



The NORCAT Underground Centre

The global “one-stop shop” for all that is the future of mining

June 4th, 2021

Founded in 1995, NORCAT is a private, non-profit organization dedicated to developing programs, services, and resources that provide our clients with the skills, competencies, and confidence to have meaningful and sustainable careers.



We are the **global leader** in skilled labour **training** and **development**



We are the global **“one-stop shop”** for all that is the **future of mining** technology and innovation



We work with community partners to help start and accelerate the **growth of innovative companies** that will drive future economic and **social prosperity for Canada**



We have a **dynamic** and **exciting workplace** that fosters collaboration, continuous learning and development, and a desire to achieve excellence and make an impact



We celebrate and promote our success and leadership by listening, highlighting, and sharing the stories of our **client’s success**

Located in the City of Greater Sudbury, NORCAT is the only non-profit regional innovation centre **in the world** that has an **operating mine** designed to enable start-ups, small / medium enterprises, and international companies to develop, test, and showcase innovative and emerging technologies in an operating mine environment.

Our priority is to become the global **“one-stop shop”** for all that is the **future of mining** technology, innovation, and skilled labour training and development.

The NORCAT Underground Centre has become the **global destination** to see the emerging technologies that are poised to transform the mining industry. In doing so, we have helped build and support **Canada’s global reputation** as a market leader in the mining industry.

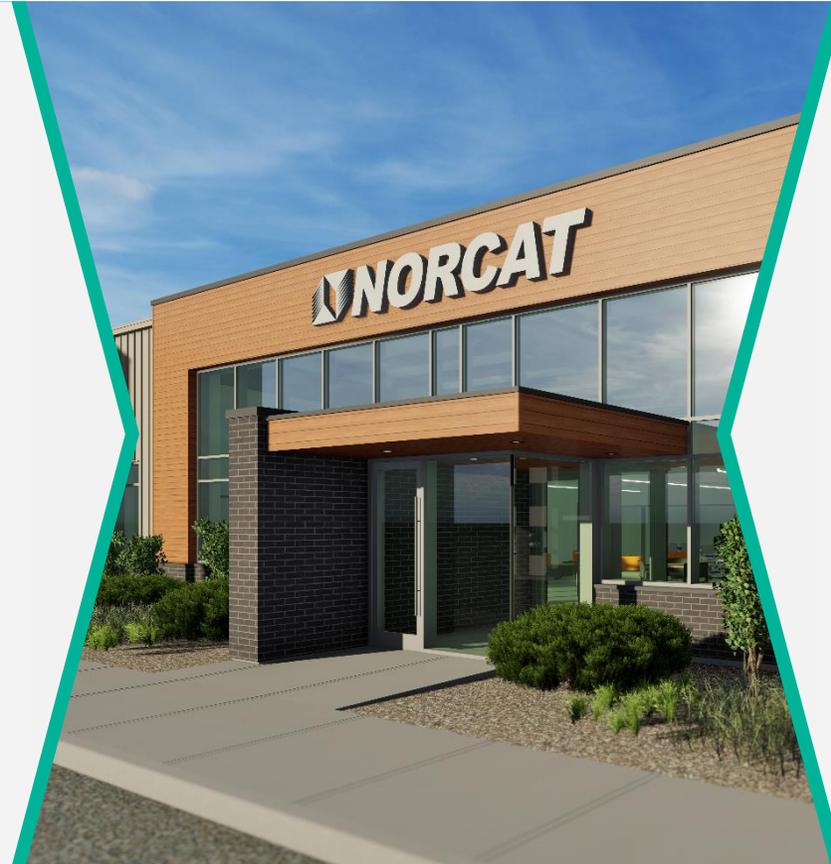


MacLean Engineering Electric Bolter Testing at NORCAT Underground Centre

“Buyers” of Innovation

Why mining companies should care?

