



CROSH

SPOTLIGHT

CENTRE FOR RESEARCH IN OCCUPATIONAL SAFETY AND HEALTH
AT LAURENTIAN UNIVERSITY

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CROSH
CRSST

**centre for research in
occupational safety and health**
at Laurentian University

**centre de recherche sur la
santé et sécurité au travail**
à l'Université Laurentienne

HELPING SMALL BUSINESSES

MINING



Sudbury-based DMC Mining Services had a raise bore drill that regularly broke down because of a **vibration problem**. DMC Mining Services hired us to solve this problem. To do so, our team first went into the field to analyze and understand the situation.

Field Measures



Lab Solutions



CROSH researchers measured field vibration signals from the drill underground, then we designed a drill mounting prototype to be used in conjunction with the rotopod. We tested different isolators using simulated field signals in the lab, identifying a method to **solve the problem**.

TRANSPORTATION



Brinks Canada was experiencing **vibration-related health** issues for workers associated with the use of their fleet of vehicles. CROSH measured and evaluated whole-body vibration exposure on all their trucks, then we provided Brinks Canada with a report outlining which vehicles and drivers were at risk and the steps to take to prevent further injuries. Ultimately, we enabled **injury prevention** and cost-savings while at the same time training our own OHS students.



SURVEYORS



Existing loop wire back-pack frames are manufactured by Abitibi Geophysics and they are highly durable. They are, however, a burden to the wearer due to the high level of forces and torques experienced at the lower back. Abitibi Geophysics asked CROSH to help them avoid further workplace incidents through the creation of an **ergonomic and biomechanically** sound backpack.



COMMUNITY OUTREACH

RESEARCH



CROSH has partnered with Aviation Forest Fire Emergency Services (AFFES) to **solve** health and safety issues relevant to this population of workers. In 2018, we travelled to eight bases across Northeastern (4) and Northwestern (4) Ontario, reporting results of a previous project and launching the 2018 Psychosocial Hazards in the Workplace project.



STUDENT TRAINING



Ministry of Education

In 2022, M-CROSH visited 14 schools (741 students) in two communities and provided a half-day workshop to grade 10 and 11 students regarding OHS, including vibration awareness, physiological and biological hazards, line-of-sight, and the future of virtual reality and gaming in OHS training.



CREATING PARTNERSHIPS

ERGOCALCULATOR



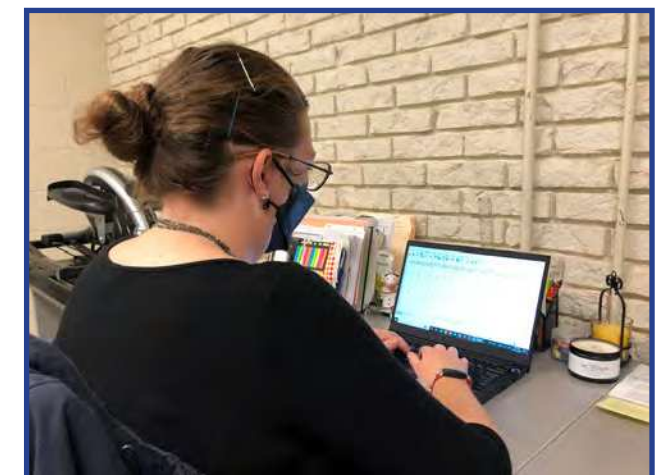
Occupational Health Clinics for Ontario Workers
Centre de santé des travailleurs et travailleuses de l'Ontario

In 2019 CROSH partnered with Ontario Health Clinics for Occupational Workers (OHCOW) to collect data to confirm the reliability of their ErgoCalculator for use in novice and expert populations. CROSH was responsible for advising on research design, collecting the data, writing up the results and sharing the findings in succinct, technical documents.

MENTAL HEALTH TRAINING EVALUATION



In 2021 CROSH partnered with Workplace Safety North (WSN) to provide expertise in data analysis on the Mental Health and Psychological Health and Safety CPO-directed initiative. The project aims to assist resource-based industries in the north in understanding, identifying, and addressing mental health and psychological health and safety issues in the workplace.



