

Increasing yield and efficiency in the aluminium industry



Innovative technologies for
low-cost, high-efficiency melting

Gas-based technology solutions tailored for the Aluminium Industry

The aluminium industry continues to face challenges that require action by producers and consumers to achieve a truly sustainable society. To do this, it is imperative that Aluminium producers continue to improve the energy efficiency and environmental emissions associated with their operations.

At Air Products we have extensive experience in aluminium production and offer a wide range of solutions of industrial gas-based technologies, bringing benefits such as product quality, cost savings, increased production and reduced emissions.

Close collaboration with our customers has enabled us to rigorously test these technologies in real-world production environments before bringing them to you.

We have pioneered the application of industrial gas-based technologies in both rotary and reverberatory furnaces and are constantly looking to develop and improve our range.

In addition to our combustion technologies, we have a dedicated team of experienced metallurgists who can work with you to fully understand your metal processing needs and recommend the best solution for your operations.



Gases

A wide range of gases, such as oxygen, hydrogen, nitrogen, argon, gas mixtures, specialty gases ...



Equipment

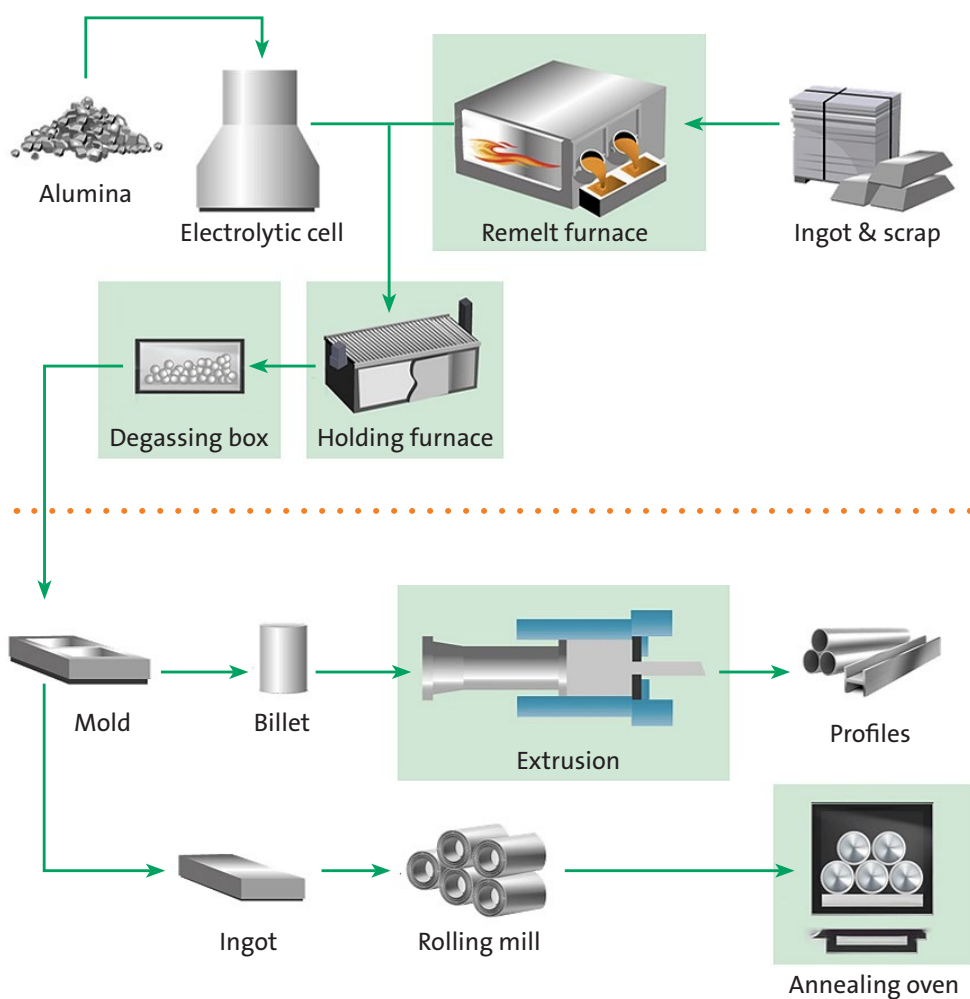
The best equipment for each need

Solutions for aluminium production

Melting

Oxy-fuel and oxygen enhanced (air/oxy-fuel) combustion systems for increasing efficiency, productivity and yield, as well as air-hydrogen and oxy-hydrogen for a lower carbon footprint:

