

Pilot Plant Testwork Services



RIGHT SOLUTIONS | RIGHT PARTNER

Introduction

There are some inherent shortcomings from bench scale or batch testwork data that can limit the usefulness of data for process plant design. These shortcomings arise from the small scale batch operated laboratory equipment and testing procedures, which do not properly replicate and demonstrate the operation of full scale continuous process plant equipment. Factors might include:

- Particle size distribution,
- Influence of process and reaction time,
- Effect of size of process machinery upon process plant performance,
- Behaviour and disposition of by products and unfinished fractions such as middlings, scavenger concentrates or cleaner tailings,
- Implication of recirculating streams, and
- Limitations associated with the quantity of samples available for bench scale testwork.

Even if the metallurgical end results are the same, the above shortcomings of benchscale testwork will create a gap in the design criteria that may only be filled by the operation of a larger scale continuous pilot plant.

Within reason pilot plants can be used to examine alternative process flowsheets, produce concentrates and other products for downstream process design testwork such as pyrometallurgical and hydrometallurgical processing of concentrates. Pilot plants are also used for the study of instrumentation and control units within a process plant and to evaluate a speciality equipment such as ultrafine milling machines and high pressure grinding rolls.

ALS Metallurgy has a comprehensive array of pilot plant equipment that can be assembled to suit most mineral processing and extractive metallurgical unit operations. All of our pilot plant equipment and circuits have been designed with many years of piloting experience, together with in depth consultation with our mining and process engineering company clients and industry partners.

There are numerous niche skills specific to pilot plant processing that can only be gained from years of experience. Since the company started in 1979, ALS Metallurgy has conducted hundreds of pilot plant programs, which means we can derive the best data acquisition, correct selection of process plant parameters, and overall metallurgical outcomes from your ore samples.

There is often no substitute for pilot testing when it comes to reducing technical and commercial risk. An ALS Metallurgy pilot plant will provide a high degree of confidence in the design criteria and ensure the feasibility study is truly bankable.



Mineral Processing Pilot Plants

Mineral processing forms an important and integral part of metallurgical process plants. The production of mineral concentrates and other product streams of correct physical and chemical characteristics for downstream extraction processing can often make or break a project. Very often a pilot plant is the best way to produce these products.

At ALS Metallurgy, we have extensive mineral processing pilot plant equipment to suit a variety of circuit flowsheets, either as unit operations or in combination with other equipment. These include:

Pilot SABC (AG/SAG) up to 4tph – This AG/SAG milling circuit installation is one of the few remaining 6' x 2' high aspect units in the world. The AG/SAG mill has been fully re-conditioned and fitted with a dump hatch to facilitate quick charge sizing. Circuit instrumentation includes: mill weight, mill speed (100% variable), mill power, motor amps, and drive shaft torque for on-stream data collection. Together with excellent control of feed rate and feed size distribution, our pilot SAG mill will deliver accurate mill specific energies.

High Pressure Grinding Rolls (HPGR) up to 60tph – In partnership with Koeppern Machinery Australia, ALS Metallurgy has available a state-of-the-art pilot HPGR unit. This second generation pilot HPGR incorporates rolls of 1000mm diameter and 250mm width with nominal throughput capacity of 40tph on a continuous basis, which can reach a maximum rate of 60tph. The HPGR pilot machine is fitted with a fully computerised data collection system for accurate data capture at each stage of the HPGR process operation. All process design parameters such as roll speed and specific pressing force can be evaluated and optimised.

Flotation Pilot Plants – Our inventory of flotation cells range in size from 1.5 to 300 litres and can be arranged to simulate virtually unlimited circuit configurations, with throughput rates ranging from 50kg/hr to 2tph. Of course no continuous pilot scale flotation plant is complete without the associated comminution, classification, regrind, ultra-fine milling units, and reagent dosing equipment. At ALS Metallurgy we can tailor make a flotation circuit with all of the require unit operations. Specialised flotation cells from conventional tank style to column flotation technologies are also available, including flash flotation cells.



Extraction Pilot Plants

In chemical processes recycled solutions, electrolytes and organics must be studied for days to detect the accumulation of so called undesirable contaminants in the final products. In such process operations, the inclusion of a pilot plant test program during the study phase of the project is of crucial importance and often indispensable.

ALS Metallurgy has a number of extraction processing pilot plant installations for a variety of minerals and commodities; including:

- Heap leach amenability column testing pilot plants,
- High pressure acid leach (HPAL) pilot plant,
- Atmospheric leach pilot plant,
- Continuous pilot and mini pilot scale leaching circuits,
- Ion exchange resin pilot plants,
- Solvent extraction pilot plants.