STUDENT TRAINING THROUGH INTERNSHIPS

newgold



For their CROSH internships, graduate student members Kate Posluszny and Emily Tella of Lakehead University measured and analyzed whole-body vibration in heavy duty machinery mine operators at New Gold's Rainy River Mine in Emo, Ontario.

Undergraduate student George Flagler assisted with the Panbio Antigen COVID-19 Rapid Testing Pilot Project as part of his internship with the Laurentian University Health and Wellness Team.

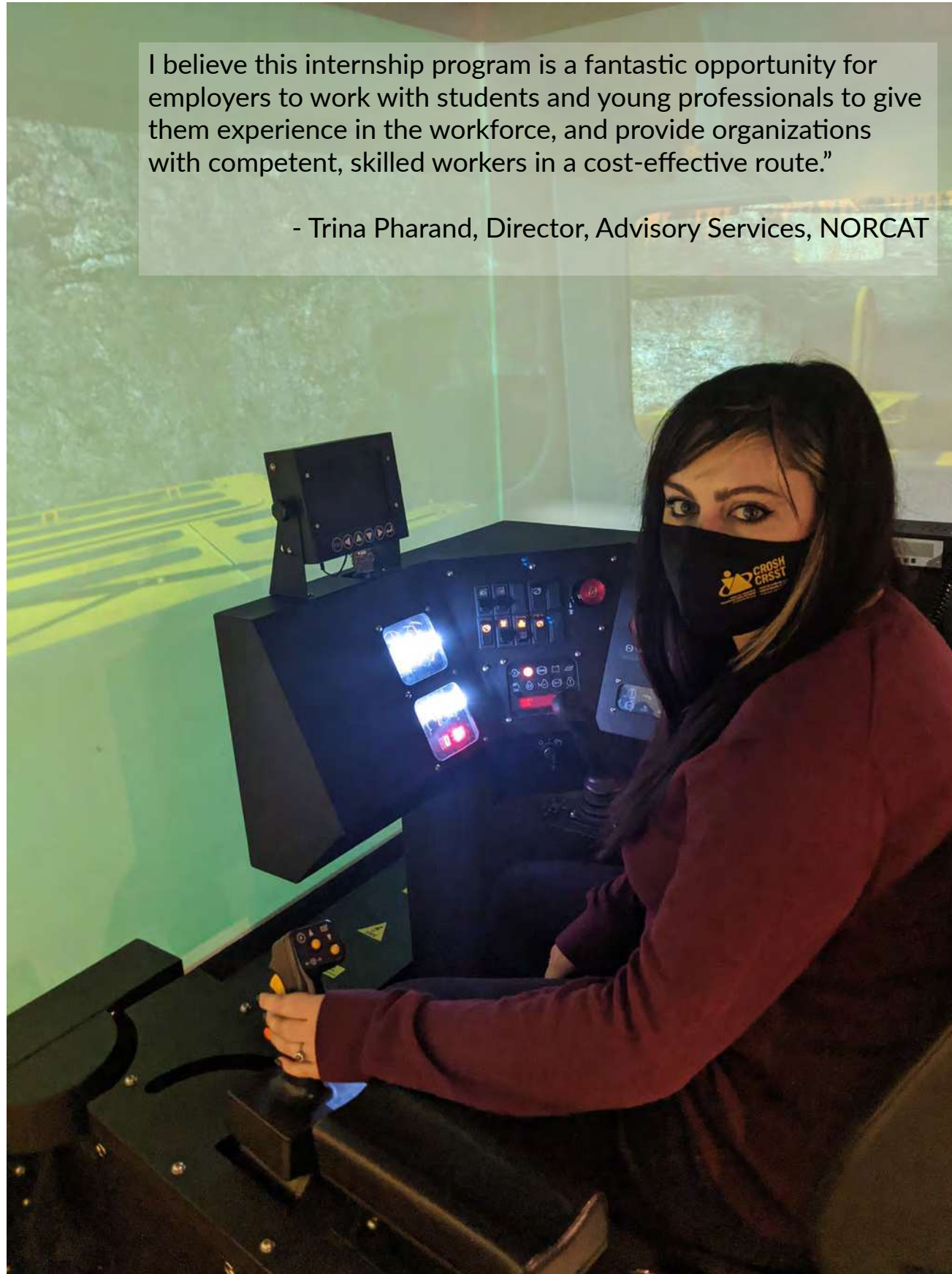


Amanda Dodaro, who is now doing graduate work at Lakehead University, helped MIRARCO create a comprehensive report for the Ontario Mining Association on their COVID-19 controls, performance standards, and lessons learned.



