

+ Gold

HATCH



Driving the maximum value from gold

Worldwide, gold production has changed over the past 30 years. Exploring and discovering large, free-milling gold deposits in major mining districts is largely a thing of the past.

Mining companies like yours face a difficult decision. Do they process large, low-grade deposits, or look for smaller and probably more complex ones in remote, often hard-to-reach locations?

It's a complicated situation. These far-off ore bodies are often refractory, with the gold locked in sulfide minerals. Or double refractory, where gold is bound within sulfide minerals and preg-robbing components due to the presence of organic carbon. Large free-milling gold operations share this dilemma, as their deposits become more refractory in nature, too.

To manage the size and complexity of these ore bodies and the remote locations where they're found, you need a solid understanding of the mineralogy involved and the benefits of different extraction options. Today, that can mean spending less on the development of new mineral deposits, and focusing instead on optimizing existing mines and production facilities.

We can help.

Our professionals come from many different disciplines and backgrounds, with a world of experience working in and serving the gold industry. We can offer targeted, innovative solutions that can enhance your operation and save you money.

With today's best practices as a baseline, we'll take it to the next level. We'll help boost your capacity. Even find new technologies and tools that we'll help develop, adapt for your needs, and maybe bring to market.

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

- Process development and design
- Studies and engineering services
- Comminution, gravity separation, and flotation
- Gold recovery and refining
- Refractory gold-ore pretreatment
- Equipment design and specification
- Tailings and water management
- Heap-leach design
- Project management
- Due diligence studies
- Asset management
- Performance enhancement
- Sustaining projects and engineering
- Operational performance and readiness.

Hatch received the 2013 Kinross Safety Award for the Tasiast expansion project

Global presence, local focus

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



- Hatch offices
- Selected gold projects

1 Goldstrike roaster facility, Barrick Gold Corporation

USA

We provided full engineering, procurement, and construction management services for this, one of the largest capacity, whole-ore refractory gold-roasting facilities in the world. A 12,000 T/d, dry-grind, greenfield plant was constructed, with two two-stage fluid-bed oxygen-enriched roasters and complex gas cleaning trains that met stringent United States EPA emissions standards.

2 Pueblo Viejo, Barrick Gold Corporation and Goldcorp Inc.

Dominican Republic

For this, one of the most complex gold ores in the world, we provided a full EPCM program for the core part of the gold refractory process (pressure oxidation and oxygen plant). Four of the largest autoclaves in the world were designed and the largest-capacity oxygen facility at any gold mine to date was built.

3 Fruta del Norte, Kinross Gold Corporation

Ecuador

Our prefeasibility and feasibility studies helped Kinross develop the plan and design for permitting and constructing the new gold mine and mill. Studies for the project included an underground mine, a processing plant, and the associated infrastructure. Processing options were developed based on metallurgical test results to evaluate optimum throughput, recovery, and the process plant design criteria.

4 Chapada, Mineraço Maracá

Brazil

EPCM services were provided for this greenfield mining development and copper/gold concentrator plant with a capacity of 172,000 tpa of concentrate. The facilities included the full range of ore processing, storage, waste treatment, and water recovery.

5 Kittila mill expansion, Agnico-Eagle Finland Oy

Finland

For Agnico- Eagle Finland Oy's newly operational, double-refractory gold pressure oxidation facility, we provided feasibility studies and helped optimize the pressure oxidation autoclave operations. The recommended brownfield modifications were able to be implemented to increase gold production with minimal interruption to operations.



6 Dvoinoye project, Kinross Gold Corporation

Russia

In this extreme subarctic climate with minimum winter temperatures of 58ºC, we provided a scoping study and feasibility study consisting of mine design, cemented rock-fill design, surface infrastructure, an all-season road between Dvoinoye and Kupol, and an expansion of the Kupol mill to increase output from 3,000 to 4,500 tpd.

7 Kisladag gold mine, Eldorado Gold Corporation

Turkey

Engineering and procurement services where provided for the largest open pit heap leach gold mine in Turkey. We also prepared the feasibility study for the initial develop and planned expansion of the project.

8 Bulgah gold project, Ma'aden Gold & Base Metals

Saudi Arabia

The challenge was to construct a gold heap-leach facility in two phases, each consisting of leach pads covering approximately 37 hectares. We provided detailed engineering design for the heap-leach pads in this remote, hot, and arid environment, and documented the tie-in and seamless Stage 2 extension to the existing, operating Stage 1 heap-leach pad.

9 Tasiast expansion project, Tasiast Mauritanie Ltd. SA

West Africa

To help this gold mine expand production to 38,000 tpd, we conducted a feasibility study for the construction of a new process facility, workforce accommodations, water pipeline, power station, water treatment, and distribution system. The value improvement process we created during the study saved almost US$400 million.

10 Gold mine debottlenecking, Confidential

Western Australia

To increase haulage from underground operations and improve throughput, we mapped the mine's design and linked a dynamic model to its planning software, tracking the flow of goods, people, and machinery. Productivity and expansion options were evaluated and a model devised to increase production by 50% over five years.

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.

Process development and design

Today, you need process-design and implementation methods that have proven innovative approaches. Ones based on clear understandings 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, with the best economic options always selected.

Comminution, gravity separation, and flotation

Our technical design team is experienced in all the comminution technologies used in crushing, conveying, grinding, classification, gravity-gold separation, and recovery. With more complex polymetallic deposits, our experience in flotation with a wide range of minerals can drive the success of a project.

Gold recovery and refining

You need successful recovery methods that drive profits. Design teams with extensive experience in cyanide-in-leach (CIL), cyanide-in-pulp (CIP), carbon elution, carbon reactivation—and newer thiosulfate leaching and regeneration processes—can enhance gold recovery and profitability.

Refractory gold ore pretreatment

Many gold discoveries now include ores that are wholly or partially refractory. So the need to treat these ores—whole ores and flotation concentrates—is becoming more and more common. Refractory pretreatment processes include pressure oxidation, biological oxidation, and various forms of roasting. Our design teams are familiar with all three processes and can maximize a project's value.

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 both conventional and today's improved methods, you'll have tailings disposal systems that are sustainable, expediting the permitting process, optimizing water use and return, and lowering ongoing operational liabilities and costs. Hatch completed 800,000 man-hours with zero LTIs for the Mary River Iron Ore development feasibility study.



Hatch designed, delivered, and installed the 4 largest autoclaves in the world by weight (2,178 tonnes) for the Pueblo Viejo project

Heap-leach design

We design heap-leach pads with metallurgical balance in mind, so operators can monitor performance with greater accuracy. The geotechnical aspects of each facility are analyzed, including settlement and deformation, to provide a stable, long-term configuration.

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 gold 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, reducing safety incidents associated with unplanned activities, and achieving operational targets. We combine the impacts of operations on asset health, allowing us to develop holistic solutions.

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 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 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, as part of an integrated team with your staff. 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 & 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. So that they achieve optimal performance and reliability, and that 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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