Enhanced Integration of Persons with Disabilities Through Mining Sector Automation
Overview

The rapid advancement of digital technologies is changing how Canadian employers envision their future operations. The adoption of new technologies is advantageous to industry productivity and to Canada’s global competitiveness.¹ A recent study identifies artificial intelligence, new electronics (e.g., 3D printers), business intelligence systems and robotics/drones as technologies that managers would most like to adopt in the next five years.² These preferences show employers’ willingness to adopt automation and new technologies and that they see the advantages of doing so. On the other hand, employers who delay adoption of new technologies, such as automation, risk losing competitiveness and market share, especially in trade-intensive industries.³

The mining sector is constantly evolving and developing new innovations and approaches to work. For example, some mechanical repairs to equipment can now be controlled remotely while performed in the field through robotics.⁴ During the COVID-19 era, many roles became remote and were successfully supported by mining companies.⁵ New opportunities for remote work opened up and have advanced the sector’s knowledge and understanding of what can currently be supported by automation and new technologies.

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¹ Wyonch, The Next Wave, 5-6.
² Thomson, Responding to Automation, 12.
³ Thomson, Responding to Automation, 14.
⁴ Interview finding.
⁵ Interview finding.
Automation and other new technologies offer multiple benefits to the Canadian minerals and metals sector, such as improved control over the major costs of wages, energy, materials and supplies.\(^6\) They also offer new opportunities for the sector to engage more diverse talent and address labour shortages which limit the sector’s ability to realize its potential.\(^7\)

Persons with disabilities represent a potentially important source of skilled labour for the Canadian mining sector. The Canadian Disability Act defines disability as any impairment, including a physical, mental, intellectual, cognitive, learning, communication or sensory impairment — or a functional limitation — whether permanent, temporary or episodic in nature, or evident or not, that, in interaction with a barrier, hinders a person’s full and equal participation in society.\(^8\)

More than one in four (27%) Canadians aged 15 or older – about eight million people – have one or more disabilities.\(^9\) Persons with disabilities are often affected by more than one: only 29 percent of Canadians with disabilities experience a single form of disability.\(^10\)

Creating accessible work environments is important to engage persons with disabilities in meaningful roles that contribute to individual and organizational success. The Accessible Canada Act establishes standards for how organizations are to identify, remove and prevent barriers for persons with disabilities in different areas, including the workplace.\(^11\)

However, it is important to note that in addition to federal legislation, there are also provincial and territorial legislative requirements that organizations may be subject to or required to comply with. Provincial and territorial governments have their own human rights codes, accessibility legislation and regulations that outline specific requirements for accessibility and accommodation within their jurisdictions. These legislative frameworks are matters of jurisdiction and provide helpful frameworks/guidance.

Because everyone’s needs are unique, addressing barriers to accessibility often involves one or more individualized solutions. Factors such as physical barriers, availability of technologies, the commitment to adjust and identity-based discrimination\(^12\) affect an organization’s capacity to make workplaces accessible.\(^13\) Accordingly, accommodating persons with disabilities in the workplace can take many forms. Automation and increasing adoption of new technologies creates potential for addressing accessibility issues and for the successful employment of persons with disabilities.

This briefing explores current and potential opportunities and challenges presented by automation to enhance the integration of persons with disabilities into Canada’s mining sector.

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6 Vella, Automation and Excess.
7 Gratton, The Critical Question, 6.
8 Canadian Institutes of Health Research glossary of terms used in accessibility and systemic ableism, [https://cihr-irsc.gc.ca/e/53446.html](https://cihr-irsc.gc.ca/e/53446.html)
11 Parliament of Canada, Bill C-81.
12 Identity factors include sex, gender, race, ethnicity, religion, age, disability, geography, culture, income, sexual orientation and education, among others. Government of Canada, Guidance.
13 Canadian Human Rights Commission, What We Did.
Methodologies

An online scan and literature review focused on investments in automation and their potential to enhance integration of persons with disabilities in the sector. Prior Canadian studies, analyses, research and cases from the mining and other natural resource sectors were explored. Eight key informant interviews were also conducted to add insights from human resource practitioners (three interviews), disability management practitioners (three interviews) and recruiters (two interviews) working in or serving the Canadian mining sector.
For the purposes of this report, disabilities are defined as belonging to any of three categories:

1. **Physical**
   Any degree of physical disability, infirmity, malformation or disfigurement that is caused by bodily injury, birth defect or illness and, without limiting the generality of the foregoing, includes diabetes mellitus, epilepsy, a brain injury, any degree of paralysis, amputation, lack of physical co-ordination, blindness or visual impediment, deafness or hearing impediment, muteness or speech impediment, or physical reliance on a guide dog or other animal or on a wheelchair or other remedial appliance or device.\(^{14}\)

2. **Mental health-related**
   A condition of mental impairment or a developmental disability or a mental disorder.\(^{15}\)

3. **Learning**
   Disorders that impair one or more processes related to perceiving, thinking, remembering or learning\(^{16}\) and are not emotional disturbances, intellectual disabilities, or sensory impairments.\(^{17}\)

The categories of physical and mental health-related disabilities map directly onto those described in the UN definition. The category of learning disabilities differs from the UN definition which speaks to intellectual or sensory impairments.

