Oxy Combustion Global Offering

Cast Iron

Air Liquide

BoostAL™ for Cast Iron Melting in Rotary Furnaces

Looking to:

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

Rotary furnaces are used to produce all grades of grey iron and ductile iron. Historically, oxygen in combustion air was used to melt the metal. However, being a thermal ballast, nitrogen in the air limits the combustion temperature to 900°C.

During melting in a rotary furnace, all the heat radiation accumulated in the refractory lining is transmitted to the metal load with the furnace rotation.

Using pure oxygen increases the flame temperature to 1500°C, allowing more energy transfer for metal melting.

We offer an oxy-fuel technology that combines oxy-fuel burners and oxygen injection directed to the melt in which a solid fuel (anthracite) is added.

BoostAL™ for Cast Iron Melting in Rotary Furnaces reduces atmospheric emissions, highly accelerates the melting time, increases productivity, lowers investment costs (smaller filter unit) and improves the metal yield.

Applicable Industries

Foundry and casting industries

Environmental Benefits

Up to 90% NOx saving

Up to 60% CO_2 saving

Up to 60% fuel saving

Operational Benefits

Production rate increase
Cycle time reduction of up to 30%

CapEx reduction
Flue gas volume to filter divided by 4

Higher metal yield

Cast Iron Case Studies #1
3t Rotary Furnace

Customer requirement
Fuel saving

Solution
Air Liquide proprietary oxy-fuel technology (*1MW burner)* and adding a lance and anthracite

Benefits

27% natural gas
52 Nm^3/t -> 38 Nm^3/t

36% propane
22 Nm^3/t -> 16 Nm^3/t

4% O_2 consumption
135 Nm^3/t -> 130 Nm^3/t
The oxygen addition lance reduces O_2 consumption

Cast Iron Case Study #1
3t vs. 12t Rotary Furnaces

Customer requirement
Melting time reduction

Solution

Replacing conventional oxyfuel technology by Air Liquide proprietary 100% oxy-fuel technology (burner+oxygen lance+anthracite)

Benefits

Furnace size: 3t*	Furnace size: 12t**
20 minutes melting time reduction (25%)	40 minutes melting time reduction (29%)
80 min -> 60 min	140 min -> 100 min

*3t furnace size: Burner power -> 1.5 MW
**12t furnace size: Burner power -> 3 MW

What We Offer:

• Low-Carbon Oxygen Supply in liquid storage.

• Combustion Equipment

FLAMOXAL-B is an automated valve train to control the oxy-fuel burners mounted with built-in lances and their supply systems.

OXYGEN INJECTION TECHNOLOGY

- Patented burners

The **ALJET** burners are water-cooled oxy-fuel systems especially designed for batch melting furnaces in metallurgy.

The **ALJET** burner range consists of six standard models named by their power in kW

- ALJET 1500
- ALJET 2000
- ALJET 2500
- ALJET 3000
- ALJET 5000
- ALJET 6000

- Made-to-order oxygen lances

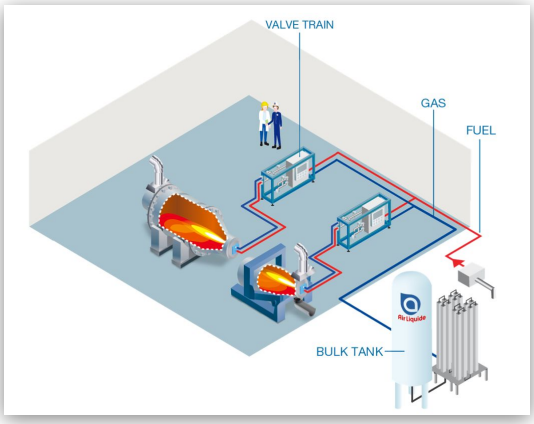
• Expertise

Based on your specifications, our experts design the best **BoostAL™ for Cast Iron Melting in Rotary Furnaces** 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 of BoostAL™ for Cast Iron Melting in Rotary Furnaces

Related Offers

- BoostAL™ for Cast Iron in Cupolas
- BoostAL™ for Ladle Heating

BoostAL™ for Cast Iron Melting in Cupolas

Looking to:

- Reduce your carbon footprint?
- Increase your productivity?

Cupolas are vertical furnaces to produce all grades of grey iron and ductile iron. Bottom air injection make solid coke burn, which in turn transfers heat to the metal load.

However, being a thermal ballast, nitrogen in the air limits the combustion temperature to 900°C and the cupola performances. This put limits on the productivity rate, the pouring temperature and restricts the scrap supply.

To surpass these limits, using pure oxygen increases the flame temperature to 1500°C, allowing more energy transfer for metal melting.

