

# ELECTROWINNING

## SGS MINERALS SERVICES

SGS Lakefield Orestest Pty Ltd (SGS) was originally founded in 1993 as Orestest Pty Ltd. SGS has since developed into a major metallurgical services organisation located in a purpose-built laboratory in Perth, Western Australia.

The laboratory is dedicated to providing high quality metallurgical testing across the broad spectrum of the minerals industry including:

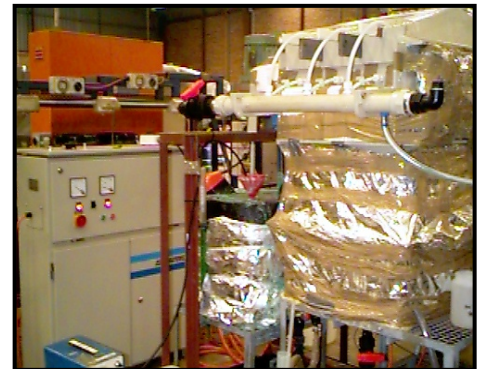
- Gold ores
- Nickel laterites
- Base metal
- Iron ore
- Mineral sands
- PGM ores
- Rare-earths and other exotics
- Diamond ores
- Environmental services

SGS provides a comprehensive range of test work capabilities including bacterial leaching, crushing, screening, grinding, ultra fine grinding, gravity, magnetic & electrostatic separation, solvent extraction, electrowinning, flotation, pressure leaching, pressure oxidation, pressure acid leach and cyanide speciation. Pre-feasibility studies, on-site diagnostic metallurgical services, environmental testing and analytical services are also included in our range of capabilities.



## Introduction

In electrowinning, inert electrodes are immersed in a solution containing metal ions of interest and a direct current is passed through. Electrolytic reduction of ions to the metal takes place at the negative electrode (cathode). At the positive electrode (anode), water is oxidised to produce oxygen and protons (acid). Most metals are recovered industrially from their leach solutions by electrowinning. The examples are copper, nickel, cobalt, zinc, silver, gold, cadmium, antimony, chromium, manganese, gallium and tellurium. The metals such as aluminum and magnesium cannot be electrolysed from aqueous solutions due to their high electrochemical potentials and therefore the reactivity with water. These metals are produced commercially by electrowinning in a molten salt (i.e. fluorides or chlorides) media.



## Facilities at SGS

A range of electrowinning equipment is available to conduct testwork in batch mode or continuously when coupled to a solvent extraction pilot plant production of metals. Various cell types, cathodes, anodes, gas scrubbing systems and rectifiers (ranging 800 A; 10 V, 200 A; 10 V and 10 A; 18 V) are available to produce metal up to commercial scale size cathodes. The cells can be incorporated with anode or cathode bags.

Oretest has developed an unique electrowinning (EW) cell capable of recovering metal values from dilute liquors. The testwork conducted using both laboratory and prototype cells showed encouraging results, which will have applications in recovering metal values directly from dilute solutions such as heap leach and bacterial leach liquors or even waste streams. Registered as the **Jetcell**<sup>®</sup> its design differs from the conventional cell by the electrode arrangements and hydrodynamics.



The benefits of the **Jetcell**<sup>®</sup> are:

- Superior current efficiencies
- Low power consumptions
- Low labour costs
- Option of producing metal powder
- Fully automated continuous metal recovery
- Fully enclosed cell system
- Selective electrowinning



## Testwork Completed

- Development of anode bag system for nickel electrowinning in sulphate media and producing commercial size 7 day cathodes.
- Development of optimum conditions and surface preparations to produce 48-hour, full-size nickel starter sheets on stainless steel and titanium cathodes.
- Fully integrated solvent extraction - electrowinning continuous pilot plant operations to produce LME grade nickel and copper. Seven major projects over the past five years.
- Batch leaching, impurity removal and electrowinning projects on nickel, cobalt, copper, zinc, gold and silver with individual projects extending up to 6 months.
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For more information, please contact us:

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