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\(^{14}\) Ontario Human Rights Commission, *What is Disability?*

\(^{15}\) Ontario Human Rights Commission, *What is Disability?*


\(^{17}\) Learning Disabilities Association of America, *What are Learning Disabilities?*
Findings

Employment Barriers for Persons with Disabilities

Persons with disabilities currently demonstrate significantly lower employment rates in Canada than those without disabilities (65.1% versus 80.1%).\(^\text{18}\) Employment-related barriers faced by persons with disabilities point to a need for education, awareness and accessibility considerations. Some specific barriers within the mining sector include workplace environments that are not fully accessible; limited awareness on the part of persons with disabilities, employment counsellors and agencies regarding industry-specific opportunities; and a lack of targeted outreach to persons with disabilities.\(^\text{19}\) The willingness and energy of the sector in addressing these barriers is another challenge.\(^\text{20}\) Addressing them would facilitate more persons with disabilities entering or remaining in employment and would help mining operators address labour shortages.

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19 MiHR, *Take Action for Diversity,* 20.
20 Interview finding.
1. Mining Work Environments Not Accessible

A major employment obstacle for persons with disabilities is the design of mining work environments. Some mining facilities in Canada are aged and were not designed to modern accessibility standards. For instance, a lack of ramps or elevators can limit access for individuals who are physically unable to climb stairs.  

Mining operators may be limited in their ability to make changes to such facilities owing to any number of factors. The nature of mining work and the design of controls and working environments can create other barriers. As one interview respondent noted, roles that require the ability to discern colours of paint, rock, wiring and control indicators, for instance, may not be open to persons with visual limitations. The return on the investment is an important factor in mining companies’ decisions to design more accessible working environments. The benefits of doing so, such as filling labour gaps or creating a more inclusive culture, must be clear and measurable.

2. Limited Awareness of Employment Opportunities

Career path planning for individuals is based on the information available to them. Information on career options in primary sectors, including mining, is often lacking in Canada.  

Career counsellors may not know that the increasing use of automation and new technologies in mining has resulted in a demand for technological skills. Moreover, managing work taking place remotely, such as through control rooms, requires both technical knowledge and soft skills, including creativity and adaptability.  

Understanding the current and emerging skills needs of the mining sector can help guidance counsellors to provide relevant advice to youth and adults with disabilities about working in mining.

21 Interview finding.
22 Interview finding; Lindsay, “We Need to do a Better Job”.
23 Interview finding.
An experienced human resource practitioner working in the mining sector highlighted that many roles in mining now call for a combination of field work experience and technological skills. Acquiring experience working in the field may be challenging for some persons with disabilities. However, experienced workers who have a permanent or temporary disability due to an injury or health condition can often be accommodated when they are ready to return to work. For instance, training can be provided to support skills acquisition, if needed.

3. Lack of Targeted Recruitment Efforts

Employers seek economic and efficient methods of doing business, including in the recruitment of talent. As in many other industries, smaller mining operators are challenged to compete for talent with larger organizations that can offer higher compensation and other rewards. When an employer has an opportunity to find needed talent without taking on new costs, it will opt for this traditional method. The ability to attract talent from other organizations, industries and countries delays the need for some to find alternative solutions. An interview respondent commented that considering how to attract talent from groups currently underrepresented in the mining sector is not a top priority for employers who have more cost-effective options. As a result, there is minimal targeted recruitment efforts stemming from the mining sector aimed at persons with disabilities.
4. Lack of Incentives to Address Barriers

Leadership support and buy-in is critically important to mining facilities’ ability to address employment barriers facing persons with disabilities. An interview respondent noted that C-suite roles in mining are often filled by individuals with engineering and hard science, mathematics or financial management backgrounds. Their exposure to the benefits of an equitable, diverse and inclusive workplace culture may vary and point to awareness raising and education opportunities. Further, when companies can fill their labour gaps through traditional recruitment efforts as well as hiring from other companies and industries, there is less urgency to address barriers for underrepresented groups.24

Even if mining company leaders are well-informed and well-intentioned as to the benefits of establishing an equitable, diverse and inclusive workplace culture, they may still be cautious about making changes.

