Nickel

HATCH


REDRILL

Smarter solutions. For your best elements.

Nickel plants are some of the most complex metallurgical facilities in the world. A multitude of challenges and roadblocks can converge when companies try to design, build—and ultimately run—these mammoth operations. For executives and shareholders who scrutinize every capital expenditure and expect a return on every investment, it's vital that these facilities deliver on their potential.

Processing nickel involves a variety of technologies, from concentrating techniques to pyrometallurgical and hydrometallurgical processing. There are different processing routes to choose from, too, adding another layer of complexity to the flow-sheet-selection mix. Whatever the choice, whatever the issues, maximizing tonnage and minimizing cost is the key to your survival in the nickel business.

We can help.

Our professionals come from many different disciplines, with a world of experience serving the nickel industry. You'll get targeted, innovative solutions that can enhance your operation and save you money.

We take today's best practices to the next level, applying new technologies to improve production efficiencies and boost your capacity. Even find new technologies and tools that we'll help develop, adapt for your needs, and maybe even bring to market.

You'll get expert help, sound advice, and full support with:

- Mining and mineral processing
- Hydrometallurgy
- Pyrometallurgy
- Process development & design
- Studies and engineering services
- Equipment design and specification
- Tailings and water management
- Project management
- Due diligence studies
- Asset management
- Performance enhancement
- Sustaining projects and engineering
- Operational performance and readiness.

Hatch completed studies with a world-class safety record, reaching 5.7 million hours with zero LTIs at the Nickel Rim South mine in Canada

Solving your toughest challenges

To meet the world's growing demand for metals, your facilities need to be capable of full-out, best-of-class production. We can help you deliver the goods.

Onaping Depth project

Glencore Sudbury Integrated Nickel Operations (INO), Canada

Glencore Sudbury INO is developing the Onaping Depth resource into an underground production nickel mine with a 1.2 Mtpa ore production rate. As part of an integrated team, we are providing project management, engineering management, project controls and services, as well as engineering for selected infrastructure areas of ventilation, cooling, ore/waste handling, and mine systems. The project is adopting an all-battery electric mobile fleet for development of the main Onaping Depth mining area to reduce the ventilation flow and heat generated underground, creating a healthier work environment.

Additionally, Glencore needed to improve the daily development rates at Onaping Depth. The goal was to obtain the highest possible advancement rate by minimizing the time needed to access the ore body and providing the tools to support a connected-worker paradigm. Hatch teamed with Glencore to conduct trial operational-management-system philosophies aimed at reducing in-shift variability. We created a digital underground operational management solution to more closely plan and manage in-shift performance, from the start of shift stand-up meetings to monitoring in-shift performance to handover at the end of shift.

Long Harbour processing plant

Vale Newfoundland & Labrador, Canada

Vale's Long Harbour processing plant uses hydrometallurgical technology for sulphide-based nickel ores, processing metals such as nickel, cobalt, and copper without generating emissions common to traditional smelters. We have been involved in this project from conception through to construction and commissioning, including the design and construction of the hydrometallurgical demonstration plant, and the prefeasibility and feasibility studies, preliminary design, construction, and commissioning of the commercial plant. The process involves the treatment of nickel concentrate by pressure oxidative leaching (POL) using Vale Inco's proprietary POL process. Advancement of the POL process plant was achieved through mini-plant (1:10,000 scale) trials to demonstration plant (1:100 scale), which completed operation in mid-2008, providing very good information for the design of the commercial hydrometallurgical facility. The full-scale facility has a design capacity of approximately 50,000 tonnes per year of finished nickel product, 5,000 tpa copper cathodes, and 2,500 tpa cobalt rounds.

Voisey's Bay mine expansion project

Vale Newfoundland & Labrador, Canada

The Voisey's Bay mine began production in 2005, producing a nickel-cobalt-copper concentrate at a rate of 6,000 tpd. In 2015, Vale decided to expand the open pit mining and develop the underground deposits at Voisey's Bay. Once in operation, underground mining will extend the life of the Voisey's Bay operation until at least 2034. At peak production, the underground mines will produce about 40 ktpa of nickel-in-concentrate, which will be shipped to Vale's processing facility in Long Harbour, Newfoundland for further processing into finished nickel. Some 20 kpta of copper-in-concentrate will also be produced.