We offer a comprehensive offering of oxy-fuel technologies for different levels of oxygen enrichment that combine lances and oxygen injection in the cupolas.

With **BoostAL™ for Cast Iron Melting in Cupolas,** three possible means are:

- **Oxygen enrichment** of combustion air that modifies the heat gradient in the combustion zone by increasing the maximum temperature It is used for low oxygen enrichments (2 %) of the blast, on all sizes of cupolas.
- **Oxygen injection through lances** to the coke combustion zone with enrichment rates above 2%; The oxygen is injected directly into the cupola and allows for better oxygen penetration into the centre of the cupola and better oxygen distribution.
- **Oxygen injection through supersonic lances** for hot blast cupolas for deeper oxygen penetration in the centre of the cupola thanks to an injection speed twice as high (Momentum oxygen force=230N) as the previous one.

Applicable Industries

Foundries industries

Environmental Benefits

Coke reduction up to 5-10%kg coke/t_{iron}

Operational Benefits

Production rate increase

Up to 7% to 1% per % of oxygen enrichment

Pouring temperature increase
Up to 10 °C to +15°C per % of oxygen enrichment

Operating range increase
Up to -30% to +50% of the nominal production with 3% oxygen enrichment

Higher metal yield

Cast Iron Case Study: 28t Hot Blast Cupola

Customer requirement

Reducing coke consumption (gas natural)

Reducing production rate

Increasing iron temperature

Solution

Oxygen (27Nm^3/hour)

Supersonic lances and valve train

Benefits

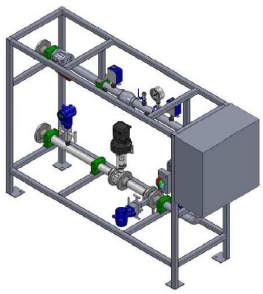
5t/h production increase 19 t/h -> 24 t/h	Coke need reduction (*10%*) 13.5 % -> 12.1 %
40°C melting temperature increase (*3%*) 1500 °C -> 1540 °C	10°C air temperature increase (*2%*) ~ 490°C -> 500°C

What We Offer:

• Low-Carbon Oxygen Supply in liquid storage.

• Combustion Equipment

The **SUROXAL** is an automated valve train to control the oxygen injection.



OXYGEN INJECTION TECHNOLOGIES

- The **Lances** to be placed in the blast conduit or

in each of the tuyeres;

- The **Supersonic lances** to placed in the center of the cupola.

Lances and **Supersonic lances** are made-to-order.

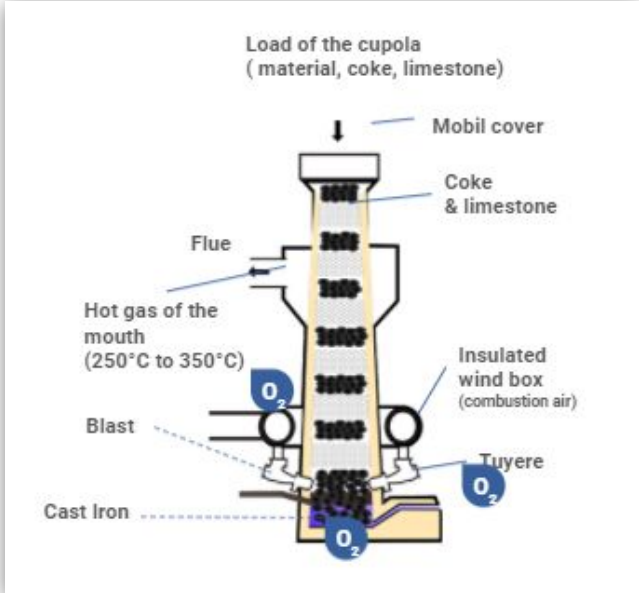
• Expertise

Based on your specifications, our experts design the best **BoostAL™ for Cast Iron Melting in Cupolas** 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 of Cupola

Related Offers

- BoostAL™ for Ladle Heating
- BoostAL™ for Cast Iron Melting in Rotary Furnaces

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% CO_2 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 m^3 -> 1366 m^3

52% less CO_2 emissions/cycle
5700 kg -> 2732 kg

1 cycle -> Heat-up time : 8 hours

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 m^3 -> 350 m^3

- Improvement of metal quality by eliminating thermal stratification in ladles.
- 100°C metal temperature increase (1100°C -> 1200 °C).

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 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.

