AIR LIQUIDE

# BoostAL™

## Solutions for Metallurgy

www.airliquide.com

# Your needs

You require enhanced process output and improved production flexibility, while reducing environmental emissions.
Air Liquide will optimize your core production performance with customized solutions.

| Your Needs… | … Expected Features… | … Our Solutions |
|---|---|---|
| Productivity improvement | Production increase up to 50% without additional investment | Oxy-combustion technologies for efficient radiant heat transfer to the load |
| Energy efficiency | Energy cost reduction by 50% | Oxy-combustion technologies for efficient radiant heat transfer to the load |

| | | |
|---|---|---|
| Emission reduction | • Reduction of $CO_2$, $NO_X$, VOC, $SO_X$ and other greenhouse gas emissions<br>• Waste water treatment | Clean technologies with advanced oxy-combustion process control ASPAL Clean |
| Flexibility | • Improve production time<br>• Increase yield<br>• Implement efficient process control | Large oxy-combustion burners adapted to each metallurgy process |
| Reliable supply chain | • Product certification<br>• Regulatory compliance | Supply chain engineering, measurement and management |

# Our value creation

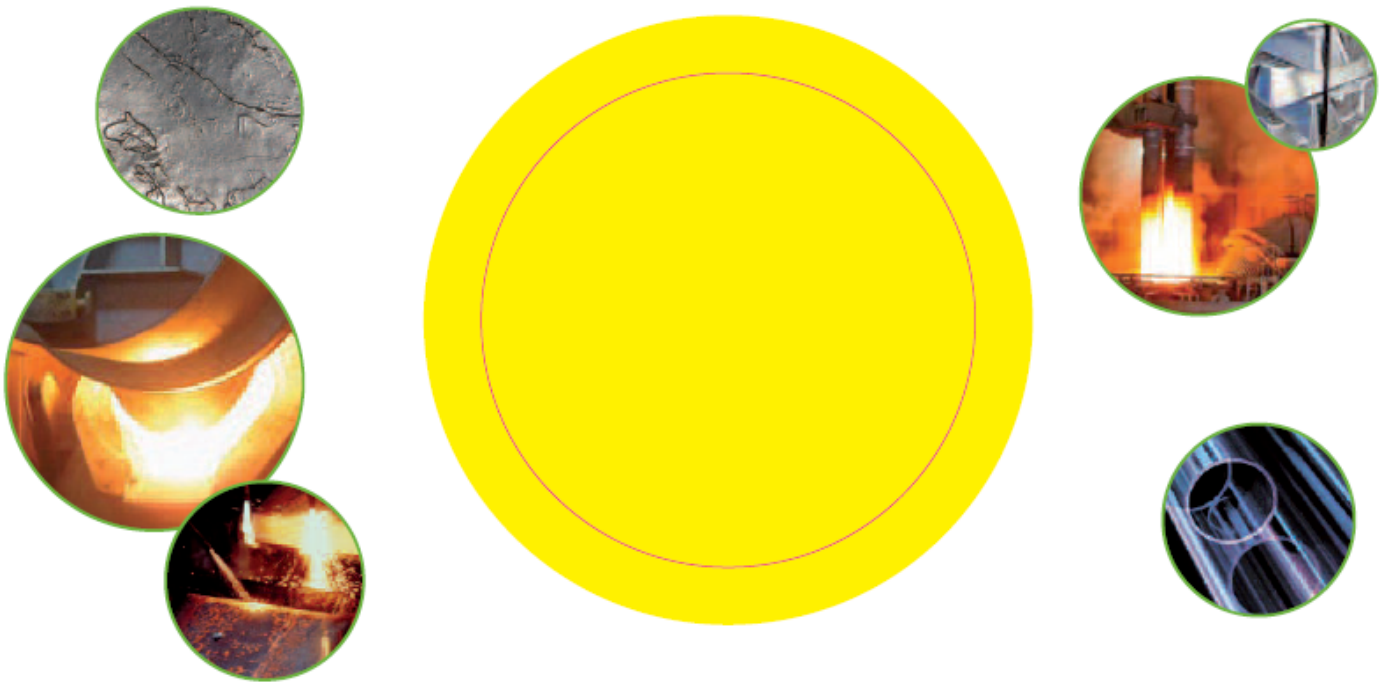
With ***BoostAL*** Air Liquide commits to create value demonstrated by tangible and measurable results obtained through engineered solutions that are supported by a network of experts and full implementation at the customer's plant.

