

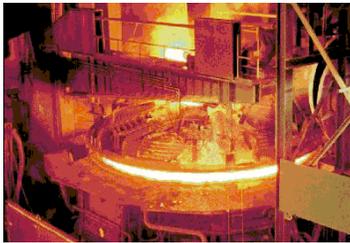
Processing of steelmaking dusts and solid wastes

Iron & Steel

Treatment of dusts and solid wastes generated during steelmaking is important for the recovery of valuable metals including zinc, nickel, chromium, molybdenum, and iron. A number of competing technologies have been developed and new approaches are being considered to enhance economical effectiveness and reduce environmental impacts.

Some of the technologies that have been commercially implemented include:

- Recycling of briquetted iron-bearing waste streams into conventional process charges (e.g., blast furnace burden or basic oxygen furnace coolant, etc.)
- Rotary hearth kiln pre-reduction of pellets followed by submerged arc furnace smelting (Inmetco and Fastmet USA, other plants in Japan for Nippon Steel and Taiwan)
- Non-transferred plasma arc heated coke-filled shaft kiln with dust injection via tuyeres (Scandust Sweden)
- Smelting of briquetted dust in a conventional submerged arc furnace (Metal Europe France)
- DC transferred open arc furnace (Heckett Multiserv Italy and Mogale Alloys South Africa)
- Recycling of cold bonded stainless steel fines to the steelmaking process as cold charge
- Rotary kilns (Waelz), multi-hearth (Primus), and Cupola processes (Thyssen Krupp).



Electrical steelmaking



Oxygen steelmaking

Contacts

Heraldo Andrade
Regional Director, South America
+55 31 3308 7210
Heraldo.andrade@hatch.com

Yakov Gordon
Technical Director
+1 905 403 3750
Yakov.gordon@hatch.com

Engineering and project assistance

Our process specialists have extensive knowledge of the different processes and can provide technical assistance to develop commercially-viable plants for the processing of electric arc furnace dust to recover valuable metals.

The following are key steps involved in the technical assistance program offered:

- High-level techno-economic evaluation of the technologies and selection of the most viable technology



- Process design basis including mass and energy balance, process flow-sheet, process consumptions, equipment list, estimated design capacities, assessment of zinc product quality, and conceptual layout
- Operating cost analysis
- Capital cost estimate
- Financial analysis
- Sensitivity analysis to determine impact of business variables on the economic viability.

We can also provide extensive EPCM services during implementation and construction of the plant. Our specialists have been involved in the commercialization, construction and operation of different processes involving the treatment and recovery of dusts and solid wastes:

- Anglo Platinum Converting Process: Provided full basic and detailed EPCM services for the design and construction of two top submerged-lance converter vessels based on Ausmelt process technology.
- Technology selection study for zinc ore processing on the Gamsberg deposit on behalf of Anglo American. The study ranked the various processing options using an appropriate set of selection criteria. In addition to the conventional Roast-Leach-Electrowin route, the options included pyrometallurgical processing routes (in particular, the use of Ausmelt Top submerged-lance technology) as well as hydrometallurgical routes (e.g., direct leaching and pressure leaching).
- Ausiron pilot plant where the Ausmelt technology was used to produce pig iron. Hatch mentored operations of the heavy pilot plant in Whyalla, South Australia.
- Design and operational experience with DRI rotary hearth furnaces and kilns for dust agglomerating processing.
- Completed studies on recycling of solid wastes and sludge in the form of cold-bonded briquettes and pellets in primary furnaces within the steel plant.
- Experience related to operation and process control and technological issues at steel melting shops.
- Steelmaking plant experience related to assessment of slag for recycling, handling systems for transfer, storage and transportation of the material, end-use identification and properties required.
- Completed audits and operational assistance programs (covering cost/productivity/energy/product quality/shop logistics) at several plants including Severstal, Essar Steel Algoma Inc, BlueScope Steel. This program also included the

evaluation of the steelmaking operations as well as reduction of flux consumption and slag generation.

- Provided technical assistance for reduction of greenhouse gases at BlueScope Steel, New Zealand Steel, OneSteel. This program also included the evaluation of steelmaking operations as well as reduction of flux consumption and slag generation.
- Completed studies on recycling of LF slag in secondary steelmaking.
- Completed technical studies on steelmaking slags—solubility of titania in mould flux, the role of fluorspar in stainless steel slags and the stability of chromium-bearing slags.
- Technical assistance to review the state-of-the-art clean technologies list developed by the APP steel task force; and review the data compiled by the steel task force.
- Cold bonding of stainless steel wastes and recycling these into the steelmaking process—knowledge of the process route and definition of the required equipment and practices.

