



Alphamet

NEOMET TECHNOLOGIES

World class extractive metals process technology.

Combines efficient energy consumption with high purity extraction.



Neomet Technologies

Neomet Technologies provides energy efficient and environmentally friendly proprietary processes, designed to effectively extract valuable metals for a wide spectrum of base, light and precious metal oxides and sulphides, intermediates and waste feeds.

EFFECTIVE METAL EXTRACTION

A series of patented extractive metallurgical processes have been developed and are now available for commercial license. These processes include cyanide-free gold and silver processes (especially for refractory and arsenic-containing ores), nickel laterite processing, titanium and vanadium processes, energy from sulphide-based ores and rare metals recovery processes.

LOW ENERGY AND ENVIRONMENTAL IMPACT

The processes have low energy intensity and are based on cost-effective processing methods, designed to extract high purity primary and secondary metals from crushed ore to compound concentrates and refractory deposit mineral tailings. The process designs are configured to recover the maximum value from the ore feed, minimising tailings and providing an environmentally friendly sustainable solution to metals recovery.

The designs can also be applied to existing or old mine tailings producing additional revenues through single or poly-metallic recovery while stabilising toxic wastes.

A UNIQUE ACID RECOVERY PROCESS

The key operation unit of the Neomet process is a unique closed loop proprietary acid recovery and regeneration system that is significantly more efficient and robust than other commercially available technologies. The technology has been proven through successful completion of several mini-plant and pilot plant campaigns on a variety of ore samples, concentrates, wastes and intermediates.

KEY BENEFITS

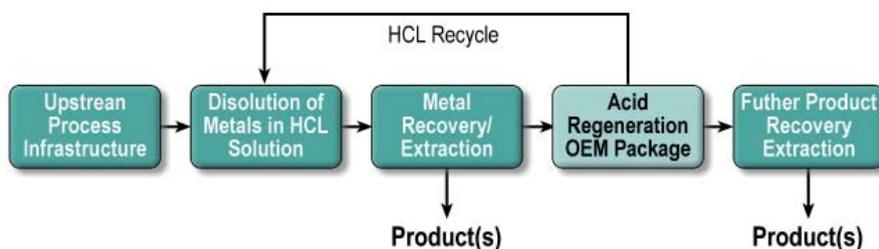
The hydrochloric acid based acid recovery and regeneration system designed in combination with conventional metallurgical processes has the following benefits:

- High metal recoveries >95% and recovery of secondary metals from poly-metallic deposits
- High metal purities >99.5%
- Low environmental impact including cyanide free, inert tailings, significantly lower chemical wastes, wastes and atmospheric emissions
- Ability to treat difficult to treat ore bodies including refractory ores, carbonaceous ore, free-milling ore, laterites, low grades and ores containing toxic trace elements

- Completely recycles the hydrochloric acid through proprietary acid regeneration technology
- Energy efficient process operating on low temperature at atmospheric pressure
- Commercial ready licensing arrangements
- Low capital and operating cost
- Scalable and robust based on proven chemical and processing fundamentals
- Credible implementation partners Sedgman Pty Limited (Engineer, contractor and process plant Operator) and vendor (supplier of process equipment and acid regeneration package)

The metallurgical processes are tested primarily at an international standard laboratory based in Neomet Technologies laboratory facilities in Montreal Canada. The process flowsheet is configured and refined through various stages of project development, as per stakeholder requirements, to best suit the ore characteristics and de-risk the technical solution. The process designs are optimised to target the most effective use of capital, highest return on investment whilst ensuring reliable plant operations.

TYPICAL PROCESS BLOCKS



Applications

The proprietary hydrochloric acid regeneration technology when configured with conventional leaching technology has a range of practical applications for processing of virgin ore deposits, intermediate streams associated with new or existing plants, waste treatment of smelter slags or rejects, and tailings treatment or recycling.