We were contracted to help convert Voisey's Bay from an open-pit-only operation to two new underground mines, providing detailed engineering and project management services for the mine expansion. Vale is planning to use data to maximize the effective implementation of the project, as well as the efficiency of the day-to-day operation through commissioning and ramp-up. To accomplish this, one of the key strategies for the project is the integration of information technology systems used in data-centric computing and operational technology to monitor events, processes, and activities.

Vale's Sudbury nickel operations

Vale, Canada

For more than 20 years, we've been providing engineering services to Vale's Sudbury operations. We support all underground nickel sulfide mines, including integrated mining, milling, smelting, and refining operations for the Copper Cliff nickel refinery and Clarabelle Mill.

Onça Puma project

Vale, Brazil

Onça Puma is Vale's first ferronickel operation in Brazil and one of the largest in the world. From conceptual development to the definitive feasibility study and EPCM, we provided the full range of services for this large, remote, greenfield project. When smelting operations halted due to the failure of two furnaces from another supplier, we investigated the facility. We provided engineering, procurement, and construction management services to completely rebuild the furnace crucible, calcine transfer system, and slag handling, and upgraded to the cooling water system. Work was successfully completed in just over a year—a world record for projects of this nature!

The Voisey's Bay underground mine expansion project will extend the life of the Voisey's Bay operation until at least 2034. Photo courtesy of Vale Canada Limited.

Hatch provide EPCM services for Vale's first ferronickel operation in Brazil and one of the largest in the world

Barro Alto electric furnace upgrade

Anglo American, Brazil

As part of an integrated project execution team, we provided engineering, procurement, and construction management services to upgrade two 81 MW rectangular FeNi electric furnaces and related ancillary equipment. Furnaces were upgraded to reach nameplate capacity using our licensed technologies, promoting long-term furnace integrity. Improved efficiency and the shortest possible shutdown was provided through construction planning, 4D schedule simulation, and strong materials-management implementation. The project was completed on time and USD$30 million under budget.

"The furnaces reached operating capacity early and passed all performance test criteria with flying colors. The project was completed approximately 1 month early and 8% under budget, making it stand out amongst recent efforts."

—Euler Piantino | Projects Director, Anglo American NNP (Brazil)

Cerro Matoso Line 2 expansion project

BHP Billiton, Colombia

The Cerro Matoso ferronickel plant doubled its capacity with the addition of a second rotary kiln electric furnace line. We completed basic engineering for the full expansion project and subsequently provided EPCM services for the calcine transfer system, electric furnace, and smelter building. New technologies were applied for dust recycling and slag disposal, and the custom off-gas systems were designed to meet new World Bank nickel smelter emission standards. The project was completed ahead of schedule and under budget. Cerro Matoso is now one of the world's largest ferronickel furnaces, with fully automated control schemes, and is one of the lowest-operating-cost nickel laterite smelters.

Koniambo ferronickel project

Société Minière du Sud Pacifique & Glencore Nickel, New Caledonia

Koniambo is one of the world's largest and highest-grade undeveloped nickel laterite deposits. Our involvement in the project began in 1998 with scoping studies and other project development work, and we continued to support our client throughout the prefeasibility and feasibility studies to complete EPCM services in joint venture. The metallurgical plant includes a novel process for nickel production utilizing two process lines. A hammer mill-flash dryer produces a fine, bone dry feed. The feed is flash calcined, pre-reduced in a fluid bed reactor, and smelted in an 80MW DC furnace. These four unit operations are integrated with recycle of waste gases to enhance energy recovery. The successful integration of these technology packages provided by Hatch and other companies is a notable success. We provided a global response, with teams on site in New Caledonia, in Hatch's Brisbane, Australia office, and supported by our Mississauga, Canada office.

Project LUCY nickel residue disposal

Vale Nouvelle-Caledonie, New Caledonia

Vale Nouvelle-Calédonie's Goro Mine and Refinery is an integrated mine and nickel processing operation in New Caledonia designed to produce 57,000 tons per annum (tpa) of nickel and 5,000 tpa of cobalt. The high-pressure acid leach (HPAL) and neutralization processes currently generate a slurry waste tailings stream (residue) that is transported via pipelines to the existing KO2 residue storage facility. At full production, the process produces 6.3 metric tons per year of residue that must be contained in purpose-built storage facilities on the site.

