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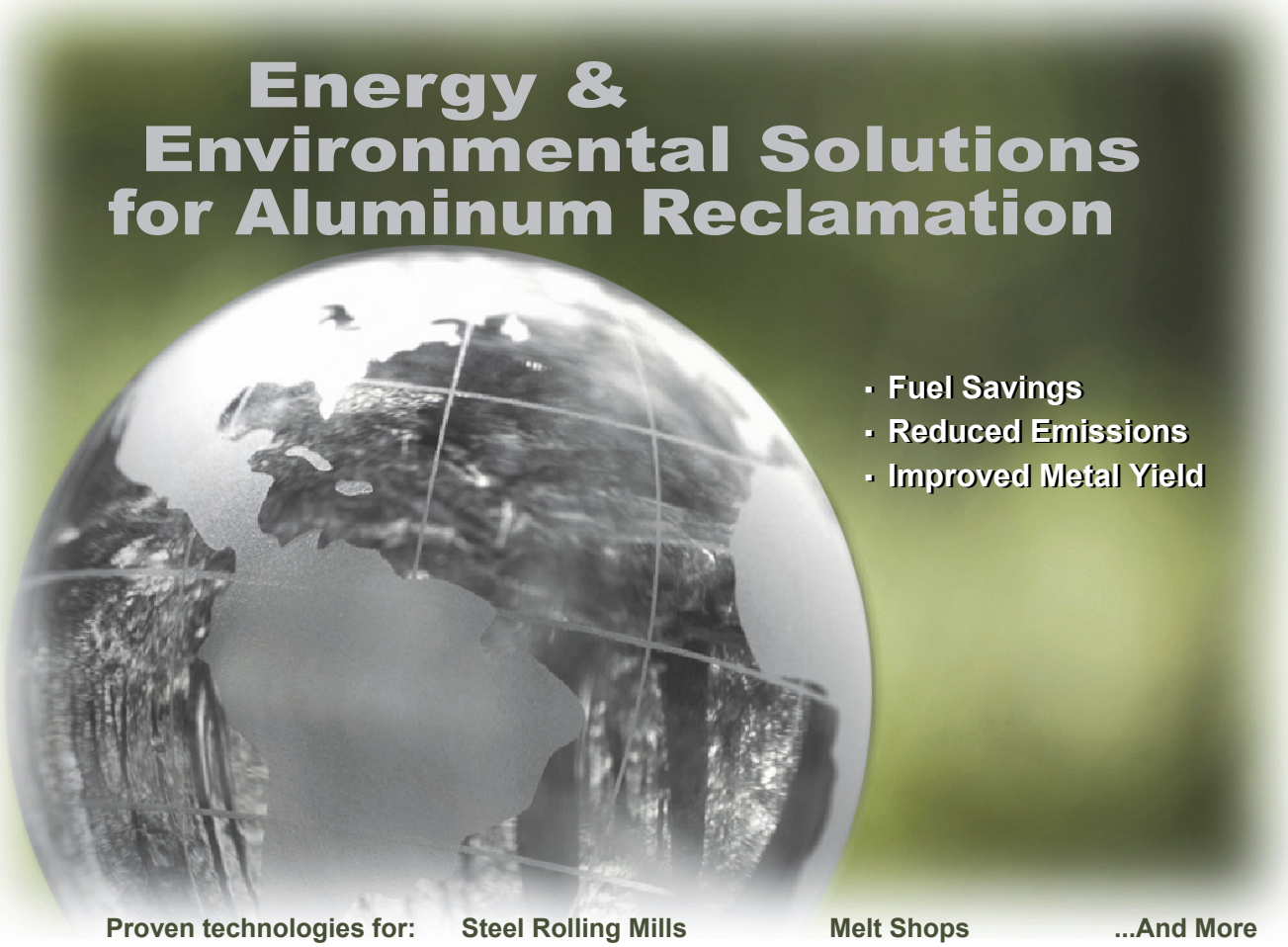
COMBUSTION CONTROL



United PROCESS CONTROLS

AFFILIATED MEMBERS

Furnace Control Corp. | Marathon Monitors Inc. | Process-Electronic | Waukee Engineering Co.

