Metso:Outotec

Ausmelt TSL Process

Benefits

- Low investment and operating costs
- Environmentally friendly
- Flexibility to process a wide range of feed materials
- Compact furnace system - ideally suited to retrofit into constrained plant area
- Rapid ramp up to full production

The Metso Outotec Ausmelt TSL Process is an efficient, environmentally friendly and highly flexible pyrometallurgical process for treating a wide range of feed materials:

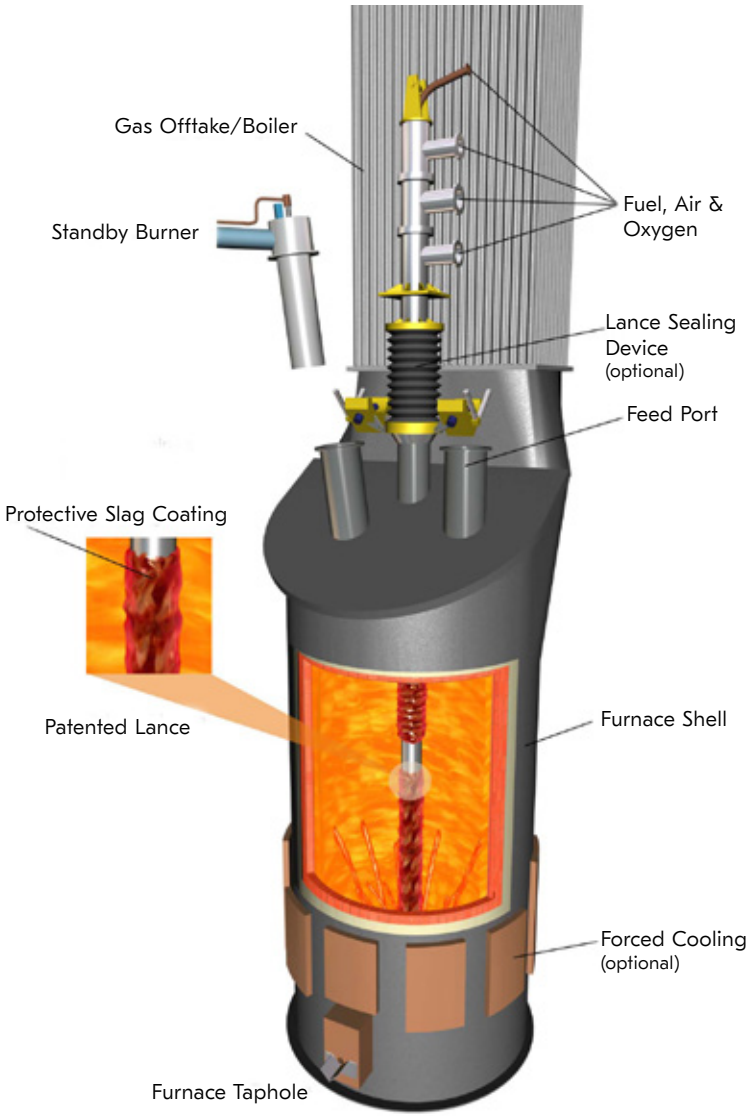
- copper, nickel, lead, tin and polymetallic concentrates
- copper and lead secondaries
- zinc bearing residues
- various waste materials and ferrous feedstocks

We have the world's leading smelting technology portfolio which includes the Metso Outotec Ausmelt TSL Process, the Metso Outotec Flash Smelting Process, the Metso Outotec Kaldo Process and other complementary offerings. This extensive array of technologies and expertise ensures you receive not only the best possible solution, but one that is tailored to match your specific requirements.

Ausmelt TSL Process in brief

Based on Top Submerged Lance (TSL) technology, the Ausmelt TSL Process has become a leading smelting technology due to its versatility, cost effectiveness and environmental benefits. It is equally suitable for new installations and for modernization of existing smelting plants.

The Ausmelt TSL Process is based on injecting air, oxygen and fuel directly into the molten slag bath via a vertically suspended lance. Critical process phenomena, such as feed material dissolution, energy transfer, reaction and primary combustion, take place in the intensely agitated slag layer. As a result, the Ausmelt TSL Process is extremely efficient with high specific smelting rates. Metso Outotec's commitment to the continuous development of the Ausmelt TSL Process - in close collaboration with our customers - ensures you receive a best practice solution.