## ***BoostAL*** Value for Steel

- Reduction of electrical energy consumption up to 60 kWh/t
- Reduction of power-on-time up to 12%
- Increase of metallic yield up to 1%
- Enhanced safety

## ***BoostAL*** Value for Foundries

- Decrease of melting process cycle time up to 30%
- Improvement of product quality up to 30%
- Productivity increase up to 15%
- Reduction of coke consumption up to 10%



## ***BoostAL*** Value for Non-Ferrous

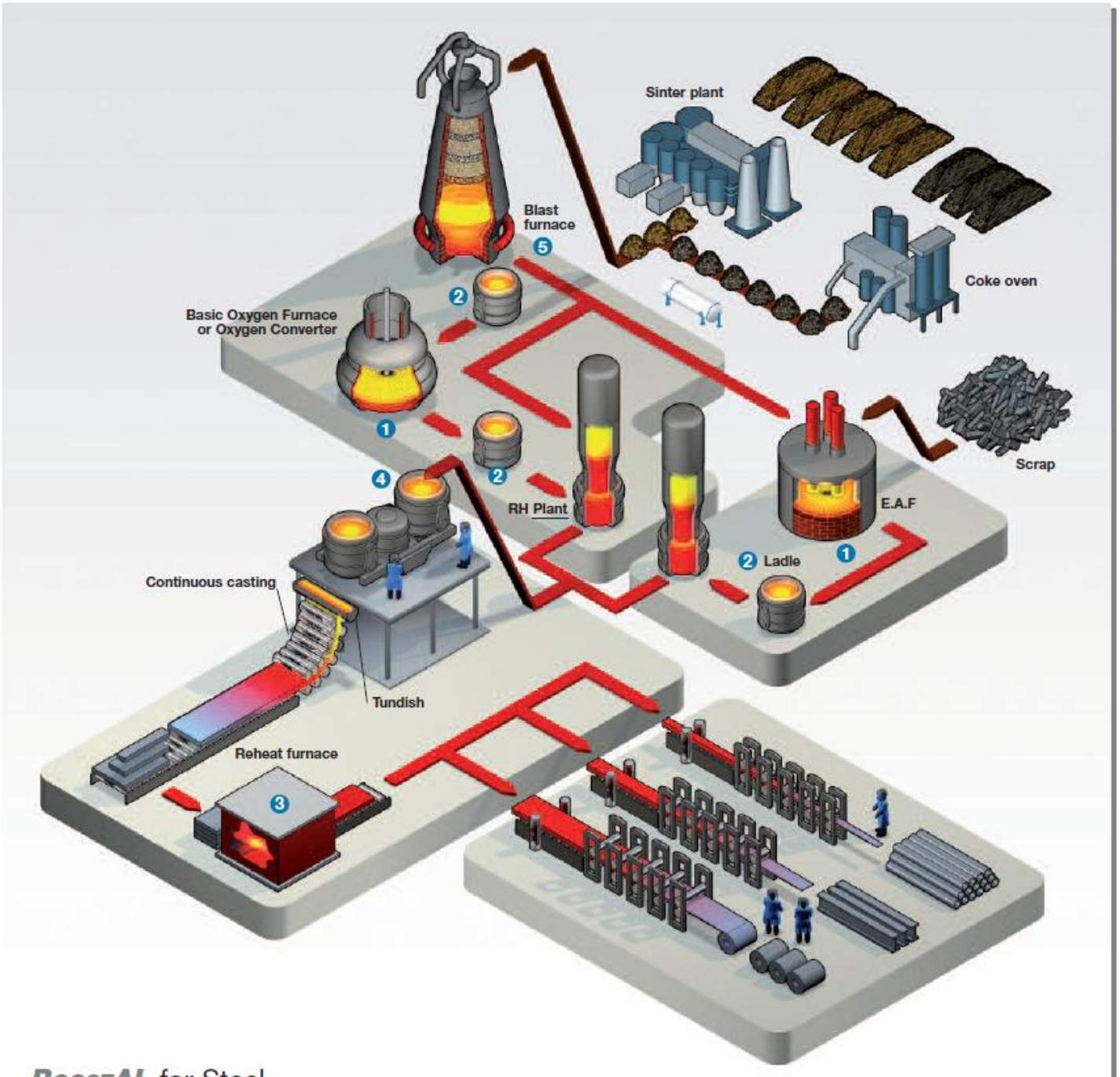
- Fuel savings of up to 50%
- Production increase of up to 50%
- NOx reduction of up to 90%
- Significant $CO_2$ reduction