I believe this internship program is a fantastic opportunity for employers to work with students and young professionals to give them experience in the workforce, and provide organizations with competent, skilled workers in a cost-effective route.”

- Trina Pharand, Director, Advisory Services, NORCAT



CROSH graduate student member Josée Cormier at her internship at NORCAT, where she helped develop safety training resources with a mobile equipment simulator. **Josée was hired full-time by NORCAT** after completing this project.



CROSH undergraduate student member Sydney Boileau, left, with her internship supervisor, CROSH Senior Scientist Dr. Katie Goggins. For her internship, Sydney helped Dr. Goggins ergonomically evaluate a loopwire backpack for Abitibi Geophysics.

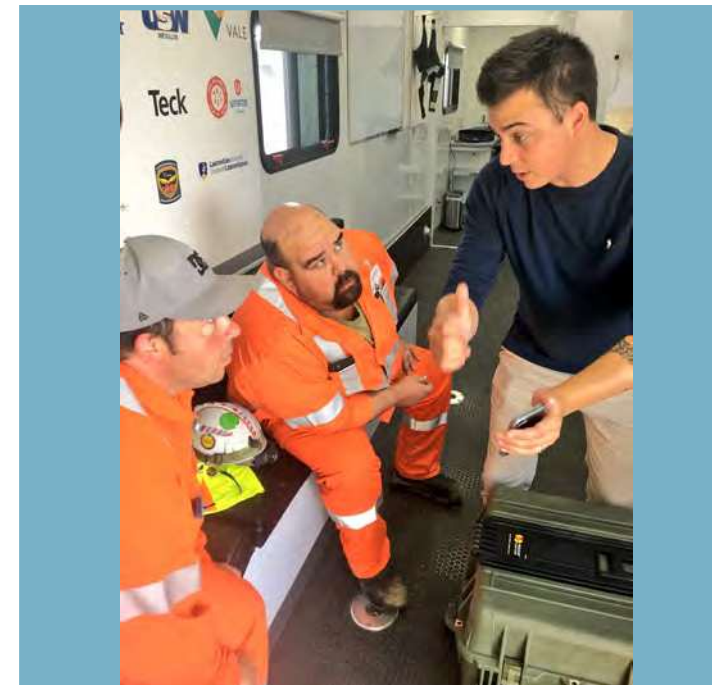
PROVIDING TRAINING TO STUDENTS AND WORKPLACES

Since 2018, CROSH has had **127 student members**; our student members are the **future OHS professionals** of Northern Ontario.

In that time, we have awarded **71 student scholarships**, totalling **\$124,000**.

In the past four years, CROSH has facilitated **47 student internships**, giving students real-world **health and safety training**.

Our students learn and conduct health and safety research and engage with workers in Northern Ontario industries.



PRIORITIZING RESEARCH NEEDS FOR NORTHERN ONTARIO

RESEARCH GRANTS

Helping protect healthcare workers from violence



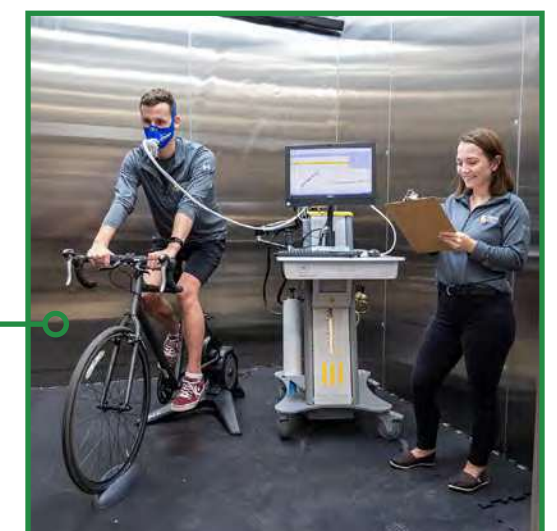
Health Sciences North
Horizon Santé-Nord

Healthcare workers in northern and rural communities continue to face the risk of violence from patients. Our researchers are testing the Violence Assessment Tool (VAT) to see if it's a reliable way to assess the risk of violence from patients towards healthcare workers.