- Global **mining companies** seeking to understand emerging technologies and the future of the industry
- **“See and touch”** technologies in an operating mine environment to inform buying / adoption decisions
- Engage with a trusted broker to **filter and qualify technologies / companies** that are relevant to a mining company's innovation roadmap
- Meet / **collaborate** with mining tech companies and technical teams in a vibrant innovation ecosystem

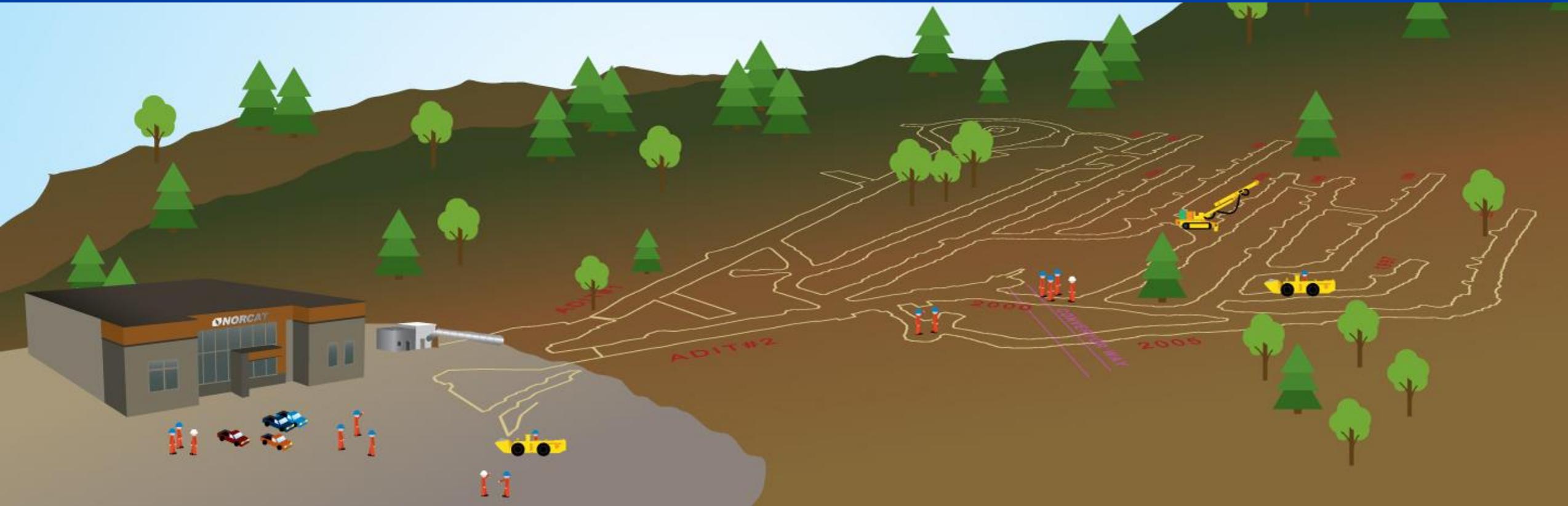


“Builders” of Innovation

Why mining tech companies should care?

- Develop, test, and ultimately showcase new and emerging products in an **operating mine** environment
- Demonstrate a referenceable mining **“customer”** to prove the technology / solution to drive continued sales and adoption by mining companies
- Connect with global mining industry executives to “listen, learn, and build” solutions in a **collaborative** environment
- Identify strategic partners, talent, investors, and customers in a vibrant **ecosystem** like no other in the world

Using our **“active laboratory”**, we help to connect and broker relationships between mining technology companies (the “builders” of innovation) and global mining companies (the “buyers” of innovation) creating an **ecosystem** like no other in the world.



- 12,500 square foot state-of-the-art surface operations located adjacent to the underground mine
- Dries, offices, kitchenette, collaboration rooms, on-site incubator, and hosting / demonstration facilities
- PPE provided for visitors, clients, and delegations

- Vehicles, machinery, tools, and equipment available
- On-site support staff and resources to assist with product installations, testing, and demonstrations
- Dedicated use of drifts and headings
- Underground communication platforms



Experience Collaboration, Innovation and Learning
“Clubhouse membership agreements” available for ecosystem participants