- Transient heating oxy-fuel burner
- High-yield oxy-fuel burner
- Advanced Low emission Melting system (ALEM)
- Air Products Process Intelligence for foundries



Downstream processing

To increase production efficiency and reduce environmental emissions

- Extrusion/die cooling technology
- Annealing
- Atmosphere control systems for annealing

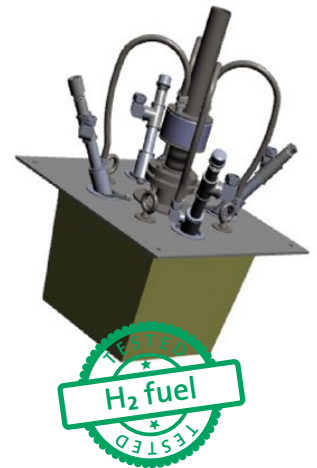
Solutions for melting processes

Transient Heating Oxy-fuel burner

Our oxy-fuel burner is designed for reverb furnaces and includes Air Products Process Intelligence, an Industry 4.0 technology. It now features air-oxygen fuel capabilities for use in holding furnaces, and hydrogen-air and hydrogen-oxygen capabilities for a lower carbon footprint.

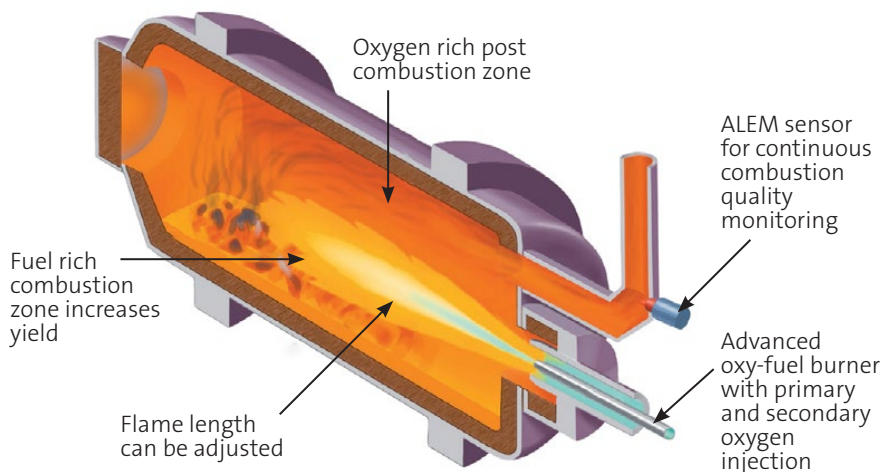
Benefits:

- Up to 40% increased productivity
- Up to 40% improved fuel efficiency
- Up to 1-2% higher metal yield
- Minimises NOx generation by lowering flame temperature via staged combustion
- Prevents oxidation and metal losses by creating a reducing atmosphere near the metal



Advanced Low-Emission Melting system (ALEM)

A system which can be used for any type of furnace in the non-ferrous industry that uses lower grade and/or contaminated scrap. ALEM monitors and controls the fuel and oxygen ratio for optimal combustion inside the furnace, which supports effective post combustion of contaminants and hence, increases furnace efficiency.