Energy & Environmental Solutions for Aluminum Reclamation

Where Does the Real Problem Lie?

In an Aluminum melting process, scrap is loaded into a furnace and melted to produce ingots. The rotary furnace has become the most popular. There are two types of rotary furnaces – Fixed Axis Rotary Furnace (FARF) and Tilting Rotary Furnace (TRF). An FARF furnace is basically a rotating tunnel with a burner at one-end and the exhaust port at the other. Operating with negative pressure, air is drawn in to the furnace which causes some metal loss from oxidation. Salt is used in large amounts to protect the load. Operation of the FARF furnace leads to increased emissions as well as costs involving the disposal of the salts. In a TRF type, the furnace chamber is a closed well. The burner and the exhaust port are located on the same end of the furnace and within the door. The furnace is operated with a positive pressure avoiding air ingress. Salt used is diminished and the furnace atmosphere is controlled for reducing, stoichiometric, or oxidizing states.

Most of the furnace technologies include oxygen enriched air/fuel or oxy-fuel burner systems. Burner systems are available using natural gas, LPG, light fuel oil, heavy fuel oil and solid fuel. Burners are normally set up to provide a slightly reducing atmosphere. However, because of varying feedstock requirements, the ability to accurately control the air/gas ratio during the melt cycle is beneficial. This would allow the operator to create an atmosphere in the furnace that is either oxidizing or reducing as required to obtain even higher yields, to optimize production or for metallurgical reasons. Oxygen analyzers are used to measure and control the correct ratio. The oxygen sensors can be located in the furnace exhaust port or duct. The oxygen analyzer equipment can be added to existing furnaces in the field.

TRF Furnace Cutaway ►

◄ Typical FARF Melter

The Solution "Measure where it matters!"

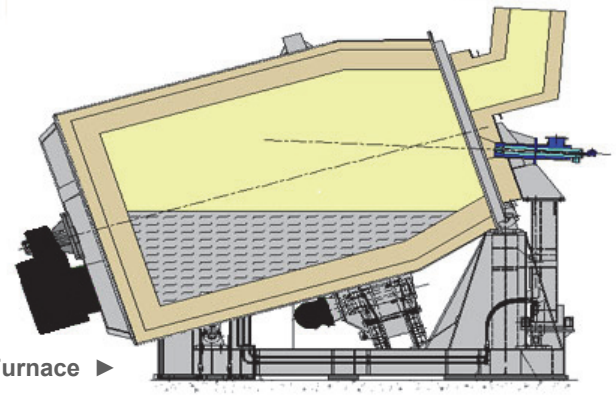
There are two major types of oxygen analyzers found in the aluminum industry: extractive and in-situ sensors. Both types work in aluminum applications, but excessive maintenance limits the usefulness and reliability of the extractive units in many applications. Because of high moisture content and particulate in the combustion gas, cells and sample conditioning systems require continuous attention. Regular calibration services are a must. The filters used on the sensor must be cleaned periodically due to moisture and particulate in the hot gases.

Using a high temperature in-situ sensor solves these problems. In most cases, high temperature in-situ oxygen sensors do not require pumps, heaters, filter systems, calibration, etc. The sensors are located in the exhaust port or duct. Proper installation of the sensor will ensure its performance. Continuous oxygen monitoring improves efficiency, lowers emissions, provides higher metal yields, better metallurgical results, and improved through-put. While monitoring has its benefits, the true Return on Investment is realized when oxygen is accurately controlled for optimized combustion.

Results: Cost Savings + Eco-Efficiency

The recurring cost of sensors is low compared to the operating expense of the melt process. Continuous excess oxygen measurement provides a tighter, more responsive air/fuel ratio resulting in:

- **more consistent quality**
- **reduced operating costs**
- **increased melt production**
- **reduced emissions**



Typical TRF Furnace ►

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