Laboratory analysis and engineering study development previously conducted and continuing, identifies the following suitable commodity applications;

- Precious metal recovery including gold and silver processing
- Base metal recovery including nickel, copper, lead, cobalt, tin and zinc processing

- Titanium dioxide and vanadium recovery
- Lithium carbonate recovery
- Rare earth metal recovery

Neomet Technology uses a patented hydrochloric acid recovery and regeneration process to regenerate the spent acid from the leaching stages. Using optimal combination of

leaching reagents in a high intensity atmospheric leaching process, the metal values are dissolved into solution either separately or altogether. The reagents are then further treated to recover the metal components as metal chlorides or oxides. The spent acid from the leach process is regenerated in closed loop using Neomet's propriety hydrolytic distillation technology.



METAL EXTRACTION FROM ELECTRIC ARC FURNACE DUST AND SPENT PICKLE LIQUOR

Carbon steel production by electric arc furnace (EAF) technology produces about 15 - 20kg of dust per tonne of liquid steel produced. This dust in many jurisdictions is classified waste due to its content of heavy metals.

The EAF dust forms as a result of volatile metals, like zinc and lead, passing into the vapour phase as the operating temperature of the furnace is around 1600°C. These volatiles are oxides and collected in the extractive gas air flow and find their way into the resulting dust as free oxides and in the form of composites with iron oxides. Management and disposal of EAF hazardous dust becomes an economic factor for steel mills employing EAF technology.

The EAF dust can be effectively treated by applying Neomet Technology for the extraction of

saleable metals, zinc and iron, while producing an inert waste for easier disposal.

Spent pickled liquor containing iron chloride, zinc and hydrochloric acid can also be treated using this technology to regenerate the hydrochloric acid and recover the zinc and iron. The acid can be reused for pickling.

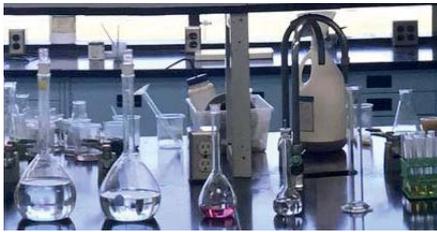
PRECIOUS AND BASE METAL INDUSTRIES INCLUDING TAILINGS RECYCLE

Neomet Technology is a hydrochloric acid based metal extraction process that can be applied for the extraction of not only gold and silver, but also associated metals from refractory and carbonaceous gold

ore concentrates and intermediate materials. The process does not require the use of cyanide to recover gold, nor does it require pre-treatment methods such as pressure oxidation or ultrafine grinding to liberate gold from the refractory matrix.

It is also possible to recover gold and silver separately or together and allows for the recovery of other value metals such as copper, nickel, cobalt, rare earths, minor rare metals such as scandium, gallium, and indium as well as the platinum group of metals. The process fixes the arsenic present in the ore or tailings as an inert scorodite and recovers almost all of the acid used in the process.





TITANIUM DIOXIDE PRODUCTION

Titanium dioxide is conventionally produced through the chloride and sulphate process. In the chloride process, Ilmenite, synthetic rutile or Ti slag is chlorinated at a temperature of about 1000°C in the presence of carbon to produce titanium tetrachloride which is oxidised in the presence of oxygen to produce rutile grade titanium dioxide. In the sulphate process Ilmenite or Ti slag is reacted with concentrated sulphuric acid to produce titanium and iron sulphates. Titanium dioxide is precipitated from the combined sulphate solution and calcined to produce Anatase grade titanium dioxide. The sulphate process produces a lot of acidic wastes that has to be neutralised for safe disposal

Titanium dioxide (Anatase and rutile grade) can be produced using the Neomet Technology process. The Ilmenite, synthetic rutile or Ti slag is reacted with hydrochloric acid under atmospheric pressure and temperature below 95°C. All metals including titanium and iron dissolves forming their respective chlorides. The leach solution containing the metal chlorides is passed through the Neomet acid regeneration process to recover the acid and iron oxide. Titanium is precipitated from the leach solution and calcined to produce the titanium dioxide. The process produces very little benign waste and all the acid used in the process is recycled. Associated metals like iron and aluminium is recovered as coproducts. The ilmenite does not need any pre-treatment prior to the leaching.

The main advantages of the Neomet process for the production of titanium dioxide are as follows.