## ***BoostAL*** Value for Semi-Finished Products

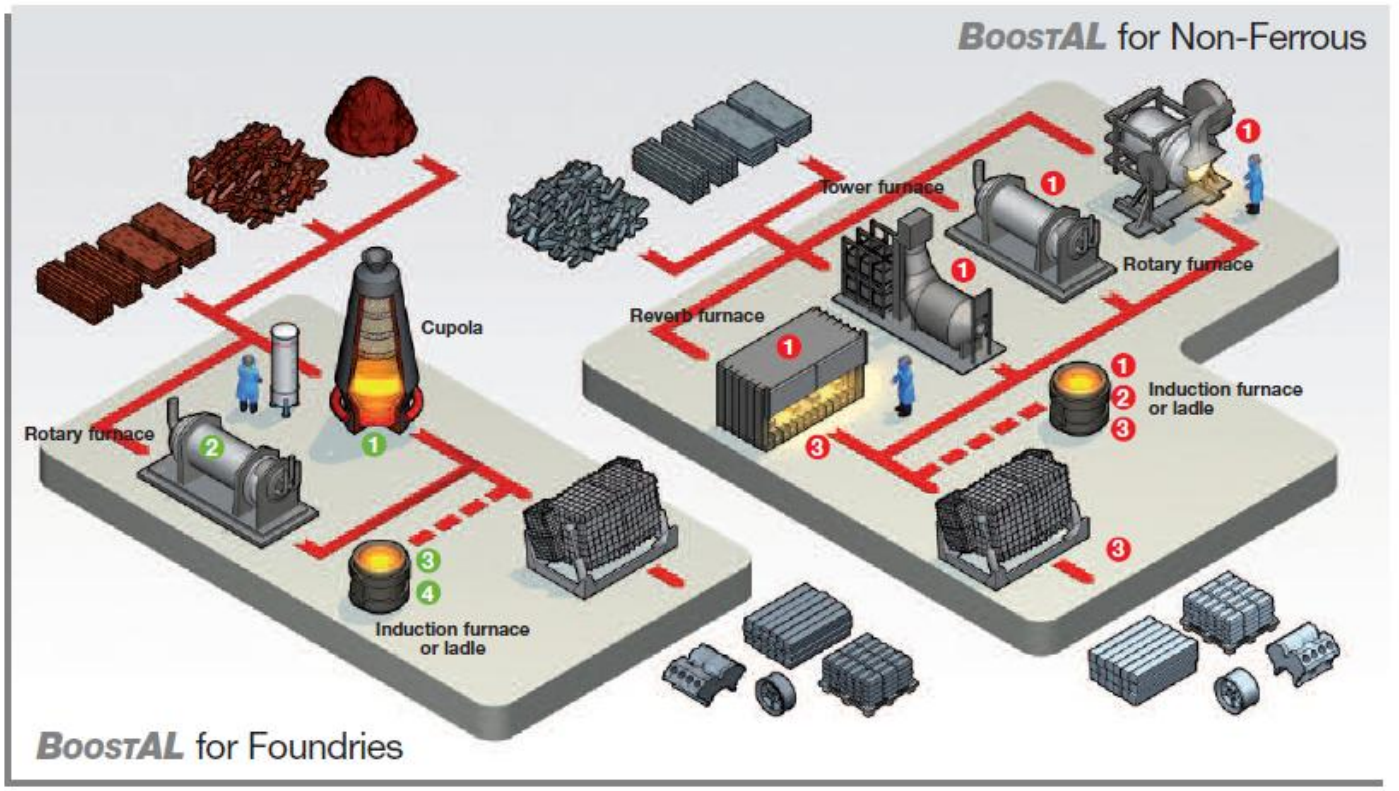
- Fuel savings of up to 50%
- Increase of production of up to 40%
- Reduction of heat-up time by more than 40%
- Homogenous temperature profile in the product

