

Copper

HATCH



Your challenges, our solutions

All over the world, high-grade copper deposits are rare; low-grade ore bodies are common. Beneficiating these low-grade resources is expensive, and, at any point in time, the market price for copper is determined by global supply and demand. Productive mines and concentrators cost billions of dollars to capitalize, and many years to develop.

Today, costs are increasing for both open-pit and underground operations. Existing mines must constantly dig deeper. And the deeper the mine, the less pure the ore.

Copper mines are frequently found in remote locations. That can mean difficulties getting the concentrate to custom or integrated smelters. Roads or rail lines often must be built. Getting access to the sea may mean special vessels are needed so the copper cargo can be carried to ships and loaded before they set off to the four corners of the world.

Still, copper mining has achieved a high degree of sustainability in the world. Modern practices and methods have been created to give environmental sensibilities the highest priority. So, for the most part, copper mining has gone green.

All these issues, combined with strict government regulations for operating permits and safe, responsible practices, demonstrate the challenges facing the copper industry today.

We can help.

You need targeted, innovative solutions that can enhance your operation and save you money. Our professionals have a world of experience serving the copper industry.

With today's best practices as a baseline, we'll take it to the next level. We'll help boost your capacity and lower costs. Find new technologies and tools that we can help develop and adapt to your needs.

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

- Mine development
- Oxide copper leaching and modeling
- Electrometallurgy & solvent extraction
- Smelters
- Flash furnace upgrades
- Process support services
- Operational performance & readiness
- Due diligence studies
- Asset management
- Performance enhancement
- Sustaining projects & engineering
- Project management
- Construction management

Hatch helps transform the world's largest open-pit mine, Chuquicamata in Chile into an underground mine, one of the largest, most efficient, and advanced in the world

Global presence, local focus

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



- Hatch offices
- Selected copper projects

1 Clarabelle Mill CORe project, Vale

Canada

This C$200-million brownfield and greenfield project included full EPCM services to replace the existing mill equipment and add a new flotation building and substation. The investment increased metal recoveries at the mill by 4% and enhanced the value extracted from existing resources.

2 Phoenix copper mill, Newmont Mining Corporation

USA

Detailed engineering, procurement assistance, and field support were provided for this two-phased mill expansion, which helped increase throughput from 33,700 tons per day to 48,000 tons per day. Phase 1 added a new secondary crushing and screening circuit, and Phase 2 expanded the grinding, rougher flotation, and tailings deslime areas.

3 Smelter upgrade project, Confidential Client

USA

We are providing engineering and procurement services plus site technical support for the smelter upgrade project to assist the client to meet new emissions guidelines. The project includes one of the metallurgical industry's largest SO2 caustic scrubbing systems.

4 UHC demonstration plant, Companhia Vale de Rio Doce

Brazil

Feasibility study, basic, detailed engineering, and construction support services were provided for the project. Our services also included new technologies on copper concentrates (CESL), high pressure leaching process, and custom autoclave circuit design for a 10-ktpa copper cathode demonstration plant.

5 Chuquicamata underground mine, Codelco

Chile

With our help to complete the feasibility study and basic engineering, this project will transition one of the world's largest open-pit mines into one of its largest, most efficient, and advanced underground mines. We provided detailed engineering for the mine works, and designed the mine communication systems, civil works, and overland conveyor platforms.

6 Tenke Fungurume mine, Freeport-McMoRan Copper & Gold Inc.

Democratic Republic of Congo

With our help providing detailed engineering and procured equipment, this project increased copper production from 125,000 tons per annum (tpa) to 190,000 tpa. Our contribution included construction-support services, major new process equipment and facilities, and an upgraded reagent processing and distribution system.



7 Kamoto refinery & roaster refurbishment, Katanga Mining Limited

Democratic Republic of Congo

Two new copper-cobalt-concentrate fluid-bed roasters replaced three existing roasters. Feed-samples testing and extensive thermal and structural modeling of process equipment was done to provide structural integrity and reduce maintenance requirements.

8 Mopani copper mine, Mopani Copper Mines plc

Zambia

Our experts provided detailed engineering design services and assistance to procure hoist and headgear packages for this operation, which has four underground mines, a concentrator, and a cobalt plant. Conceptual work and cost estimates were reviewed and the feasibility study conducted.

9 Flash furnace upgrades, Pan Pacific Copper Co. Ltd.

Japan

Hatch is designing crucible upgrades including a new hearth binding system, modified refractories and enhanced cooling systems to improve hearth stability and prolong furnace life by controlling matte penetration.