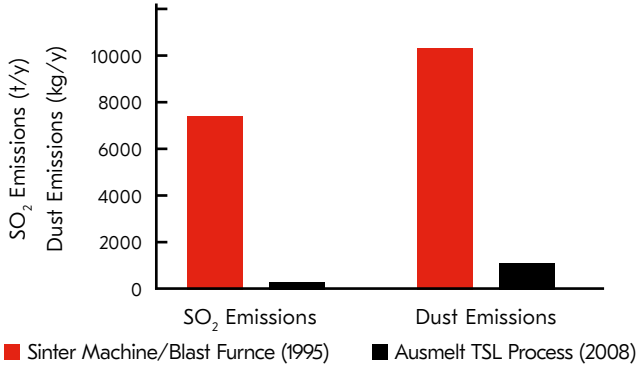
Superior environmental performance

The Ausmelt TSL Process is one of the most energy efficient smelting technologies available. In the Ausmelt TSL Process the direct injection of fuel into the slag bath and ability to utilise the energy released during the oxidation of the feed (e.g., sulphides, plastics) reduces the fuel requirements compared to alternative processes. The addition of post combustion air with the Ausmelt Lance Shroud System is used to maximize the recovery of energy available in the system. This energy may be used in other sections of the plant or for electricity generation. This further reduces the plant's energy requirements and minimises green house gas emissions.

The Ausmelt TSL Process offers a range of process solutions for the treatment of various metallurgical slags, residues and waste materials. Unlike other smelting technologies the Ausmelt TSL Process produces a benign slag that meets Toxicity Characteristic Leaching Procedure (TCLP) requirements. The slag does not require any downstream processing and is simply granulated to vitrify and lock in metallic components before discarding.

Metso Outotec Ausmelt TSL Furnaces are fully sealed and operate under a slightly negative pressure to eliminate fugitive emissions to the environment. As a result, the lower offgas volumes and higher strength SO_2 also offers significant savings, as a smaller offgas handling system is required. In addition to these benefits, the Ausmelt TSL Process provides significant improvements in occupational health and safety.

The Weser-Metall GmbH Nordenham lead smelter is a prime example of how the Ausmelt TSL Process can dramatically improve a site's environmental performance. This modernization project, which involved replacing an existing sinter plant/blast furnace process with the Ausmelt TSL Process, significantly reduced SO_2 and heavy metal emissions from the site.



Emissions at Weser-Metall before and after the installation of the Ausmelt TSL Process (U. Kerney, "The Nordenham Pb Smelter and its Challenges", International Science and Technology Conference: Lead Metallurgy – Achievements and Problems Conference, Legnica, 2010 (preprint).)

Environmental benefits

- Reduced offgas and SO_2 emissions
- High strength SO_2 offgas
- Reduced energy consumption
- Ability to treat waste materials and heavy metal residues
- Ability to process secondary materials

Versatility of the Ausmelt TSL Process

The flexibility of the Ausmelt TSL Process allows us to tailor a processing solution to suit your specific requirements. This versatility, combined with Metso Outotec's extensive metallurgical knowledge and experience, enables us to deliver an optimized plant design.

The Ausmelt TSL Process can handle a wide range of feed materials including low grade concentrates, complex polymetallic ores, materials with high impurity contents and secondary and industrial waste materials. These materials, which are often problematic for conventional smelting technologies, are becoming increasingly important feed sources.

The Ausmelt TSL Process has been widely adopted in commercial operations and successfully implemented worldwide. Metso Outotec has a strong track record of projects achieving rapid ramp-up to design capacity or even exceeding design production capacity.

