

# Aluminium recycling made easy with WASTOX®

Oxygen lances and burners for greater combustion efficiency and cleaner air





## Recycling challenge resolved

**Recycling of aluminium and other non-ferrous metals presents a number of challenges. The organic compounds – such as lacquer and oils – generally contained in scrap generate emissions, which can limit productivity and restrict the choice of raw materials.**

WASTOX® from Linde Gas is the answer. WASTOX® uses oxygen lances and oxy-fuel burner management to combust emissions within the furnace. By assessing the flue gas composition, WASTOX® helps you tightly control the combustion process online. With over ten years' experience in the development and implementation of WASTOX® technology, Linde is the undisputed innovation leader. This patented and versatile system is successfully deployed by many customers around the globe for both single and double-pass installations in rotary salt and tiltable rotary furnaces.

### **Maximum combustion efficiency**

Tests have shown that combustibles react more efficiently to a pure oxygen stream than to an oxygen-enriched flame. This was confirmed by pilot plant tests in the rotary salt furnace operated by the German aluminium company VAW (see table page 5). With an air-fuel burner, 20-50 % of the carbon on the processed scrap (used beverage cans) was emitted as volatile organic compounds (VOC). An oxygen-enriched oxy-fuel flame reduced these emissions to 1%. With an oxygen lance, combustion was almost complete with emission levels dropping below 0.01%.

### **Benefits at a glance**

- **Cheaper raw materials**
- **Tight emission control**
- **Lower energy consumption**
- **Suitable for any furnace**

# Leaving nothing to waste

## Utilizing cheaper scrap and cutting emissions with WASTOX®



WASTOX® lance in a single-pass furnace



WASTOX® lances in a double-pass furnace

AMAG produces ingots for the foundry industry from its two parallel, single-pass rotary salt furnaces. To meet strict statutory requirements on emission levels, AMAG installed WASTOX® at both of its furnaces. The oxy-fuel burners are located at the charging door and the WASTOX® lances at the flue-gas opening.

WASTOX® has given AMAG a cost-effective way of meeting emission regulations without having to relocate or install an

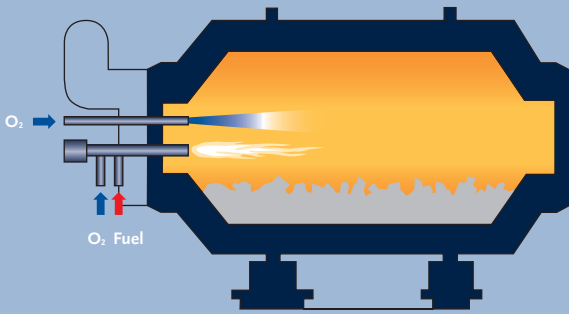
expensive post-combustion system. AMAG can melt scrap with higher levels of contamination without impacting on the quality of the final product or exceeding VOC limits (50 mg/m<sup>3</sup> on average per half hour). If VOC levels are rising, the operator simply starts the WASTOX® lance and adapts the oxygen flow to the VOC, turning it off when levels have dropped again. The WASTOX® lance is combined with a base supply of excess oxygen through the oxy-fuel burner.

**“WASTOX® is an extremely efficient, cost-effective way for us to maintain tight control over emissions and keep our plants up and running. Not only does this benefit the environment, it also makes for a safer, healthier work environment for our furnace operators.”**

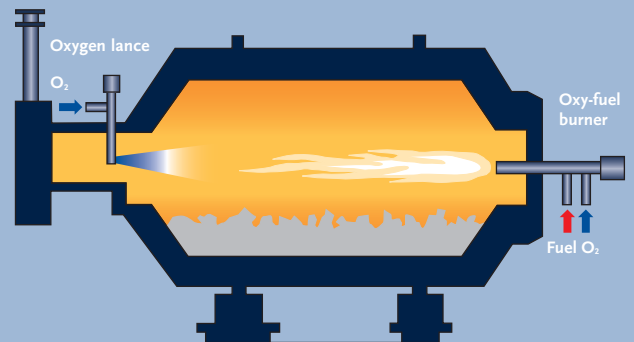
**Jo van Hinsberg  
Managing Director, AMAG**

# Waste – a natural power boost

WASTOX® technology geared to your furnace

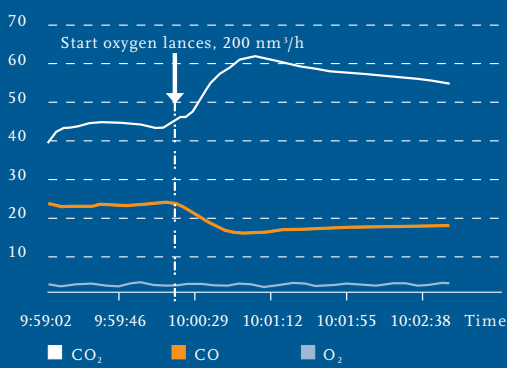


WASTOX® oxygen lances applied in double-pass rotary furnaces turn unwanted contaminants into valuable fuel.



The WASTOX® process controls emissions in the conventional single-pass rotary salt furnace.

Flue-gas analysis (%)



Analyzing the furnace gases in a rotary furnace during melting of contaminated scrap.

