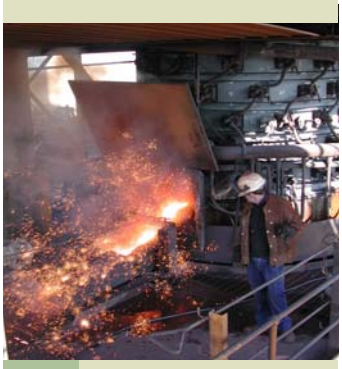


AUSMELT LIMITED

AusIron® Process

The AusIron® Process

The AusIron® process for direct ironmaking is based on Ausmelt's commercially successful Top Submerged Lance technology.

Ausmelt has applied this technology in plants around the world, processing a variety of metals such as lead, tin, zinc, copper, nickel, gold/silver and PGM's. The technology has also been used to treat hazardous waste products such as spent pot lining from the aluminium industry.

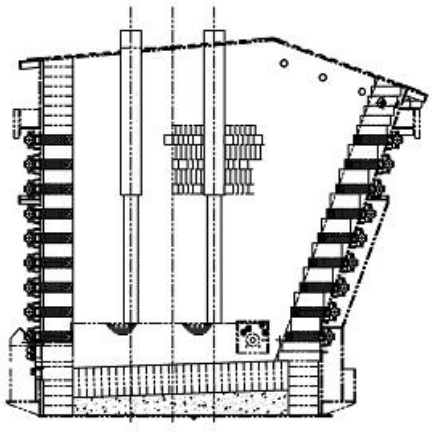
The AusIron® technology builds on this success, with the process capabilities already proven at the purpose-built Demonstration Plant in Whyalla, South Australia.

AusIron® Demonstration Plant.

Advantages

The key attributes of the technology are:

- Direct use of non-coking coals.
- Simple use of ferrous materials, no pelletising or sintering is required.
- High quality metal product suitable for both electric and oxygen steelmaking.
- Can use ferrous residues from minerals processing or steelplant waste products, as low cost feed to produce pig iron.
- An efficient, single stage process not reliant on preheating or pre-reduction of ore feeds.
- Product gases are fully combusted within the furnace, and can be directly fed to energy recovery equipment, simplifying offgas handling.
- The furnace operates at sub-atmospheric pressure allowing simple feeding and tapping arrangements. Lances can be raised clear of the furnace simplifying maintenance.
- Low environmental impact. The absence of coke ovens and sinter/pellet plants reduces environmental issues typically associated with ironmaking.
- Power Generation. A waste heat boiler system, directly coupled, can generate sufficient electrical power to supply the ironmaking facility and associated oxygen plant, with surplus power available for sale.
- Low capital. The use of a single stage, highly efficient smelter reduces capital requirements for new ironmaking capacity and permits effective use at smaller scales of operation than conventional processes.
- Operating flexibility. The lance based operations offer the ability to start, stop and idle the process easily.



Demonstration Plant AusIron® Furnace.

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AusIron® Process

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Applications

The AusIron® technology is suited to a range of uses including:

- Resource development projects,
- Hot metal feed for EAFs
- Incremental hot metal capacity for integrated steelplants,
- Treatment of steelplant wastes,
- Treatment of ferrous by-products from mineral processing,
- Merchant pig iron production.

Operation

The AusIron® process is a bath smelting process which directly processes ferrous bearing feed materials to produce molten iron.

The process takes place within a smelter vessel, equipped with multiple lances. Each lance burns coal with oxygen-enriched air at the lance tip, which is submerged in the smelter slag bath. The lance tip combustion conditions are controlled to prevent bath oxidation, and optimised for maximum energy release to the bath.

Reductant coal, ferrous feed and fluxes are fed by gravity to the smelter slag bath through ports in the furnace roof. Ferrous materials rapidly dissolve in the slag bath, whilst the reductant coal reacts with iron oxide contained in the slag. The turbulence generated by submerged combustion provides efficient mixing, resulting in high smelting rates.

