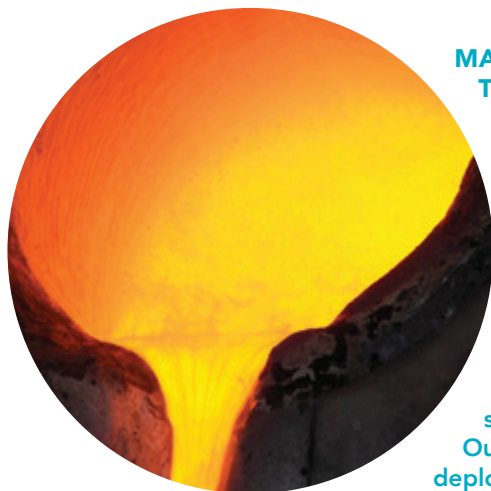


# MINING TECHNOLOGY INNOVATION

●●● Enhancing productivity and environmental performance



## MANAGEMENT OF TECHNOLOGICAL AND ENVIRONMENTAL RISKS

The National Research Council Canada (NRC) works with companies along the supply chain to help manage the technical, economic and environmental risks and costs of introducing innovative technologies into every stage of the mining process. Our multi-year R&D strategies deploy a critical mass of expertise in targeted areas to enhance recovery, reduce costs and manage environmental risks crucial to international competitiveness.

## THE NRC ADVANTAGE

The NRC brings the right technologies to the right maturity level to meet today's mining sector challenges. We work with industry, other government departments and research organizations to:

- Raise the innovation game of suppliers and producers
- Develop technology in a systems context
- De-risk integration and optimize processes
- Reduce operating cost and disruption
- Increase durability and productivity
- Reduce environmental risks and liabilities
- Increase the viability of low grade ores and deeper deposits
- Help build strong Canadian supply chains

## STRATEGIC R&D

The NRC tackles strategic mining challenges by channelling our collective R&D efforts towards industry-defined priorities such as:

### Process development and optimization

Real-time process monitoring and innovative stream characterization and separation technologies increases energy efficiency and production yields, including recovery of payable metals from tailings.

### Equipment durability improvement

Material wear and corrosion management technologies, advanced manufacturing and integrated predictive maintenance approaches combine modeling and advanced sensing to reduce capital and operating costs.

### Environmental impact avoidance, detection and mitigation

Physical, chemical and biological techniques are applied for a more comprehensive environmental risk management strategy during mining and after closure.

### Development of raw materials for energy storage

Leverage the NRC expertise in benchmarking, transforming and testing your raw materials to reach new markets in the energy storage value chain.

### Energy for remote industry

Explore opportunities to reduce reliance on expensive diesel fuel, by deploying or optimizing alternative energy, from biofuels to biomass conversion technologies.





EXPLORATION



MINE DEVELOPMENT



EXTRACTION



PROCESSING



UPGRADING AND REFINING



CLOSURE AND REHABILITATION

**VALUE CHAIN** • The NRC helps manage the risks and costs of introducing innovative technologies into every stage of the mining process

### MULTIDISCIPLINARY CAPABILITIES, MULTI-SECTOR EXPERIENCE

Our strength lies in our multidisciplinary capabilities and cross-sector experience that applies innovative technologies and processes pioneered in adjacent markets to mining industry challenges. The NRC supports technology integration and deployment in stages from lab to pilot to commercial stage demonstrations in the field, drawing on core capabilities in:

- Material science and tribology
- Chemical, mechanical and systems engineering
- Advanced sensors and diagnostics
- Bioprocessing
- Modeling and computer simulation
- Data analytics
- Techno-economic assessment

Clients also get access to state of the art research facilities and equipment across Canada, ranging from some of the world's most powerful microscopy and materials characterization centres, to industrial scale gas turbine and reciprocating engine test labs.

### INCREASING PRODUCTIVITY WHILE MANAGING COSTS

As high grade and easy-to-access oil and mineral reserves in Canada and around the world are depleting, cost-effective technology solutions are needed to economically exploit remote resources and extend existing mining operations with lower grade ore. At the same time, environmental risks — related to regulatory compliance, water management and site legacy issues — are adding billions of dollars in liabilities to the sector.

### THE NRC'S SYSTEMS APPROACH

The capital intensive nature of mining depends on established engineering practices and well-proven technologies that are generally adopted incrementally and integrated into existing processes. The NRC's systems approach encourages supply chain companies to be engaged in innovation. This minimizes adoption risk and supports effective decision-making, leading to enhanced productivity and environmental performance.

### LET'S WORK TOGETHER

The NRC engages clients on an individual basis, and through strategic alliances and other multi-disciplinary collaboration models. Contact us to find out how we can work together to introduce game changing technology solutions to the mining value chain.

### CONTACT

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