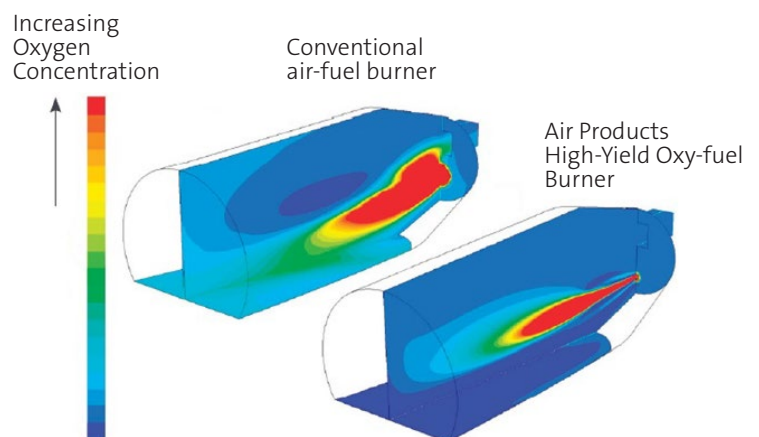


Key features and benefits:

- Allows melting of contaminated aluminium scrap in an environmentally sound manner
- Optimised temperature control and automated algorithm for combustion stoichiometry adjustment
- The system can be retrofitted to existing furnaces or integrated into new furnace installations
- Production increase and energy savings

High-Yield Oxy-fuel burner

While oxy-fuel technology has a proven track record in the metals industry, the Air Products high-yield oxy-fuel burner is designed specifically to increase yield for secondary aluminium melting in rotary furnaces. The technology minimises metal losses and flux usage while achieving improved productivity, reduced process costs and emissions. It can be easily retrofitted to existing furnaces with minimal interruption to your production schedules.



Predicted oxygen concentration profiles

Solutions for downstream processing

Extrusion - Die Cooling technology

Air Products' die cooling technology, using liquid nitrogen, can protect and improve the surface quality of extruded parts and increase extrusion speed rates. By removing heat, it can also increase the lifetime of the die and provide a barrier of nitrogen gas to the extrusion surface as it exits the die.

The intelligent die cooling system (IDCS) is used to control the flow of liquid nitrogen used for cooling and inerting during the extrusion process. IDCS can be integrated with the press control to automatically manage the profile temperature during extrusion and can be operated in different automatic modes or in manual mode.

The high quality and smoothness of the surface obtained under nitrogen is very beneficial for post-treatment processes like painting and anodising.

Key features and benefits:

- Increase production speed
- Quality improvements
- Extended tool lifetime
- Higher extrusion speeds

Annealing

Atmosphere systems for non-ferrous annealing can maintain the consistency necessary for bright surfaces and consistent metallurgical properties for materials, such as aluminium wire and strip products.