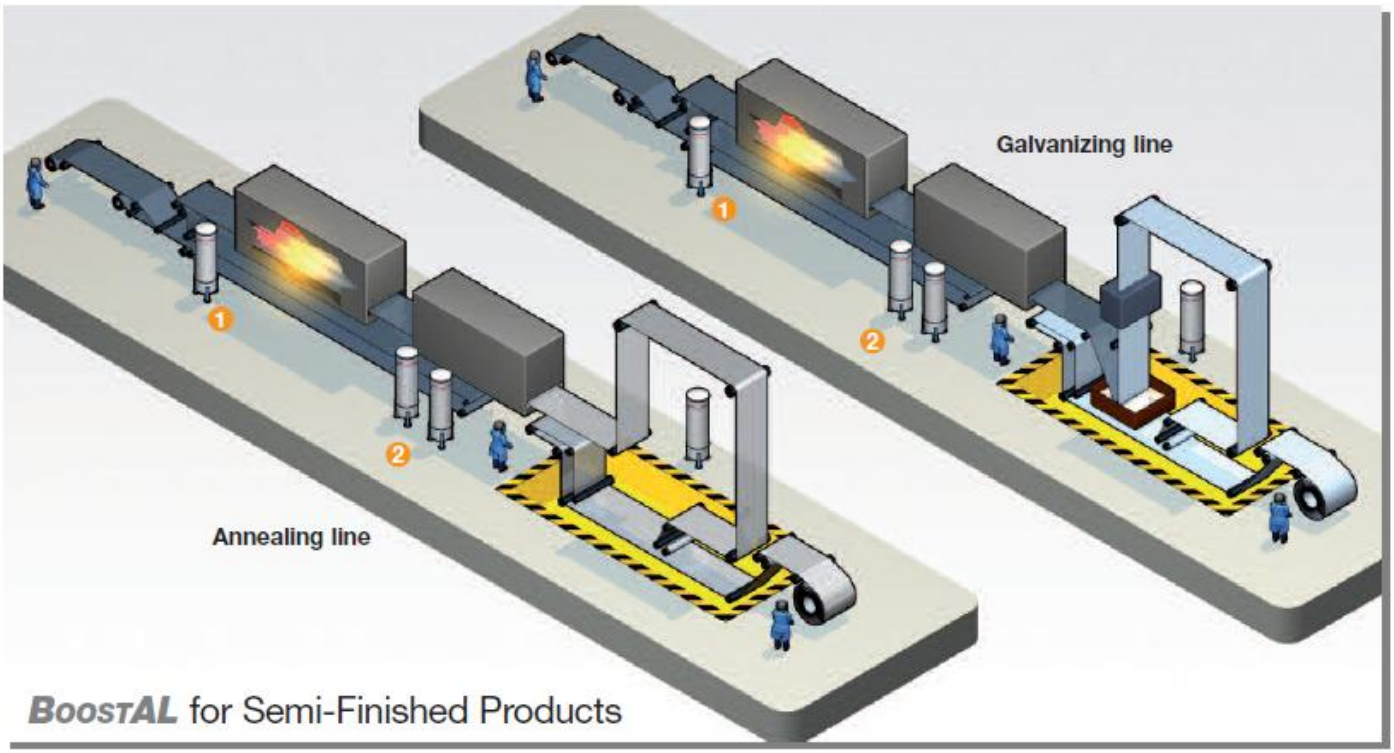
# Your process

From feed conditioning and raw material melting, to melt refining and casting, all the way to finishing operations, Air Liquide supports you in every step of your production process.