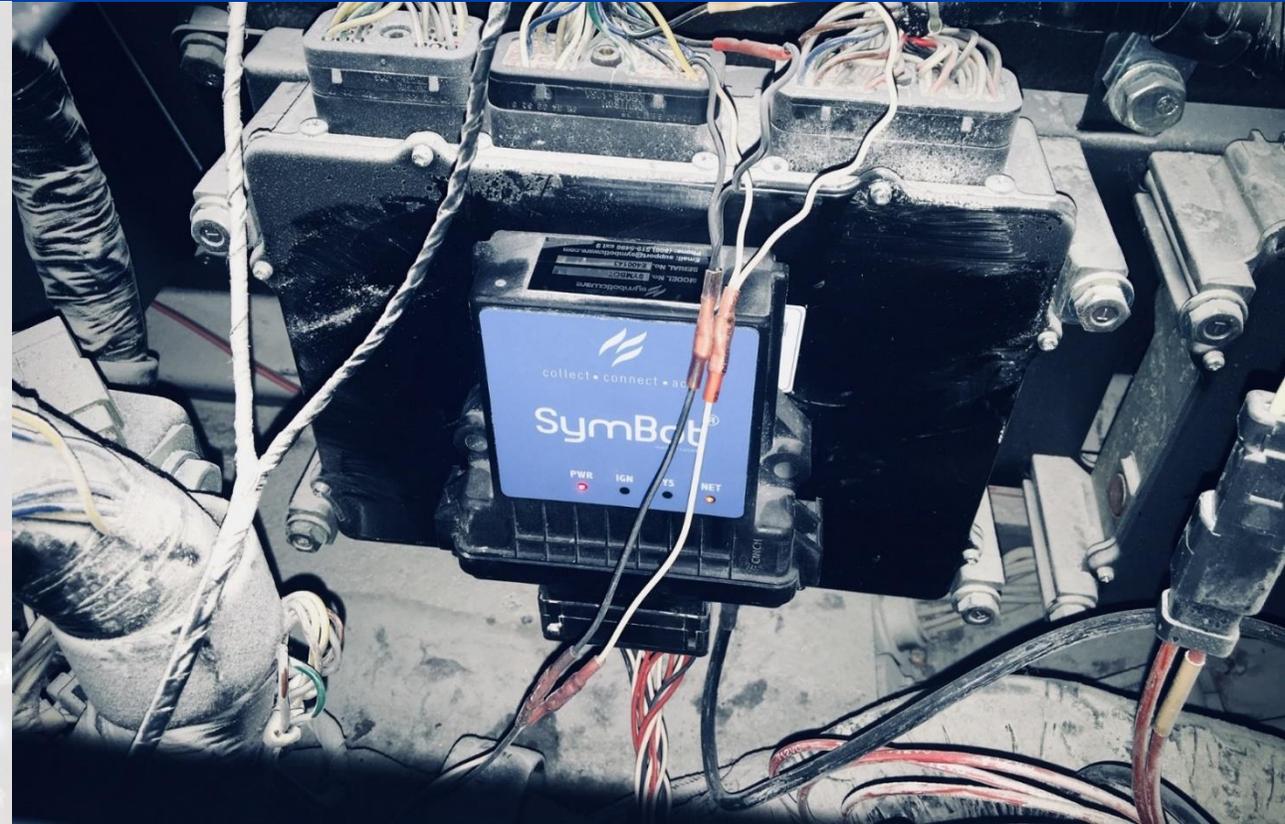
The NORCAT Underground Centre – Diversity of Projects



- Tele-remote / autonomous vehicle operation
- Resin, screening, bolting development
- Ventilation-on-demand / monitoring systems
- “How to” videos and training development
- Telemetry, sensors, analytics, AI, big data, and software systems
- Drone and survey testing and evaluation
- Blasting materials and systems
- Wearables for health and safety / location
- Underground / surface drilling and bolting technology development
- Electrical vehicles and energy storage systems
- LTE / 5G, co-axial, leaker feeder, mioty, LoRa, and wifi systems

The Underground Centre – FY2020 Snapshot

- We supported approximately **50 projects** from nearly **40 different mining technology companies**
- On average, we hosted **one mining company per week** eager to see “What’s Next”
- Multiple “ecosystem **collaborations**/partnerships” were established to develop new products
- We **trained** thousands of would-be and existing workers for meaningful careers in mining



The NORCAT Underground Centre – Select Mining Tech Clients



“The Internet of Everything and digitization are rapidly transforming industries across Canada. Mining is no exception, and we are excited to work with NORCAT to drive innovation and leadership in this space for years to come.”

Bernadette Wightman, President, Cisco Canada

“NORCAT’s operating mine has provided Boart Longyear with a ‘dynamic laboratory’ to develop and test our drilling technology on both surface and underground. The ability to conduct engineering and testing work combined with the opportunity to showcase our emerging products to prospective customers is imperative for the growth of our business”

Kent Hoots, Sr. Vice President Global Products, Boart Longyear

“NORCAT provided Atlas Copco Exploration the environment to test new products – combining the safety of a laboratory and the working conditions of an operating mine. Using the Underground Centre enables us to perform more controlled experimentation than is possible in our customer’s site. The NORCAT team supported us with excellent assistance to set up the tests with safety as their number one concern.”

