

Regenerative Thermal Oxidation (RTO)

E2SL completed a number of projects for primary aluminium producers globally. These projects included the design, supply, installation and commissioning of Regenerative Thermal Oxidisers.

→ Aim

Carbon baking plants, used predominantly in the aluminium smelting industry, produce off-gases heavily laden with contaminants including pitch fume, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAH) and carbon monoxide (CO). Increased awareness of the detrimental environmental impact of such substances has led to revised and more stringent environmental protection legislation.

Thermal oxidation has proved to be the only practicable technique, for minimising the emission of these harmful greenhouse and carcinogenic emissions. The process reduces all these substances to carbon dioxide and water vapour without the production of any by-product waste streams, such as condensed tar or solid carbonaceous material. Other technologies, such as electrostatic precipitation or flow filtration, capture the non-gaseous contaminants in liquid or solid form, creating a further waste disposal problem, and leaving gaseous contaminants un-treated. This is totally avoided when using the E2SL thermal oxidation process.

However, thermal oxidation on its own would be an energy intensive and highly costly operation. To address this, regeneration technology is incorporated into the process plant design, resulting in both effective environmental contaminant destruction and optimal energy consumption.

→ Scope of Work

Faced with the challenging requirements of treating high flows of contaminated flue gas Energy & Environmental Services have designed, installed and commissioned a number of Regenerative Thermal Oxidisers, specifically engineered to handle carbon baking emissions and provide the optimum environmental and cost solutions.

Using computational fluid dynamics (CFD) techniques to ensure efficient mixing and movement of gas streams, together with careful consideration of thermo-chemical requirements, the E2SL RTO design ensures high destruction efficiencies over a wide range of contaminant loadings.

CFD studies, together with the use of key component redundancy and robust design were used to eliminate any requirement for routine total plant downtime for maintenance. Consequently, one, continuously available plant is all that is required to treat a gas stream.

E2SL have extensive experience of providing full turnkey services to a customer, no matter where they are located. By integrating the design and supply activities, using computerised project and procurement management techniques, an efficient on-site installation operation is ensured, which is particularly important when plants such as RTOs are being erected at a site where production activities are still being carried out, and where tight time deadlines are to be met. Such conditions are the norm, since an RTO is frequently an add-on plant item to an existing ring furnace flue gas system.

Please visit our website www.e2sl.co.uk



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GB00724



198470



Energy House, The Stonerow Way, Parkgate, Rotherham, South Yorkshire, S60 1SG, UK
Telephone: +44 (0) 1709 521144 | Fax: +44 (0) 1709 529631
Email: enquiries@e2sl.co.uk | Web: www.e2sl.co.uk
Company Registration Number: 4369924, VAT Number: GB 796627175

Maintaining furnace operations when an RTO is to be added to the flue gas handling system presents engineering challenges. E2SL have developed structured procedures which allow for both hot and cold commissioning of the plant without production interruption. When these procedures are complete, final connection to the contaminated gas flow takes only a short time, thereby minimising production disturbance and ensuring emission minimisation from the start.

→ Benefits

- Highly effective contaminant destruction
- Exceeds all current and anticipated environmental guidelines

Composition	Units	Typical Removal Efficiency %
CO	Mg/Nm ³	99.1
Tars	Mg/Nm ³	-
PAH 17	Mg/Nm ³	98.7
PAH 8	Mg/Nm ³	99.9
Benzo(a)pyrene	Mg/Nm ³	99.9
Total VOC	Mg/Nm ³	98.9
VOC Non-Methane	Mg/Nm ³	99.3
Total Particulate	Mg/Nm ³	99.4

- No production of waste
- No requirement for stand-by plant
- Low plant maintenance requirement
- Highly dependable and durable plant – first plant has now been in continuous operation for more than 10 years

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→ Images



Images above show RTO in France



Images above show RTO in Venezuela

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