**BoostAL** for Steel


BoostAL for Non-Ferrous
Tower furnace
Rotary furnace
Reverb furnace
Induction furnace or ladle
Cupola
Rotary furnace
Induction furnace or ladle
BoostAL for Foundries


Galvanizing line
Annealing line
BoostAL for Semi-Finished Products

# Our offer

***BoostAL*** is Air Liquide's offer in metallurgy that covers the full range of clean application technologies designed to satisfy your needs.
***BoostAL*** optimizes performance through increased production output and reduced energy consumption, resulting in high quality products.

## *BoostAL* for Steel

**1 - Melting with Electric Arc Furnace mills (E.A.F)**
- Oxygen lancing to adjust carbon and reach composition target ($O_2$)
- Post combustion to reduce CO and electrical power consumption ($O_2$)
- Oxy-combustion to increase furnace's overall efficiency ($O_2$)
- Supersonic injection technology to combine all the benefits of oxygen usage ($O_2$)

**2 - Metal transfer**
- Oxy-combustion for preheating ladles to enhance flexibility and lower costs ($O_2$)

**3 - Reheating**
- Oxy-combustion in reheat furnaces to increase productivity and reduce $CO_2$ and $NO_x$ emissions ($O_2$)

**4 - Surface protection and degassing**
- Non-reactive stirring gas injection for degassing (Ar, $N_2$)
- Liquid argon for metal surface protection (Ar)
- Inert vessels: RH, ladles, tundishes to lower defects and increase yield (Ar, $N_2$)

**5 - Environment**
- Carbonic dry ice injection in ladles for red fumes suppression ($CO_2$)

## *BoostAL* for Non-Ferrous

**1 - Melting with refiners and smelters**
- Oxy-combustion to increase furnace's overall efficiency ($O_2$)
- Post combustion with oxygen enriched air to reduce CO and increase the heat transfer to the load ($O_2$)

**2 - Metal transfer**
- Oxy-combustion for preheating of ladles to enhance flexibility and lower costs ($O_2$)

**3 - Surface protection and degazing**
- Non-reactive stirring gas injection for degassing (Ar, $N_2$)
- Inert vessels: ladles, tundishes to lower defects and increase yield (Ar, $N_2$)

## *BoostAL* for Foundries

**1 - Melting with cupolas**
- Oxy-combustion and Post combustion to save coke and increase production ($O_2$)
  - Blast air enrichment with oxygen
  - Supersonic oxygen lancing
  - Oxy-fuel flame

**2 - Melting with rotary furnaces**
- Oxy-combustion to increase production and furnace yield ($O_2$)

**3 - Metal transfer**
- Oxy-combustion for preheating of ladles to enhance flexibility and lower costs ($O_2$)

**4 - Surface protection and degassing**
- Non-reactive stirring gas injection for degassing (Ar, $N_2$)
- Liquid argon for liquid metal surface protection (Ar)
- Inert vessels: ladles, tundishes to lower defects and increase yield (Ar, $N_2$)

## *BoostAL* for Semi-Finished Products

**1 - Reheating**
- Oxy-combustion in reheat furnaces to increase productivity and reduce $CO_2$ and NOx emissions ($O_2$)

**2 - Heat treatment with protective atmospheres**
- Controlled atmospheres for annealing and galvanizing lines to enhance production quality for a cost effective solution ($N_2$, $H_2$, CO)