We can also fabricate new equipment and modify existing equipment to suite our clients' specific testwork requirements. In conjunction with our state of the art purpose built Hydrometallurgy Technical Centre our industry experienced metallurgists offer a comprehensive range of testing services.

Our heap leach pilot testing column units can cater for a variety of minerals and commodities including precious metals, base metals, nickel and uranium. Leaching can be carried out continuously for several months whilst metal extraction data and operating parameters affecting the design and operation of a full scale heap leach operation are determined. A variety of leaching solutions ranging from acidic to alkaline can be utilised on as crushed or agglomerated ores.

Our HPAL bench and pilot testing equipment has been designed to operate at relatively high oxidising conditions of temperature and pressure. Bench scale batch autoclave tests will be conducted to confirm the ore response to operating variables such as acid addition, leach temperature, autoclave residence time and liberation particle size. These bench scale tests will determine the parameters to be employed for the continuous pilot plant operations.

Our bench scale Parr autoclaves (1 gallon and 5 gallon units) can be also utilised for pressure oxidation (POX) testwork applications in particular for testing of refractory gold. POX tests can be carried out on a batch as well as semi-continuous basis to determine the effect of recirculating streams.

Our atmospheric and other leaching circuits can be custom assembled to meet any particular project requirements.

Our bench and pilot test programmes are supported by an extensive range of ancillary and support services including state of the art in-house analytical facility fully staffed with experienced personnel in the accurate analysis and measurement of metallurgical testwork products including radionuclide concentrations in metallurgical samples.

Our leading edge in-house Mineralogical facility offers supporting services such as QEMScan, X-ray diffraction (XRD), HyLogger™ and optical microscopy techniques to complement bench and pilot scale metallurgical studies.

Contact us today to discuss your project's bench and pilot scale needs with our team of specialised metallurgists.

Spiral Concentrator Pilot Plant – At ALS Metallurgy we offer a spiral pilot plant that includes a scrubbing, screening and slurry preparation circuit. The pilot spiral plant has been designed to meet a wide range of operating conditions (different feed particle sizes, pulp density and flux rate). We stock a range of spirals for rougher, cleaner and/or scavenger applications. The selection of spirals could be based on the feed grade, particle size distribution and of course specific gravity considerations. The development data for a new Wet Concentrator Plant or optimising data for an existing plant could be obtained by simulating its performance using our spiral pilot plant installation.

Pilot Dense Media Separation (DMS) Plant – This continuous DMS Cyclone rig has two integral DMS Cyclones (150 mm and 75 mm) together with all of the associated feed and product screens, and a dense media (ferrosilicon) control and recovery circuit.

Allmineral Pilot Jig – Capable of treating 0.6-1tph and sizes of -40+1mm, this one of the most sophisticated pilot jigs in the world with PLC control automatic operation and sampling.

Low Intensity Magnetic Separation (LIMS) – ALS Metallurgy has available both large scale wet rougher Eriez LIMS units (950-110G) that can treat 1-15 tph of material, together with smaller scale Eriez L8 electromagnet LIMS units set-up in cascade for cleaning and re-cleaning duties. Dry LIMS units are also available for all magnetite processing requirement.

Wet High Intensity Magnetic Separation (WHIMS) – For hematite and other material beneficiation that may require a high gauss, ALS Metallurgy has available an continuous Eriez WHIMS unit capable of 75 k/hr and 11,000G. For WHIMS applications requiring a finer PSD, a SLON 750 unit with throughput of up 400 kg/hr and 11,000G.

Materials handling testing including transfer modelling pilot plants.

ALS Metallurgy pilot plants are serviced by a comprehensive range of ancillary materials handling services, which include:

- Large scale continuous crushing and screening plants for feed sample preparation plant,
- Bulk tailings and concentrate handling using thickeners and continuous filtration plants,
- Ball mill and rod milling,
- Fine grinding and ultra-fine grinding (UFG).





Australia

Perth

6 MacAdam Place, Balcatta,
Western Australia 6021

T +61 8 9344 2416
F +61 8 9345 4688
E metallurgy@alsglobal.com

North America

Kamloops

2957 Bowers Place,
Kamloops BC V1S 1W5 Canada

T +1 250 828 6157
F +1 250 828 6159
E metallurgy.kamloops@alsglobal.com

Latin America

Santiago Mineral Services Centre

Hermanos Carrera Pinto 159
Parque Industrial Los Libertadores Colina,
Santiago, Chile

T +56 2 2654 6100
F +56 2 2654 6163
E Santiago.MineralServices@alsglobal.com



RIGHT SOLUTIONS
RIGHT PARTNER

www.alsglobal.com