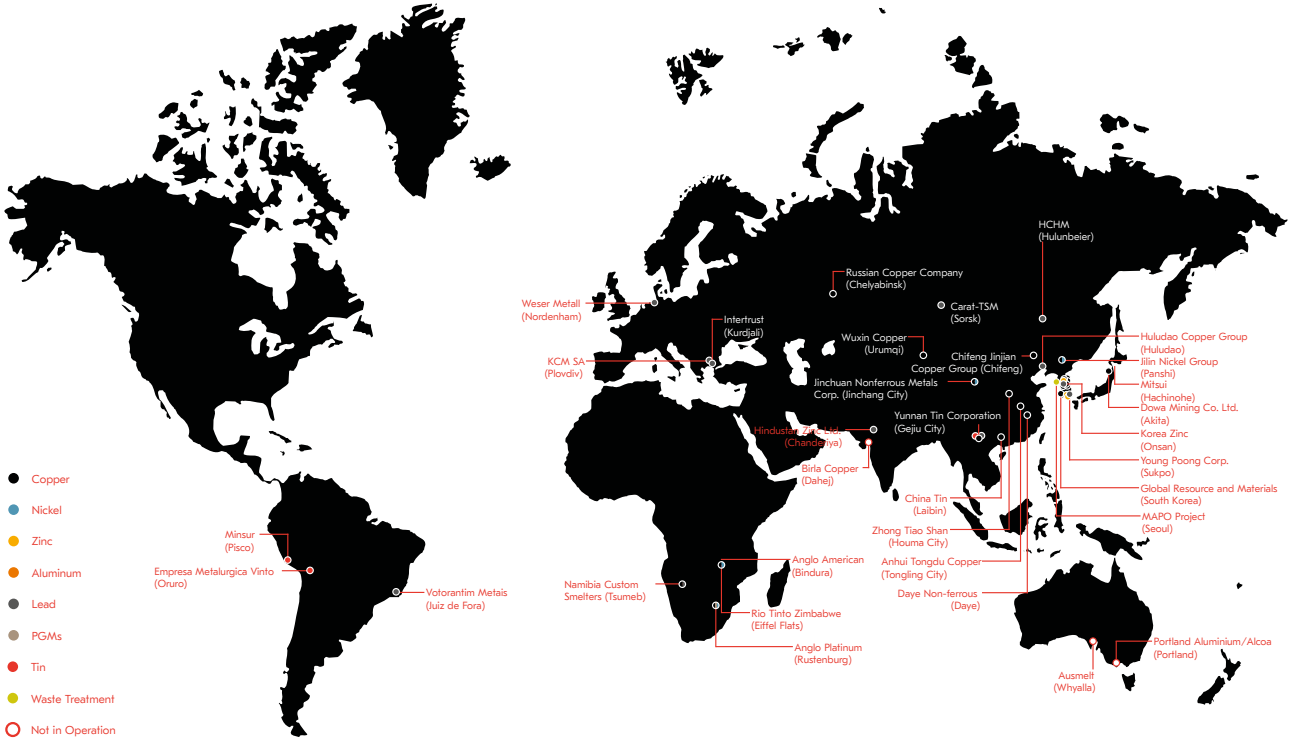
Copper smelting and converting

The Ausmelt TSL Process offers an integrated solution for copper smelting and converting or it can be coupled with existing site processes. The Ausmelt TSL Furnace can process copper concentrates with a wide range of copper contents and high impurities contents. For copper smelting the Ausmelt TSL Process has been installed in relatively small operations through to large scale operations processing in excess of 1.5 millions tonnes of concentrate per year.

Secondary copper

With increasing competition for high grade primary concentrates and pressure for sustainable development, producers are looking for technologies to process secondary copper materials. The Ausmelt TSL Process is suitable for a wide range of secondary copper feeds, ranging from low grade slags and residues, to materials with high impurity and organic contents such as e-waste, through to high grade metallic scrap.

Metso Outotec Ausmelt TSL Plants



Ausmelt TSL Furnaces around the world

Nickel smelting and converting

Ausmelt TSL Furnaces have been designed, built and operated to handle nickel concentrates with nickel content as low as 5%. Nickel converting is also available to upgrade low grade mattes before refining. PGM recovery can be targeted specifically using the Ausmelt TSL Process. Similarly, concentrates with high MgO levels, unsuitable for other processes, can also be treated using the Ausmelt TSL Process.

Lead

The Ausmelt TSL Process has been rated the BAT (Best Available Technology) for the production of lead. The emergence of the Ausmelt TSL Process as the preferred lead smelting technology has been driven by the search for environmentally friendly technologies to process low grade concentrates and secondary materials. Ausmelt TSL Furnaces can process up to 100% secondary lead materials such as lead acid batteries, metallic scrap, low grade slags and residues.

Small-scale lead producers can now also benefit from the flexibility and superior environmental performance achievable with the Ausmelt TSL Process. The consistency of secondary lead materials, especially lead acid batteries, has allowed Metso Outotec to offer 'off the shelf' small scale secondary lead plants to meet the needs of this competitive market.

Tin

Today, approximately a third of the world's tin is produced with the Ausmelt TSL Process. The Ausmelt TSL Process can be used to smelt tin concentrates or as a fuming operation to recover tin from low grade concentrates or slags.

Other

The Ausmelt TSL Process has also been adapted to successfully process polymetallic concentrates, zinc bearing residues, ferrous materials and various industrial waste materials including spent pot linings (SPL), municipal waste incinerator ash (MWIA), electric arc furnace (EAF) dust and various residues.

Complementary Metso Outotec technologies

Metso Outotec's technology portfolio covers the entire production chain from mine to metal. This broad range of technology offerings and industry experience, combined with our comprehensive understanding of equipment and process requirements, ensures you receive fully integrated process solutions customized to your specific needs.

This unique ability to supply comprehensive plant solutions allows us to provide plant and process guarantees for key performance measures including throughput, metal recovery, energy consumption and emissions. In addition to building new capacity, Metso Outotec delivers technology and services for the expansion, modernization, optimization and maintenance of existing plants, processes and equipment.

Metso Outotec is dedicated to supporting you at every stage of a project lifecycle. From conceptual studies and process development through to project implementation, training or ongoing technical and maintenance support, Metso Outotec can help.

Complementary technologies

- Smelting technologies
- Refining
- Casting
- Electro-refining
- Precious metal recovery
- Slag cleaning
- Offgas handling
- Sulphuric acid plants
- Automation and process control

In addition, Metso Outotec's technology portfolio also extends into the mineral processing, hydrometallurgical, chemical, energy and water industries.

Metso Outotec is a frontrunner in sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. By improving our customers' energy and water efficiency, increasing their productivity, and reducing environmental risks with our product and process expertise, we are the **partner for positive change.**

Metso:Outotec

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