Protecting workers from heat stress

Many outdoor workers take over-the-counter medicines for hay fever. A common side effect of these medicines is decreased sweating. Therefore, we are investigating if allergy medicines can put outdoor workers at greater risk for heat stress.

We can use the Environmental Chamber in our **Workplace Simulator Lab** to devise evidence-based cooling strategies to help preserve the health, quality of life, and performance of workers at risk of heat stress.



Training northern healthcare workers with Virtual Reality



We partnered with small business Lumeto on a grant-funded project (\$1.08M) to create 12 virtual reality modules to facilitate training for nurses on core competency topics. This was an identified project for Northern Ontario because it is difficult for workers in remote communities to access training and refresher courses.

Analyzing drilling injury data across Canada



In 2022, CROSH leveraged a Mitacs grant for a group of companies under the banner of Prospectors & Developers Association of Canada (PDAC) to analyze historical injury data amongst surveyors and drillers in Canada. This work led to clarity in survey questions and the development of a revised manual for administration of a yearly survey. In addition, this grant funded a masters student and their thesis work.



PUBLIC RESEARCH GRANTS

Solving ergonomic problems to make work safer for all Vale workers



Vale is hiring more women and needs to accommodate their smaller average size and build. For example, smaller statured individuals have different lines-of-sight than taller individuals. Vale funded us to help them **solve this problem.**

Evaluating a thermal camera for workplace screening



When the COVID-19 pandemic hit in 2020, a long-time company partner, PROVIX Inc., reached out to CROSH to evaluate one of their camera products in a new context of fever detection in workers.

PRIVATE RESEARCH GRANTS

Conducting physiology research that helps local businesses.



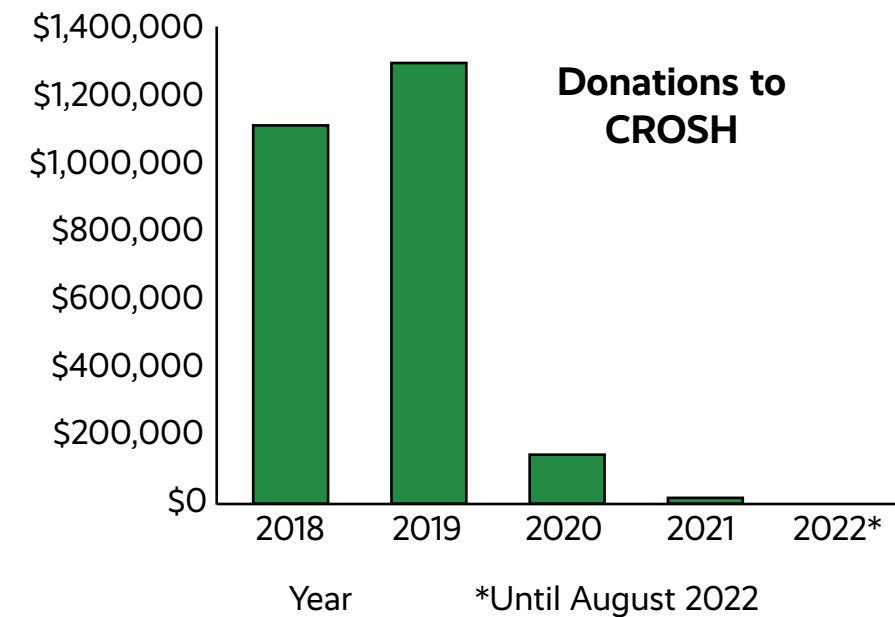
CROSH partnered with Jannatec Technologies to help them **commercialize their innovation**, a **cooling vest** to reduce the risk of **heat stress**. The study was conducted in our **Environmental Chamber**, which is a component of our **Workplace Simulator**. By understanding the health effects of being regularly exposed to hot and cold environments, businesses like Jannatec Technologies can better develop safety standards and guidelines regarding commercially-available cooling devices, like **cooling vests**.

