

# The Albion Process

**Several processes have been developed commercially to oxidise refractory mineral sulphides, such as bacterial and pressure leaching. A new emerging technology for the oxidation of refractory sulphides is the Albion Process. The Albion Process technology was developed by MIM Holdings (now Xstrata Plc) to treat concentrates produced from refractory base and precious metals ores. The process was developed in 1993 and has been patented worldwide.**

The Albion Process technology is jointly owned by Xstrata and Highlands Pacific/OMRD (a Japanese consortium).

Albion Process technology offers the mining industry an effective, yet simple solution to handling refractory sulphide ores in a more competitive way.

The Albion Process is a combination of ultrafine grinding and oxidative leaching at atmospheric pressure. The Albion Process incorporates the revolutionary IsaMill to produce an activated, finely ground concentrate at relatively low specific energy inputs. This finely ground concentrate is then leached at atmospheric pressure in conventional agitated tanks. The capital costs of an Albion Process plant can be substantially lower than a comparable bacterial or pressure leach plant, due to the simplicity of the process flowsheet.



Figure 1: The M3000 IsaMill Installed at Lonmin, South Africa

The key to the Albion Process is the ultrafine grinding stage. The process of ultrafine grinding results in a high degree of strain being introduced into the mineral lattice. As a result, the number of grain boundary fractures and lattice defects in the minerals increases by several orders of magnitude, relative to unground minerals. The increase in the number of defects within the mineral lattice 'activates' the mineral, facilitating leaching. The rate of leaching is also enhanced, due to the dramatic increase in the mineral surface area.

Passivation of the mineral surface by sulphur based leaching products is also minimised by ultrafine grinding. Typically, precipitates that form on the surface of a leaching mineral will slowly passivate the mineral, by preventing the access of chemicals to the mineral surface. Passivation is normally complete once this precipitated layer is 2 – 3 microns thick. Ultrafine grinding of a mineral to a particle size of 80% passing 8 – 12 microns will eliminate passivation, as the leached mineral will disintegrate prior to the precipitate layer becoming thick enough to passivate the mineral.

The IsaMill, marketed exclusively by Xstrata Technology, is the most advanced ultrafine grinding technology available today, with mills installed worldwide.

The oxidative leaching stage is carried out in agitated tanks operating at atmospheric pressure. Oxygen is introduced to the leach slurry to assist the oxidation. Leaching is carried out autothermally, in that the temperature of the leach slurry is set by the amount of heat released by the leaching reaction. Heat is not added to the leaching vessel from external sources. Temperature is controlled by the rate of addition of oxygen, and by the leach slurry density.

Albion Process flowsheets have been developed for a range of base and precious metals, and Xstrata Technology have extensive testing capabilities, including pilot plants capable of producing up to 120kg per day of metal at their Hydrometallurgy Research Laboratories in Brisbane, Australia.

The Albion Process technology is currently being developed by Xstrata Plc for use in the expansion of the McArthur River silver, lead, zinc mine located in the Northern Territory, Australia. Xstrata is conducting a feasibility study to use the Albion Process technology to reduce the capital and operating costs of an expanded operation. The study to date shows that the use of the Albion Process at McArthur River has the potential to place the operation in the bottom quartile for cost of production.

Key advantages of the Albion Process are:

- Lower capital costs
- Lower operating costs
- Environmentally stable residues
- Lower cyanide consumption
- Simple to operate and maintain

Core Resources is the exclusive global agent for the Albion Process technology.

For more information regarding the Albion Process, please contact:

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