Any investments create precedents for future spending and are considered in that light. The economic feasibility of a long-term commitment to supporting accommodative changes may inhibit the will to act, especially for smaller organizations.25 Significant investments create risk for significant loss if the benefits do not play out as planned. Moreover, the amount of investment required is not always clear. Creating accommodations for persons with disabilities requires customized solutions appropriate to individual needs. Although one individual may be provided with accommodation at low cost, the next case may require more significant investment.26 The future annual and year-over-year financial commitments are unknown and will only be realized as cases occur. This creates budgeting and forecasting challenges for mining operators who have committed to supporting accessibility in general.

24 Interview finding.
25 Interview finding.
26 Interview finding.
Solutions to Addressing Employment Barriers

1. Creating Accessible Mining Work Environments

Canada’s mining sector prioritizes safe production.27 Mining operators focus on keeping people from harm while meeting operational targets. Following the hierarchy of controls that seek to avoid harm,28 mining companies’ shared objective is to design away from risk. To that end, mining companies are increasingly leveraging automation and new technologies to create more efficient and safer operations. For instance, NORCAT’s new diagnostic tool helps detect cognitive disorders, such as depression, anxiety or fatigue, in workers. Any concerns detected that might affect job safety are shared with the supervisor who takes appropriate steps.29 Specialized technologies, such as this diagnostic tool, are helping companies make decisions that address safety risks as well as production challenges.

Similarly, some surveying can now be accomplished through drone and GPS technology, removing the need for in-person work.30 These changes require more sophisticated levels of controls and create more employment opportunities for persons with disabilities. In Australia, BHP Billiton’s Pilbara mine, including its fixed plant, train and port operations, is controlled remotely from a central urban location.31 An interview participant revealed that the growing reliance on technology in mining is calling for talent with skills in computer programming and coding, rather than physical capabilities. Technicians now play a critical role in mining and are in demand: “the swift pace of automation is...making software skills more valuable at some companies than the ability to drive a truck.”32

Automation and new technologies offer ways to integrate workplace needs with the capabilities of persons with disabilities. It has been demonstrated that many work tasks in industrial settings can be shared between persons with disabilities and robots.33 Further, AI-powered systems and devices can be used to:34

- Control robots and drones to investigate unreachable areas or traverse uneven ground.
- Undertake potentially difficult tasks like typing or using a computer mouse.
- More easily access and use remote work tools and technologies like video conferencing, scheduling and time management tools and project management software.

While the cost-effectiveness of such an arrangement depends on the specific equipment needed, it is recognized that “remote and autonomous technology has the potential to make mining a more inclusive industry that is more attractive to women, older workers, the physically disabled and more.”35

A practical approach to addressing employment barriers for persons with disabilities is to conduct workplace assessments for accessibility.36 A human resource practitioner shared that to support job interviewing and onboarding, some mining employers complete analyses of the physical and cognitive demands of roles, keeping safety top-of-mind. They can then provide accommodations to individual job candidates or new hires on a case-by-case basis. This relates to the fact that employers have a legal obligation to provide reasonable accommodations to employees with disabilities.

27 See for example, the Ontario Mining Association’s description of how the industry takes an integrated approach to the management of health, safety and the economic, technical and social processes of its businesses. Ontario Mining Association, Health and Safety.
28 CCOHS, Hazard and Risk: Hierarchy of Controls.
29 Lindsay, “We Need to do a Better Job”.
30 Interview finding.
31 Kakulas, “Ready to IROC.”
32 Lindsay, “We Need to do a Better Job”.
33 Jalba, “Integration of Disabled,” 11.
34 Mercer, “A Balancing Act.”
35 Stephenson, “Mining Companies Betting.”
36 MiHR, Take Action for Diversity, 22.
as mandated by human rights legislation such as the Accessibility for Ontarians with Disabilities Act (AODA) and The Accessible Canada Act (ACA). However, beyond mere compliance, effective workplace accommodations have emerged as a best practice embraced by organizations valuing inclusivity. Disclosure of needs on both sides is a key success factor in making accommodations. Mining operators also create customized solutions to accommodate workers who return to work after being injured on the job.37

One employment aspect that automation and new technologies can support for persons with disabilities is communication. Adaptive, AI-based technologies can be trained and used to support accessibility through captioning, image description or speech recognition.38

Other examples of AI being used in the workplace to help address communications for persons with disabilities include:39

- Natural language processing (NLP) technology – creates more accessible interfaces for employees with visual or cognitive disabilities.
- ChatGPT – creates more efficient and effective communication channels for employees with disabilities (e.g., for invisible disabilities such as autism, ADHD, and dyslexia).
- Virtual writing assistants – help individuals who need help with their writing skills (e.g., for dyslexia) by providing real-time feedback and suggestions.