Evaluating new technology that could protect healthcare workers



Flosonics Medical, a **small, start-up business**, **innovated** a novel, wireless, wearable ultrasound patch to measure blood flow through the neck. Using this device, healthcare workers can assess cardiovascular variables without physical contact during disease outbreaks, like COVID-19. CROSH partnered with Flosonics medical to evaluate the reliability and validity of this new patch technology under vibration, exercise, and thermal stress to help them **commercialize their product**.

CROSH has raised over \$2,500,000 in donations over the past five years.



Note: In March 2020, the pandemic shut down Laurentian University. In February 2021, Laurentian University began the CCAA process, freezing all funding.



Mr. Leo Gerard presenting a donation of \$225,000 to CROSH from the United Steelworkers.



CREATING KNOWLEDGE TRANSFER EXCHANGE MATERIALS

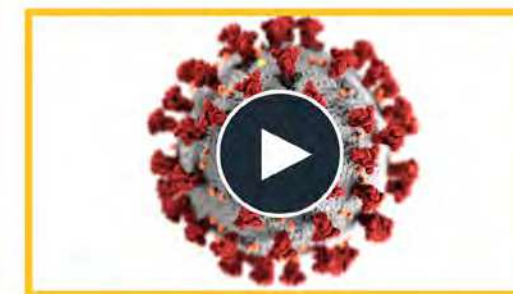
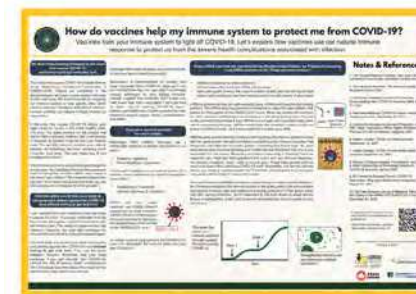
Knowledge Transfer Kits



CROSH developed a series of Knowledge Transfer Kits in three areas of OHS (vibration, line-of-sight, and fatigue) with branding and evidence-based research specific to different northern industries, including: construction, forestry, mining, steel, and pulp and paper.



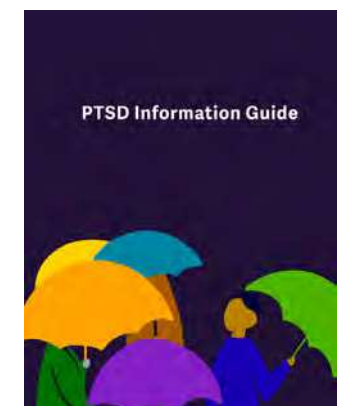
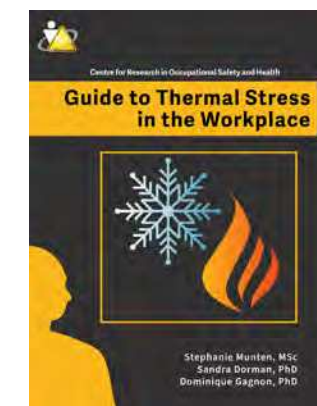
Northern Ontario Community Immunity Series



Funded with a grant from NSERC, we engaged Northern Ontario workers in conversation about community immunity and the safety and effectiveness of COVID-19 vaccines.

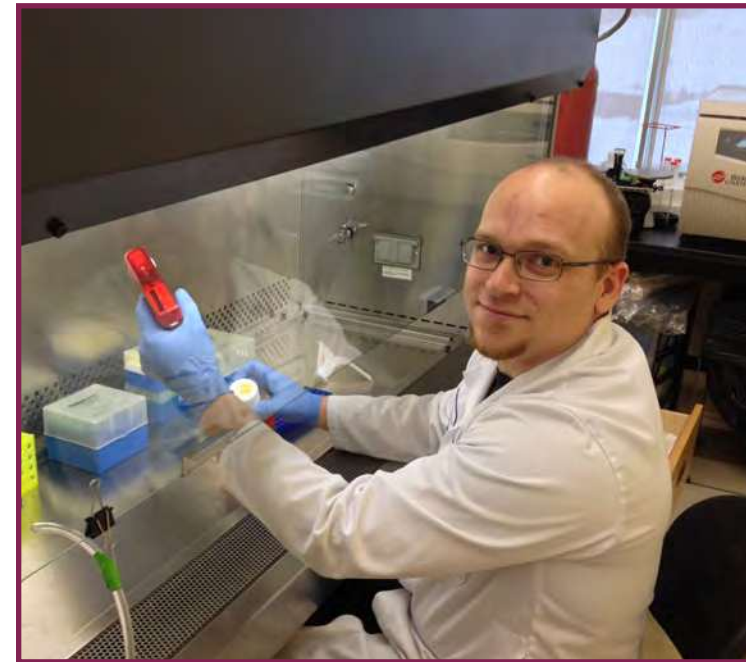
Guidebooks

These guidebooks have gathered peer-reviewed data and distilled it into a worker-friendly format, that reflects the experiences and workplaces of Northern Ontario workers.