- Both grades (Anatase or Rutile) can be produced by altering the process conditions
- Co products like vanadium, iron and aluminium oxides can be recovered
- Very little benign waste is produced from the process
- Almost all of the acid used in the process is recycled through the proprietary acid regeneration process

NICKEL LATERITE

Mine managers can overcome the problem of wasted metal in their nickel laterite processes by converting toxic tailings into potentially marketable metal by-products. What remains is rendered inert. Neomet Technology processes have the capability to effectively extract cobalt, iron, magnesium, aluminium and other metals including rare earths.

BENEFITS OF THE NEOMET LATERITE PROCESS

Higher Return on Investment	Lower Capital Costs	Simple design and automation/reduced equipment size
		Scalable to suit required capacity
		Reduced permitting reduced expenses
	Lower Operating Costs	Simple design / easy automation / reduced equipment size
		Economical treatment of nickel laterite ores
		Highly flexible treatment of limonite, saprolite, and intermediate horizons separately or together
		Crystalline or dehydrated solids are amenable to rapid solid/liquid separation
		Wash water requirements are minimized
		Energy efficient operation
		Zero chemical waste
Higher Sales Potential	Low-volume inert tailing ponds	
	95% metal recovery	
	Recovers cobalt as a metal or oxide	
	Recovers iron/hematite	
	Recovers magnesium as oxide	
	Recovers aluminium as chloride or oxide	
Smaller Carbon Footprint	Recovers rare metals such as scandium	
	Recovers other low-grade ores	
	Lower Environmental Impact	
	Inert tailings	
		Zero atmospheric emissions
		Zero chemical waste

Development Pathway

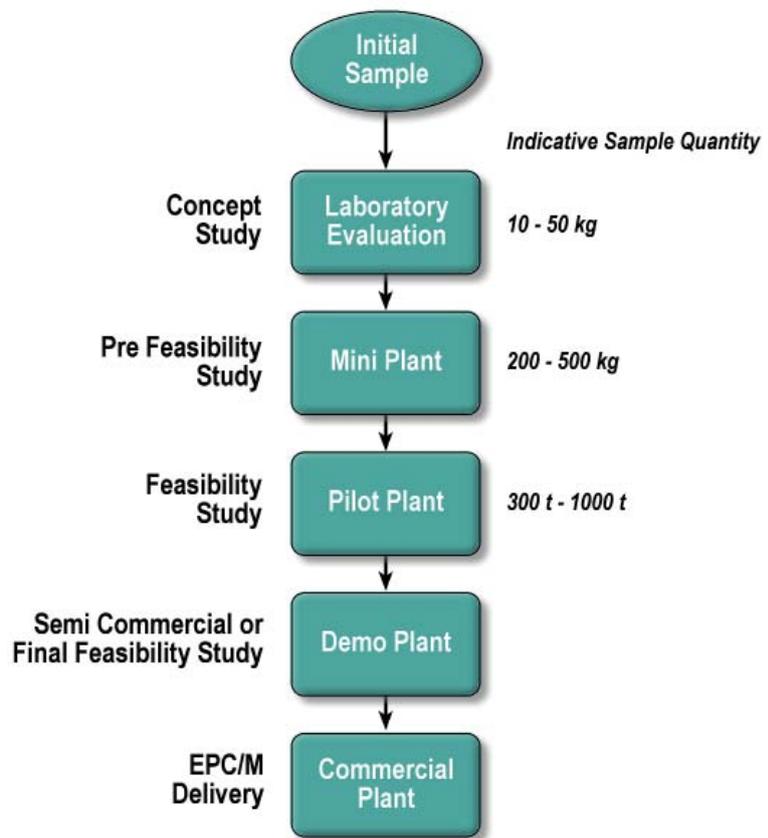
The pathway for developing a Neomet Technology based metalliferous project is consistent with industry standards. Project initiation leads to various levels of feasibility study, definition, design and into project implementation and ultimately the commercial production phase.