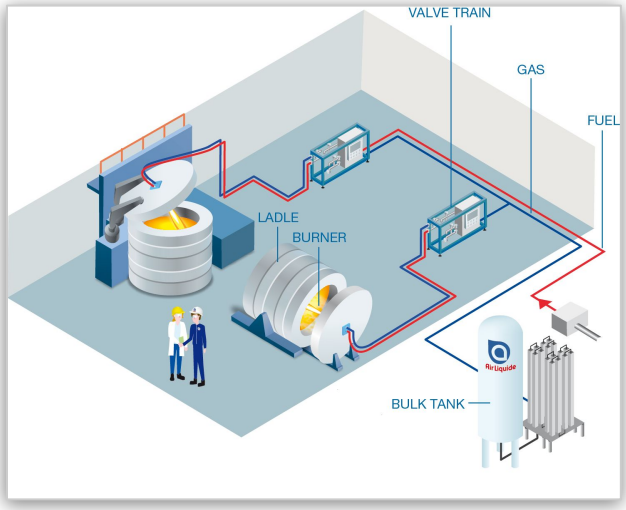
• Expertise

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.

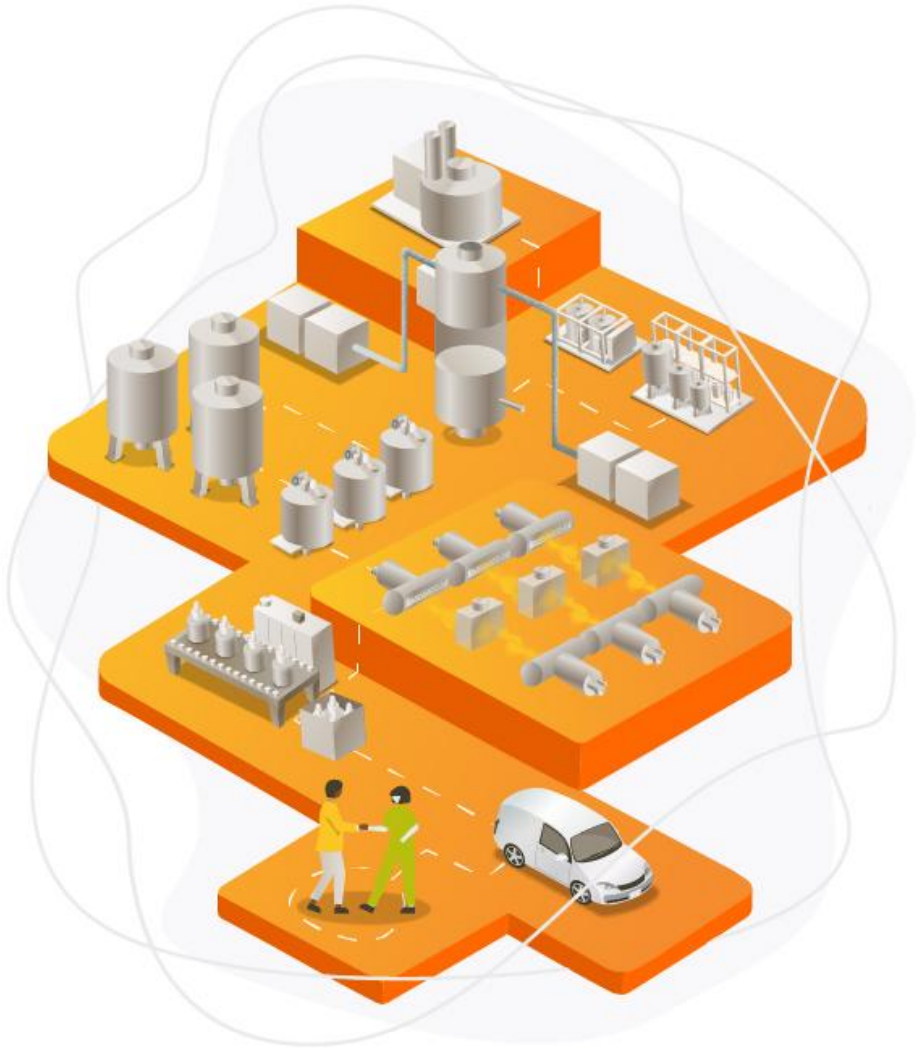
Our experts are also available to help you with your risk analysis if necessary.



Process Diagram for BoostAL™ Ladle Heating

Related Offers

- BoostAL™ for Cast Iron in Rotary Furnaces
- BoostAL™ for Cast Iron in Cupolas



Nous contacter :
AIR LIQUIDE FRANCE INDUSTRIE
Service Client - Tél. +33(0)9 70 25 00 00
Courriel : contact.alfi@airliquide.com
Espace clients : mygas.airliquide.fr

fr.airliquide.com

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.

Air Liquide France Industrie, Société Anonyme au capital de 72.453.120 euros - RCS PARIS : 314 119 504. Siège social : 6 rue Cognacq-Jay, 75007 PARIS