Predictions of the plant's production and available residue storage capacity indicate that the existing storage facility will reach its design capacity by approximately 2021. As such, additional capacity for future residue storage is required beyond that for the remainder of the life of the facility, estimated to be until 2044. To address the requirement for additional residue storage, Vale is looking to filter the residue to form a filter cake for storage in a dewatered form to make it suitable for dry stacking.

The dewatering plant and the dry stack are together referred to as "Project LUCY", for which we have been selected by Vale to deliver in its fourth phase. The project delivers a first-of-its-kind application in HPAL residue filtration, transportation, stacking, and capping for a nickel laterite operation in a high rainfall, tropical climate.

FENIX electric furnace

Solway Industries Ltd, Guatemala

A 90 MW, 18-metre-diameter, 3-electrode ferronickel furnace was designed in the same footprint as a previous 45 MW design. The furnace crucible design included a novel binding system and enhanced sidewall cooling to maximize campaign life. Involvement and support from Hatch's integrated team started from the initial design concept and continued until the first metal tap. At nameplate capacity, the furnace will operate at the highest hearth-power density for a 3-electrode, circular-ferronickel furnace in the industry, while maintaining the same level of safety, performance, and campaign life as existing operations with lower power densities.

Nickel Rim South mine

Xstrata Nickel (Glencore), Canada

Following the completion of the project mine infrastructure prefeasibility and feasibility studies, we were awarded the engineering, procurement, project and construction management, and commissioning phases of this CDN$925-million exploration project. The mine was designed for a 1.25 Mtpa production rate, and to accommodate ore and waste extraction rates of up to 1.3 Mtpa. Nickel Rim South established a new technology benchmark for all future mines by deploying the latest advances in controls and communications, including comprehensive Wi-Fi communications for surface and underground phone, data, asset, and personnel tracking. It was completed on schedule, under budget, and with a world-class safety record, reaching 5.7 million hours lost-time incident free in 2009.

"The project has been an outstanding success with a world-class safety record, below budget costs and outstanding schedule performance."

—Marc Boissonneault | Vice President Sudbury Operations, Xstrata Nickel

Nickel Rim South established a new technology benchmark for all future mines by deploying the latest advances in controls and communications

At Barro Alto, two 81 MW rectangular FeNi electric furnaces were upgraded to improve performance at the smelter and reduce the operating risks of the existing furnaces

Anglo Platinum Converting Process (ACP) project

Anglo Platinum, South Africa

The Anglo Platinum ACP Phase 2 project included a standby platinum-converting furnace with associated ancillaries at Anglo Platinum's Waterval smelter. The standby converter is integral to Anglo Platinum's sustained platinum production as the entire converting capability is routed through the single ACP plant. Hatch designed the converter to accommodate a quick changeover from duty to standby converter, to minimize production loss.

Prior to this, Hatch provided EPCM services for Anglo Platinum's Stage A converting process, which was designed to reduce sulphur dioxide emissions and expand converter capacity. From concept development and pilot test-work support to hot commissioning, we helped significantly improve the environmental performance of the smelter, and subsequently added a second converting vessel to the facility.

Rustenburg base metal refinery expansion

Anglo Platinum, South Africa

The world's first fully automated nickel-electrowinning tankhouse was constructed, incorporating a unique mist-elimination technology and complete automation of the cathode-harvesting process. The plant's nickel-cathode output increased by more than 50 percent to 33,000 tpa, as did the output of copper cathode, sodium sulphate crystal, and cobalt sulphate.

Yabulu nickel refinery

Queensland Nickel, Australia

This USD$800 million brownfield expansion initiative increased nickel capacity from 29 ktpa to 75 ktpa. We successfully delivered the project from concept study through to full EPCM services and commissioning, taking the plant to full operation in five months and achieving record production.

Ravensthorpe nickel operations

BHP, Western Australia

This nickel laterite treatment plant treats limonite and saprolite ores to produce up to 220 ktpa of a mixed nickel and cobalt hydroxide intermediate product for transport and treatment at the expanded Yabulu refinery in Queensland. The on-site service facilities included all power generation through steam turbines, package boilers and diesel generator sets, a 4,400-tpd sulphuric acid plant, and water desalination and demineralisation plants. Our high-pressure acid leaching (HPAL), atmospheric leaching, tailings neutralization, and mixed hydroxide precipitation services enabled the project to ramp-up to full capacity in 15 months—a record for HPAL nickel plants and a benchmark for future ones. BHP recognized the project for having the leading safety outcome of all its major metallurgical projects.