Mike Duffy

Global Research and Development Manager, Atlas Copco Exploration Products

“NORCAT has played an instrumental role in Hard-Line’s development of new mining technology. Professional, supportive and, most importantly, a partner in the innovation of all we do.”

Max Gray

Vice President of Sales and Marketing, Hard-Line Solutions

Mining minus the miners

Forget cars—the driverless-vehicle revolution is happening deep underground

Mining is dirty, dangerous work, so miners and their suppliers are racing to develop automated machinery and software to do the actual digging and hauling. Already there are driverless diggers and loaders, and flying drones that can spot deposits or danger zones deep underground. But before this new technology can be used in an actual mine, it needs to be thoroughly tested. That's where Sudbury's Northern Centre for Advanced Technology, or NORCAT, comes in—it has a testing facility in a working nickel mine once owned by Falconbridge. One day recently, Hard-Line Solutions, a growing Ontario-based

supplier of remote-control and automation systems, was using some of its gear to operate a driverless loader built by France's Araminc.

A decade ago, says Hard-Line's senior vice-president of operations, Ryan Sigel, improving safety was the industry's top goal. "Now a lot of the push is productivity and lowering costs," he says. Automated mines can operate 24 hours a day and be run remotely. Even a lack of oxygen is less of a problem—if deposits are blasted loose, equipment can go back into shafts quickly without waiting the usual hours or days for full ventilation.

/John Daly

Fewer people, greater output

EMPLOYMENT
IN MINING,
SUPPORT
ACTIVITIES AND
PROCESSING

2000
2015

400,637

\$19.8 BILLION

373,435

\$42.8 BILLION

VALUE OF
MINERAL
PRODUCTION
IN CANADA

2014

Hard-Line established their **global tele-remote / autonomous demonstration centre** at the NORCAT Underground Centre.

2020

The Centre of Excellence in Next Generation Networks (CENGN) supported the installation of the NLT and Nokia Communication Infrastructure in the UG Centre.





2016

Boart Longyear established one of their global technology and innovation centres at the NORCAT Underground Centre.

2019

Redline Communications installed, tested, and demonstrated **5G communications** infrastructure at the NORCAT Underground Centre



CANADA

- NORCAT has provided human capital and training / development programs, services, and resources for mining clients across Canada.

GREENLAND

- Partnered with a leading academic institution to develop comprehensive mine skills training program focused on experiential / hands-on learning for entry-level miners

MONGOLIA

- Developed and delivered a comprehensive mine hoist training and development program for one of the world's largest mining companies.

USA

- Partnered with a leading zinc mining company to evaluate, refine, and ensure proper integration of equipment simulation training.

SAUDI ARABIA

- Developed technical guidelines focused on national health and safety to establish standards for a burgeoning mining industry.
- Developed a strategy and operating model for a national mining centre of excellence.

ECUADOR

- Developed strategy and operating model for a mine skills training and development centre in southern Ecuador
- Worked with leading academic institution on the creation of a community-based entrepreneurship innovation centre.

COLOMBIA

- Developed curriculum, teaching aides, and student workbooks for multiple training programs for an Andean gold mining company.

KENYA

- Worked with a leading titanium mining company to develop culturally-unique training and development programs to support both new and existing mine workers.

PERU

- Facilitated workshops and conferences on leading practices in mine health and safety to educator operators, mine managers and executives.

ARGENTINA

- Developed and delivered a custom and comprehensive supervisor training program for high potential skilled labour mine workers for one of the world's leading gold miners.

SOUTH AFRICA

- Working with a leading platinum / palladium mining company on a human capital / training needs analysis for a large-scale underground mining operation.

CHILE

- Shared best practice research and supported the strategy and operating model development of a mining and beneficiation technology and innovation centre.

The world's one-stop shop for all that is the future of mining technology and innovation.



SKILLS TRAINING FOR THE FUTURE

TORONTO, ON • SANTIAGO, CH • SUDBURY, ON • TIMMINS, ON • THUNDER BAY, ON • ONAPING, ON

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