Atmosphere Control System for Annealing Processes

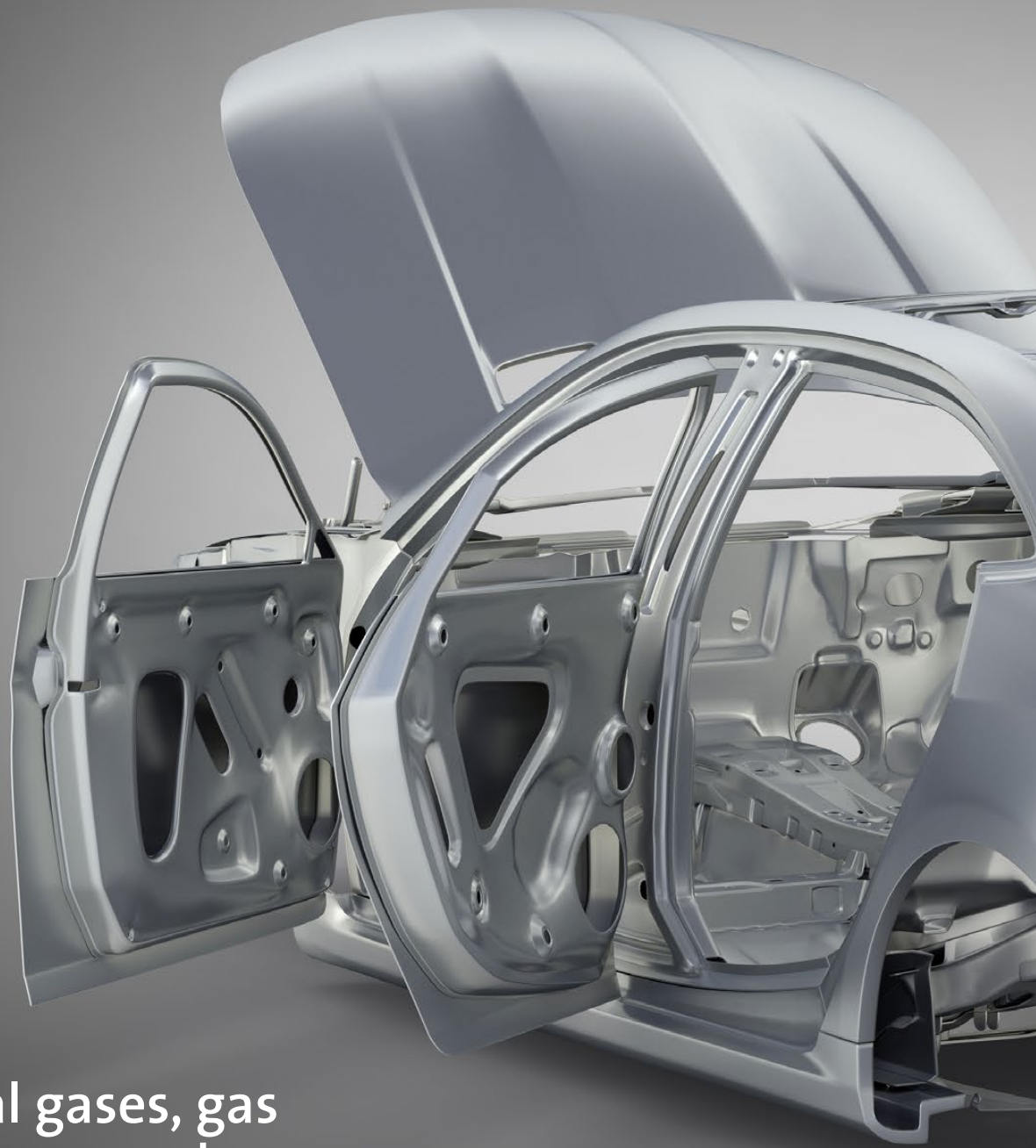
The system monitors and regulates the residual oxygen level or oxidising potential for controlled heat treatment of aluminium in nitrogen or nitrogen/hydrogen (N₂/H₂) atmospheres.

Monitoring and adjusting the furnace atmosphere allows the processor to control levels of oxidation and deliver the right degree of bright, clean surface finish.

Benefits:

- Reduced atmosphere consumptions
- Consistent quality
- Less rework





Industrial gases, gas atmospheres and technical support to help improve product quality, reduce operating costs and increase production

Reduce emissions and increase productivity with Industry 4.0 technology

As Industry 4.0 begins to shape the way equipment is designed and operated, at Air Products we have developed our Process Intelligence, a platform that can provide insight into process optimisation by taking advantage of smart systems and incorporating wireless sensors and cloud technology to track key process parameters.

Air Products Process Intelligence for the aluminium industry can improve operation consistency and melting efficiency, thereby reducing emissions and increasing productivity.

The platform can monitor and control your combustion system, track key process parameters and provide live feedback on how to improve your operations.

Air Products continually invests in its R&D capabilities with world-class laboratories researching ways to help our customers in production efficiency and reducing environmental emissions.



Winner of the 'Smarter Systems Award' at **The National Recycling Awards 2021**, by 'Harnessing Industry 4.0 to Optimise Performance in the Aluminium Industry'. Innovative and highly intelligent hydrogen burners for a lower carbon footprint.

Gas-related solutions for further processes

- Brazing nitrogen solution for Nokolok processes
- Power metallurgy
- Sintering processes
- Process gases for high-quality welding of aluminium and its alloys
- Cutting
- Specialty gases for emission monitoring
- Production increase and energy savings

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