Essential services, sound strategies

From brownfield upgrades to planning and implementing major new integrated developments, our objective is always the same: to address your most serious challenges and solve your toughest problems.

Mining and mineral processing

With our global presence and a wealth of expertise, the mining and mineral processing industry doesn't need to look any further for expert engineering advice and guidance. Our platforms provide consistent methodologies and resources that advance your operations, delivering groundbreaking opportunities for better, faster growth.

Pyrometallurgy

You can count on us for expert advice and top-notch service for everything related to the pyrometallurgical processing of nickel—both sulfides and laterites. Our experience covers the entire smelting process, from receiving and preparing raw materials to tapping and casting metal and slag from furnaces...and all the systems in between.

Hydrometallurgy

You need a partner that knows how to apply today's state-of-the-art technologies to nickel facilities. We're experienced in the many modes of leaching, and are familiar with the full range of purification techniques. For processing and recovering nickel products, we can evaluate and recommend sulfate, ammoniacal, chloride, or nitrate-based metallurgy solutions.

Process development and design

Today, you need innovative process-design and implementation methods that have proven approaches. Ones based on clear understanding of the ore body, and capable of delivering value throughout the project life cycle. Our team of engineers is at the forefront of developments in geometallurgy, process engineering, and equipment, bringing the best to every project.

Studies and engineering services

Front-end-loaded engineering. Full collaboration with your team from the earliest phases of the project. We go the distance for sound technical decisions and designs, and always select the best economic options.

Equipment design and specification

With proper design and process equipment selection, your bottom line can grow significantly. Our patented equipment designs have enabled and enhanced operations, maintenance, and the availability of units for specific process operations all over the world.

Tailings and water management

Effective tailings and water management can reduce the risks associated with developing, operating, and closing mines and processing facilities. Our experts provide a full range of services in this environmentally sensitive and increasingly regulated area. With today's conventional and improved methods, you'll have tailings disposal systems that are sustainable,

The Cerro Matoso ferronickel plant doubled its capacity with the addition of a second rotary kiln electric furnace line.

that expedite the permitting process, optimize water use and return, and lower ongoing operational liabilities and costs.

Project management

Your processes aren't like anyone else's. Neither is the work we do for you. We use modern project development and execution methods adapted to your operation so you can make high-value products better and faster, driving up your profitability in today's competitive market.

Due diligence studies

We partner with both investment and commercial banks, equity funds, bondholders, attorneys, and operating companies. Together, we provide you with thorough due diligence assessments—financial, operational, technological, environmental, market, and commercial. Our technical reviews and global surveys help you evaluate assets before you acquire them.

Asset management

Asset-intensive industries need to balance cost and reliability, and cost and risk. Our data-driven, decision-making approach provides information that helps you avoid unexpected downtime. You reduce safety incidents associated with unplanned activities and achieve operational targets. We find holistic solutions that combine the impacts of operations to drive asset health.

Performance enhancement

You need your operations to achieve their full potential. To reduce costs and achieve step changes in productivity. We help you improve asset utilization and lower operating costs with better maintenance, operating practices, and debottlenecking. Our teams and processes deliver sustainable results, combining industry data, equipment experience, and analysis. Our performance-enhancement work averages a three-month-or-better payback, and we've delivered hundreds-of-millions of dollars in operational-improvement savings to mining operations like yours.

Sustaining projects and engineering

To optimize your capital portfolio, cost certainty is key. That means delivering the approved project pipeline within the agreed timeframe, always. We work with you and your staff as part of an integrated team. We continually look for opportunities to reduce costs, improve performance, and add value. We understand portfolio optimization and implementation, and bring quantifiable benefits to your capital portfolio…and your entire operation.

Operational performance and readiness

Our business exists to help you get the most from your assets. We don't just build and say goodbye. We're there to ramp-up the projects we work on into stable, reliable operations. They achieve optimal performance and reliability, and we'll make sure they're maintained, repaired, and functioning in the best way possible.

About Hatch

Whatever our clients envision, our engineers can design and build. With over six decades of business and technical experience in the mining, energy, and infrastructure sectors, we know your business and understand that your challenges are changing rapidly.

We respond quickly with solutions that are smarter, more efficient, and innovative. We draw upon our 9,000 staff with experience in over 150 countries to challenge the status quo and create positive change for our clients, our employees, and the communities we serve.

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