Prior to entering into a full scale metallurgical testwork program to support study activities it is often recommended that a preliminary sighter-level evaluation test of representative ore sample is conducted at the Alphamet laboratory in Montreal. This initial test will be completed at no cost to the client and is aimed at providing the following outcomes:

- General characterisation of the ore sample
- Suitability of the Neomet Technology process for extracting saleable products
- Defining a suitable development pathway for further more detailed assessment

PROJECT DEVELOPMENT PHASING



The Parties

ALPHAMET – NEOMET TECHNOLOGY IP OWNER AND LICENSOR

Alphamet Management Pty Ltd (Alphamet) is the owner and sub-licensor of the proprietary acid recovery process and other chemical processes that can be integrated with hydrometallurgical process plant designs to improve recovery of saleable metals from clients' ores.

Pro-forma non-exclusive license agreements will be issued from Alphamet to the client to facilitate the implementation of the Neomet Technology.

NMR360 – NEOMET TECHNOLOGY INVENTOR AND CONSULTANTS

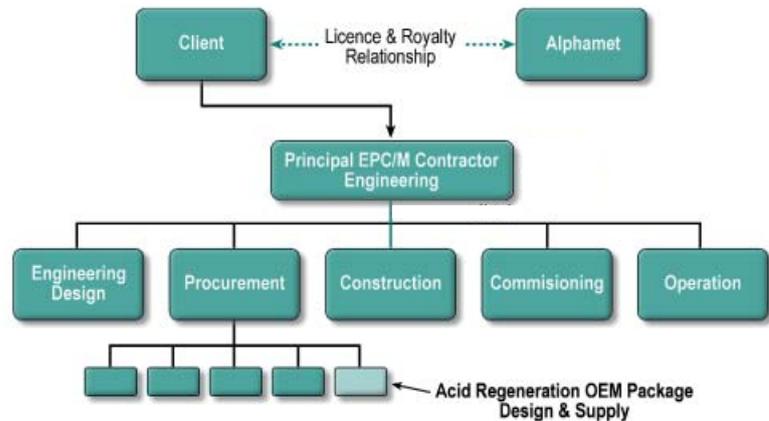
Alphamet laboratory, based in Montreal Canada, is a hydrometallurgical and chemical process extraction facility, managed by NMR360 consultants specifically established to evaluate Neomet Technology related projects. The facility is designed to test metallurgical ore samples from run of mine or composites to saleable mineral and metal products. The vendor equipment and analysis techniques used enable clients to directly relate resource, process recovery and saleable product volumes in a reliable and controlled manner.

NMR360 technicians, lead by Professor Bryn Harris and Carl White, have extensive operational and technical experience in physical and chemical treatment of metalliferous ores, refining and materials processing.

Services include:

- Ore characterisation
- Preliminary sighter laboratory tests
- Batch test scale up
- Mini and pilot plant trials
- Extractive metallurgy
- Flow sheet development
- Technical training and support

TYPICAL PROJECT ORGANISATIONAL STRUCTURE



PROJECT IMPLEMENTATION PARTNER FOR GLOBAL CLIENTS

Alphamet will partner with global providers of engineering and project delivery services associated with the applying Neomet Technology in the mining and resource sector. Sedgman's capabilities in the planning, design, construction and operation of processing plants and infrastructure provides a complete solution for clients from early stage project development through into production.

The Alphamet partners will have significant mineral processing and hydrometallurgical expertise that will leverage Alphamet's technology leadership with proven resource engineering to determine the most viable process route and development pathway for resource owners.

Alphamet's partners will work closely with the client to execute the study engineering activities to international standards and best practise methodologies under a consultancy style arrangement. Following the project Financial Investment Decision, the partner will execute a turnkey package under a contracting models that offers the client best value, including fixed price EPC, D&C, EPCM or Design Build Operate model (DBO) and Build Own Operate (BOO) arrangements.

ACID REGENERATION PROCESS - EQUIPMENT VENDOR

The proprietary acid recovery and regeneration process will be supplied and supported by a global equipment vendor with specialist expertise in minerals and hydrometallurgical applications. The vendor has significant market reach and capability to support installations and input into project development through the full project lifecycle. An OEM Supply Company (SupplyCo) partnership agreement is currently being finalised.

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