COLLABORATING WITH SAFE WORKPLACE ASSOCIATIONS

**Our strong relationships with SWAs
facilitate the sharing of health and
safety expertise**



Occupational
Health Clinics
for Ontario
Workers

Centre de santé
des travailleurs
et travailleuses
de l'Ontario

Occupational Hygienist and PhD Candidate Andrew Zarnke's work on cardiovascular disease and McIntyre Powder is made possible by the CROSH-OHCOW partnership.



In partnership with WSPS, CROSH has hosted webinars and conferences that reached more participants due to collaboration between the groups.



CROSH was contracted to complete usability testing on a first-generation fire suppression augmented reality system (FiAR). Outcomes of this partnership include peer-reviewed publications, as well as easily consumable products related to the study findings, such as technical reports, back to NORCAT.



IHSA remains a strong partner with CROSH for the execution of funded projects that require access to the workers and clientele that receive training services from IHSA. On several projects in the construction industry, IHSA has served as the key liaison with that sector.



CROSH FACILITIES

WORKPLACE SIMULATOR

The CROSH **Workplace Simulator (W-SIM)** is a one-of-a-kind facility providing state-of-the-art infrastructure for the design and execution of research studies, or income-generating research service contracts, that **solve real-world workplace problems through work-task simulation.**

W-SIM consists of four main components:

Virtual reality and eye-tracking system

- Eye-tracking
- Line of Sight
- Proximity Detection
- Cognitive Workload
- Human Factors & Equipment Operation



Metabolic cart

- Metabolic Analyses
- Pulmonary Function Tests
- Exercise & Occ. Fitness Testing
- Spirometry
- Weight Management



Environmental chamber

- Fatigue
- Heat Stress
- Nutrition
- Physiological Stressors
- Sleep



Robotic vibration and motion platform (rotopod)

- Vibration Transmissibility
- Musculoskeletal Loading
- Vibration Induced Injury
- Motion Analysis
- PPE Evaluation



W-SIM is the only lab in the world capable of combining these pieces of equipment into one integrated system.

Example Application: Vibration Reduction

Using the rotopod, we work with manufacturers to develop the “best” equipment for vibration reduction.



The rotopod reproduces the vibration profiles from the field, for example a scoop tram run.

Example Application: Mobile Equipment Design

We use virtual reality to simulate the “physical” work environment.



We can work with manufacturers to evaluate interface design with new technologies for proximity detection.

Example Application: Occupational Fitness Testing

We work with occupational athletes like wildland firefighters to ensure they are fit for duty.



The metabolic cart and body-composition scale perform comprehensive fitness tests and physiological analyses.

Example Application: Heat Stress Evaluation

We work with industry partners and equipment suppliers to study heat stress and identify solutions to mitigate heat stress risk factors.



The Environmental Chamber can recreate precise temperature and humidity conditions from the field.

MOBILE RESEARCH LAB

The CROSH **Mobile Research Lab (M-CROSH)** connects researchers and workers in rural and remote communities, and promotes understanding of critical occupational health and safety problems through active information exchange.

M-CROSH facilitates the development and implementation of meaningful solutions for northern industries through outreach and community engagement.



Workers at Glencore's Fraser Mine in Sudbury, Ontario learn about situational awareness and line-of-sight using a virtual reality program (developed by CROSH) in **M-CROSH**.



M-CROSH brings health and safety outreach into the field, such as Glencore's "Health and Safety Days" at the Fraser Mine.

CROSH

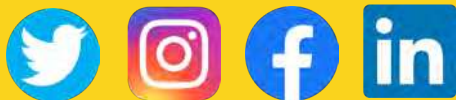
PREVENTION THROUGH RESEARCH

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