10 Olympic Dam concentrate burner improvement project, BHP Billiton

Australia

To achieve a step-change improvement in copper concentrate burner combustion performance at the Olympic Dam smelter. We developed an innovative patent-pending Swirl Disperser technology. This in turn improved oxygen efficiency to 11%, reduced fuel consumption, increased throughput, and smelter availability.

Essential services, sound strategies

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

Mine development

All over the world, companies like yours trust our capabilities in mine development and geological support services. Our range of expertise supports an integrated approach to resource development, mine design optimization, mine planning, management systems, equipment selection, and cost analysis.

Oxide copper leaching and modeling

Customized heap-leaching designs. Heap modeling. Process improvements to optimize copper recovery. We do it all.

Electrometallurgy & solvent extraction

In both small- and large-scale electrowinning and electrorefining facilities, you need to maximize productivity, cathode quality, and standards for safety. Our multidisciplinary electrometallurgy and solvent-extraction technology experts have strong operating and design experience to help you.

Smelters

Today's smelting technologies must work seamlessly with your operational culture and optimize sustainability. We offer operational expertise and furnace technology competence that exceed industry norms.

Flash furnace upgrades

For concentrate burners, we work with you on diagnostic performance audits, operational improvements, design modifications and supply of key equipment and technology to help you improve fuel and oxygen consumption, copper recovery, online time and throughput. We are also improving flash furnace crucible life and especially hearth stability with addition of active binding systems coupled with upgrades to refractory and cooling systems. We help you chart the future for your flash furnace.

Process support services

With process simulation software applications, such as METSIM and SysCAD, we can provide detailed heat and mass balances for smelting, hydrometallurgy, and other chemical processes.

Operational performance & readiness

We're in business to help you make the most of your assets. With us as your partner, equipment and processes ramp-up into stable, reliable operations, achieving optimal performance and reliability. They're maintained, repaired, and optimized in the best way possible. We don't just build and say goodbye.

Due diligence studies

We partner with both investment and commercial banks, equity funds, bondholders, attorneys, and operating companies. Together, we can provide you with thorough due diligence assessments—financial, operational, technological, environmental, market, and commercial. Our technical reviews and global surveys help organizations like yours evaluate assets before you acquire them, informing your sound decision-making and providing peace of mind.



Hatch was awarded the sole-source contract for Mina Ministro Hales given our strong implementation-phase team and previous successful delivery during basic engineering

Asset management

Asset-intensive industries need to balance cost and reliability, and cost and risk. Our data-driven, decision-making approach gives you the information you need to avoid unexpected downtime, reduce safety incidents associated with unplanned activities, and achieve operational targets. We take a more holistic view of asset health to help you better manage the impacts of operations.

Performance enhancement

Your operations need to achieve their full potential, reduce costs, and achieve step-changes in productivity. We can help you do all of this with better maintenance, operating practices, and debottlenecking. Our teams and processes deliver sustainable results, combining industry data, equipment experience, and analytical capabilities. 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 our clients.

Sustaining projects & engineering

To optimize your capital portfolio, cost certainty is key. The approved project pipeline must always be delivered within the agreed timeframe. You need a partner who works with your staff in an integrated team, continually looking for opportunities to reduce costs, improve performance, and add value. One who understands portfolio optimization and implementation, bringing quantifiable benefits, not just to your capital portfolio, but to your entire range of operations.

Project management

You need projects delivered reliably and efficiently. Our international knowledge, decades of experience, and technical expertise are your assurance. We can help you manage capital programs and process-area construction projects anywhere in the world.

You'll have the full range of project management and procurement services, provided competently and thoroughly. From the selection and management of contractors and suppliers, to the arrival of goods at the project site, we deliver. On schedule. Within budget.

Construction management

With state-of-the-art technology and innovative construction methods, you'll have consistency and predictability across the entire range of your operations. Some of the world's most challenging major resource and industrial developments have been developed by our experts. The highest standards of safety, performance, quality, cost, and schedule are always top-of-mind.

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.

hatch.com

20160155

This publication contains information in summary form, current as of the date of publication, and is intended for general guidance only. We make no guarantees, representations, or warranties of any kind, expressed or implied, regarding the information including, but not limited to, warranties of content, accuracy and reliability. Any interested party should undertake their own inquiries as to the accuracy of the information. Hatch Ltd. excludes unequivocally all inferred or implied terms, conditions and warranties arising out of this document and excludes all liability for loss and damages arising therefrom. This publication is the copyrighted property of Hatch Ltd. ©2016 All rights reserved.