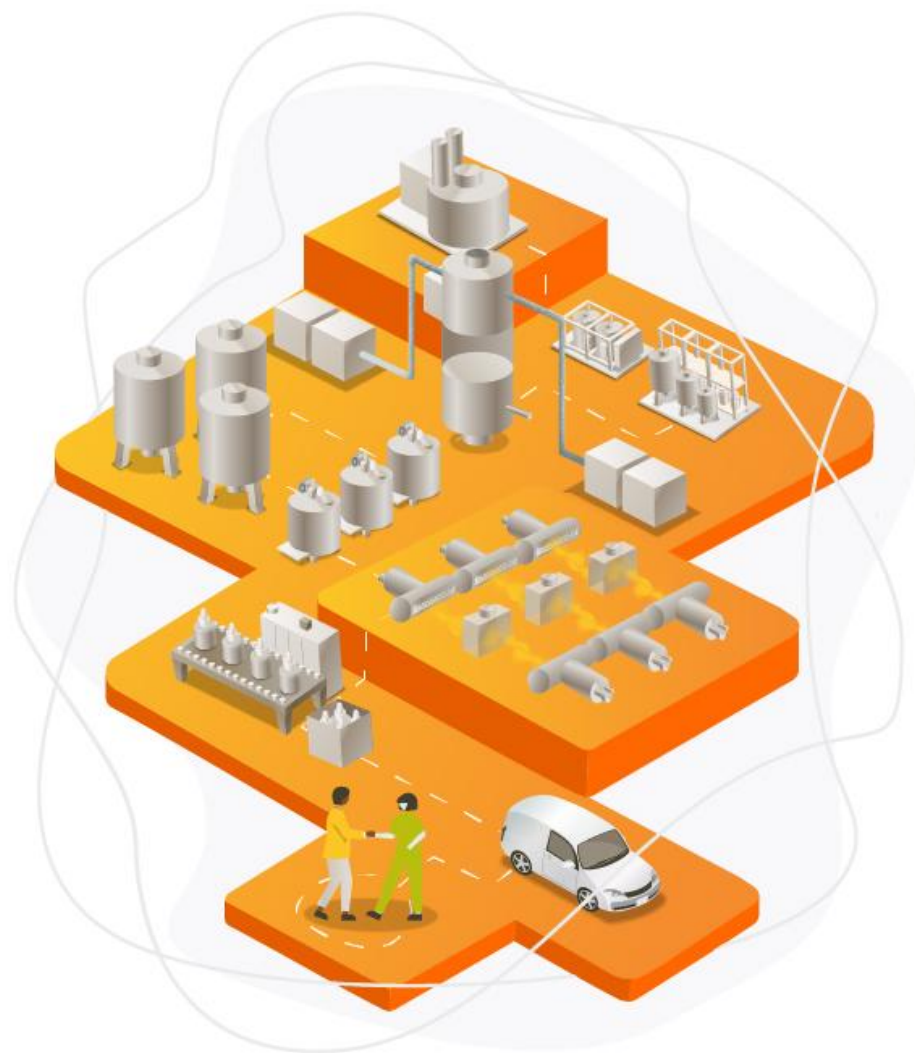
Patented burner

The **ALJET LH** burner is an oxy-fuel burner especially designed for drying and heating of ladles. It is suitable to severe working conditions as confined or overheated areas. An ignition pilot burner and a flame supervision cell can be integrated into the burner body. The burner configuration is of pipe-in-pipe type with the fuel pipe located inside the oxygen pipe. Fuel and oxygen together mix at the burner outlet and the flame develops in the ladle.

The **ALJET LH** burner is available in two standard models: the **ALJET 1500 LH** and **ALJET 750 LH** burners.

Related Offers

- BoostAL™ for Non-Ferrous
- BoostAL™ CControl for Non-Ferrous

**Nous contacter :**

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L'activité Industriel Marchand d'Air Liquide propose à ses clients des gaz et des solutions innovantes, intégrant des technologies d'application, des équipements et des services. De l'artisan indépendant aux grandes sociétés industrielles, nos 35 000 collaborateurs accompagnent au quotidien plus de 2 millions de clients dans 75 pays. Ils utilisent leurs incomparables capacités commerciales et techniques pour développer des solutions de gaz qui stimulent la performance de nos clients industriels et les aident à améliorer la qualité de leurs produits, contribuant ainsi à une plus grande compétitivité tout en minimisant l'empreinte environnementale de leurs activités.

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