Pilot plant tests in a rotary salt furnace  
Comparison of combustion processes

Hydrocarbon (VOC)  
Emissions as percent of carbon input

Air-fuel burner	20 – 50%
Oxy-fuel burner, $\lambda = 1$	0.5 – 1%
Oxy-fuel burner + oxygen lance (WASTOX®)	< 0,01%

Reference: VAW aluminium AG, TMS Light Metals, 1999

# Waste is a valuable asset

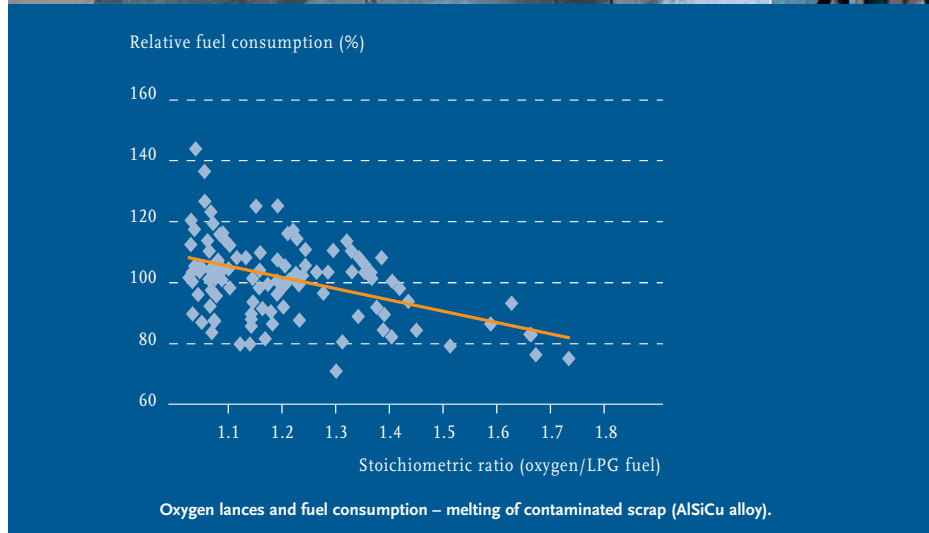
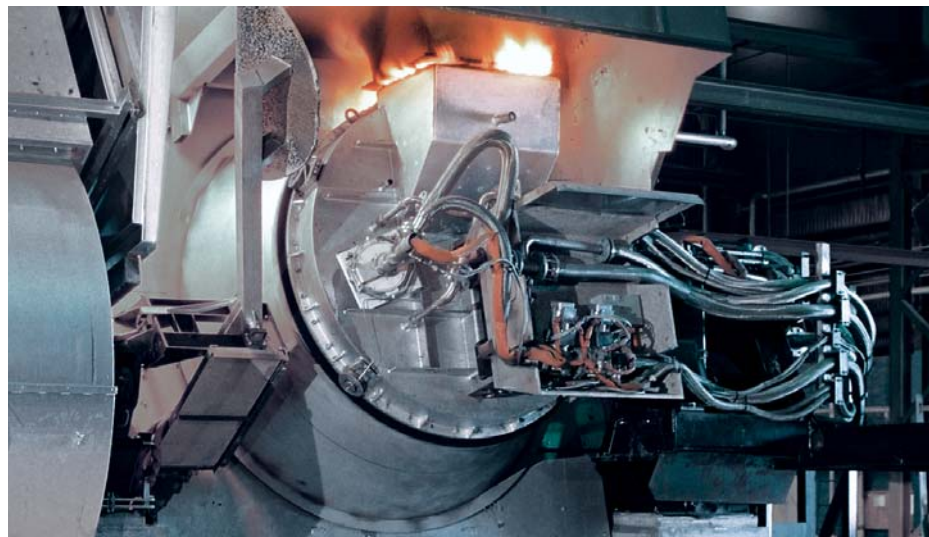
## Turning problematic contaminants into a cost benefit

At its two parallel Universal Rotary Tilttable Furnaces (URTF), Stena Aluminium AB produces ingots for the foundry industry. Stena Aluminium was keen to reduce fuel consumption and boost productivity. To achieve this, it installed WASTOX® in both furnaces.

The WASTOX® lances are mounted at the furnace door, close to and parallel to the oxy-fuel burner. This improves lance efficiency by projecting the oxy-fuel flame deep into the furnace. The CO content of the flue gas is monitored online to fine-tune the process parameters (such as lance oxygen flow, oxy-fuel power and ratio, furnace rotation).

**“One of the beauties of WASTOX® is that it turns unwanted contaminants into valuable fuel, thus significantly reducing our fuel consumption bill. Not only do we boost production with WASTOX®, we also save costs.”**

**Ronny Olausson, Plant Manager,  
Stena Aluminium AB**



## How can WASTOX® add value to your business?

Numerous customers worldwide have successfully implemented WASTOX®



WASTOX® reduces CO and organic emissions, helping plant operators to comply with strict environmental regulations and increase productivity. Lower emission levels also improve working conditions around the furnace.

Improved combustion of contaminants cuts scrap purchase costs, enabling operators to increase scrap contamination levels by as much as 100%.

WASTOX® turns unwanted contaminants into fuel, thus lowering operational costs. Savings of up to 30% have been realized in rotary salt furnaces. WASTOX® requires as little as between 5 and 15 m<sup>3</sup> of oxygen per ton of aluminium. It is easy to install and is guaranteed to make your business more profitable overnight.

# Getting ahead through innovation.

With its innovative concepts, Linde Gas is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

Linde Gas offers more. We create added value, clearly discernible competitive advantages and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardized as well as customized solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimization and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

**Linde Gas – ideas become solutions.**

Linde Gas



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