37 Interview finding.
38 OCAD University, Future of Work, 49.
2. Recruitment of Persons with Disabilities

Employers and recruiters can help to address the identified recruitment-related barriers for persons with disabilities. Examples of recommended solutions for addressing employment barriers for persons with disabilities are to establish inclusive recruitment practices\(^\text{40}\) and to create targeted recruitment campaigns.\(^\text{41}\) AI-based technologies are emerging as a means of creating more inclusive recruitment practices. They can be used to “highlight the strengths and unique experiences of people with disabilities, allowing organizations to discover candidates they might otherwise miss.”\(^\text{42}\) Recruiters in this context focus on what an individual brings to a role in terms of their unique skills and experiences.\(^\text{43}\) The outcome is better opportunities for mining operators to recognize and recruit from diverse populations.

Some mining companies are looking ahead and anticipating the need to design accessible roles. For example, mapping different organizational roles onto categories of ability helps to ensure a good job fit. Such mapping provides hiring managers and recruiters with detailed information on how to target persons with disabilities and explain the fit of their knowledge and background as well as any needed accommodations with available mining jobs.\(^\text{44}\) Understanding the work environment for different roles is also important for mapping abilities. For instance, in an urban setting, alternative transportation to and from work may be required every day for an individual with a disability. The same individual may only require accessible transportation every two weeks in a remote, fly-in, fly-out setting.

\(^{40}\) Adapted from: Twaronite, Six Ways to Advance.
\(^{41}\) MiHR, Take Action for Diversity, 22.
\(^{42}\) OCAD University, Future of Work, 49.
\(^{43}\) OCAD University, Future of Work, 44-45.
\(^{44}\) Interview finding.
Mining employers can attract persons with disabilities by emphasizing the company’s prioritization of health and safety. Sharing information about the availability of a nurse, doctor or other medical personnel onsite in remote operations, the availability of medvac services, emergency response teams or other medical supports can help clarify whether the measures will be adequate for an individual’s needs.\(^\text{45}\) The sector’s drive for safety is giving rise to new innovations on an ongoing basis.

Efforts to attract younger workers with disabilities to jobs in mining call for targeted career advice, ideally before they make education and career decisions. Raising awareness of the opportunities and wide variety of roles available will help youth with disabilities to consider work in mining as a viable career choice.

Exploring expense offsets and including them in the business case can help alleviate budgetary concerns. In the proof-of-concept phase, efforts to connect automation and employment of persons with disabilities are “de-risked”.\(^\text{46}\)

Sharing best practices and mining sector case study findings can demonstrate what success looks like and can inform leadership expectations. One human resource practitioner suggested that since larger mining operations typically have more resources to provide accommodations for persons with disabilities than smaller operations, they could share learnings with the sector about the innovative solutions they have tried. Moreover, information about the costs of different types of accommodations or accessible facility designs would also help other operators plan for making changes in their own environments.

\(^{45}\) Interview finding.
\(^{46}\) Interview finding.
Conclusion

Automation and new technologies in mining are providing opportunities to address employment challenges faced by persons with disabilities. Mining leaders’ enhanced understanding of the value of providing accommodations and the mapping of roles and abilities required represent a holistic approach to employing persons with disabilities. Sector leaders who champion the recruitment and retention of persons with disabilities provide compelling voices to others. Mining is an industry sector at the leading edge of technological innovation – it can also be a leader in demonstrating how automation can support employment of persons with disabilities.
REFERENCES


APPENDIX:
Disability Support Agencies

**CCD Council for Canadians with Disabilities**
advocates and defends human rights for persons with disabilities. Advocates for full human rights ensuring equal opportunity and accessibility for all.
http://www.ccdonline.ca/en/

**Ontario Disability Employment Network (ODEN)**
a provincial network membership program promoting inclusion and increasing opportunities for candidates with a disability in the workplace. Employment services, events, training and other resources are available.
https://www.odenetwork.com/

**DAWN Canada-Disabled Women’s Network Canada**
provides opportunities to collaborate with community-based researchers to advocate and create awareness around women with disabilities.
https://www.dawncanada.net/about/about/

**Canadian Mental Health Association**
national responses to various mental health issues through helplines, support groups and workplace resources including Health & Safety training, Workplace training and Toolkits.
https://cmha.ca/

**Neil Squire Society**
employment services, computer literacy, hearing solutions and technology innovation to enable people with physical disabilities to live and work more easily and without barriers.
https://www.neilsquire.ca/

**Canadian Disability Foundation**
eliminating physical barriers for a more inclusive society (e.g., accessible ground transportation and building accessibility).
https://disabilityfoundation.ca/