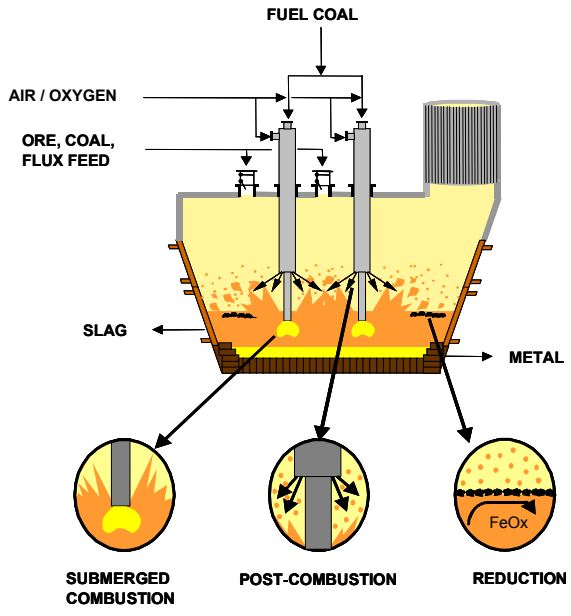
Typical Hot Metal Chemistry

Carbon:	2.5 to 4.2%
Silicon:	0.02 to 0.04%
Sulphur*:	0.02 to 0.08 %
Phosphorus:	<0.08%

* can be lowered with external product desulphurisation

Carbon monoxide produced by smelting reactions, together with reductant coal volatiles and residual fuel from lance tip combustion, is post-combusted immediately above the slag bath using oxygen-enriched air delivered through a shroud around each lance. The evolution of gases from the lance tip generates a cascade of slag droplets above the bath providing a large surface area for efficient recovery of post-combustion energy.

Complete combustion of fuel gases is achieved within the furnace maximising energy recovery and avoiding the production of difficult low CV fuel gases.



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AusIron® Process

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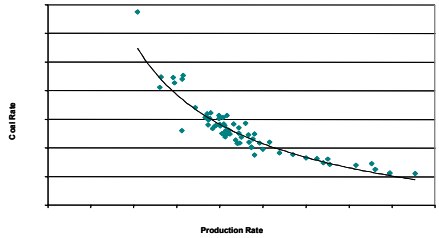
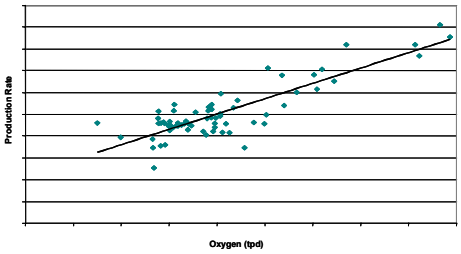
Offgases leave the furnace through a boiler tube offtake that forms part of the energy recovery system.



Improvements in coal use at the Demonstration Plant.

Hot metal product and slag are tapped separately from the furnace hearth.

The furnace hearth is refractory lined in the metal bath region. The sidewalls and roof are water-cooled to withstand the intense operation and turbulent slag. The water-cooled furnace sections are slag coated during operation reducing heat losses and protecting cooling elements from damage.



Demonstration Plant productivity

Furnace operations can be stopped quickly, and the process idled for long periods by submerged combustion of fuel coal only. For shutdown the furnace can be drained of its contents and the lance tip combustion used to maintain furnace temperature. Operations can be quickly re-established by feeding solid slag, which is melted using the lances. Once a molten pool is established, the lances can be submerged, and operations resumed.

Commercial Use

Ausmelt has successfully commercialised its Top Submerged Lance process in a wide variety of non-ferrous applications, some with scale up factors in excess of 200 times.

This experience, coupled with operating experience from the Demonstration Plant, provide a solid platform for commercial application of the AusIron® Technology.

The AusIron® process has been developed with a focus on the inherent process flexibility necessary for commercial scale facilities to be rapidly optimised. The use of multiple lances, each generating an effective 'process zone', and distributed post-combustion allows scale up to be a combination of size and number of lances. Effective use of oxygen enrichment at both the lance tip and post-combustion shroud, controllable independently, allows fundamental process characteristics to be maintained on scale-up.

Cover Photo—Tapping the AusIron® Furnace

Making Contact

To assess possible applications of AusIron® Technology
For your plant or project, please contact the AusIron® Marketing Manager at Ausmelt or the local agent in your area.
Please visit Ausmelt's website for agents' contact details and other information

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