11 Ways to Use Artificial Intelligence to Improve Work Safety & Compliance

Like many OHS coordinators, you may be considering using artificial intelligence (AI) to improve safety at your workplace. Just be careful. While it can help you identify and eliminate workplace hazards, using AI to carry out OHS program activities can also get you into legal trouble. Here's a quick briefing for OHS directors on 11 of the most common and effective AI uses, the legal risks of deploying AI systems, and the steps you can take to manage those risks.

1. Using AI for Hazard Identification

Timely and effective hazard identification is critical to safety and compliance. But periodic inspection, incident investigation and other traditional techniques that OHS coordinators have relied on to detect work hazards tend to be slow, intermittent, and reactive. By contrast, AI technologies make it possible to conduct proactive, real-time, and continuous hazard monitoring of potentially dangerous work areas, equipment, operations, etc. **Example:** AI-powered computer vision systems can analyze live video footage of machine servicing operations to detect and alert supervisors of unsafe lockout practices at the time workers actually carry them out.

2. Using AI for Hazard Assessment

Al can also help OHS coordinators assess the workplace hazards they identify. Machine learning algorithms can analyze incident reports, near-miss incidents, workers' comp claims, and other data to predict whether identified hazards are likely to occur and how serious they'd be. You can then use those predictions to make sound decisions about what, if anything, you should do to control the hazard.

3. Using AI to Prevent Workplace Violence & Harassment

AI systems can help you manage specific types of hazards, including workplace violence and harassment. Potential applications include deploying:

- Predictive analytics and threat assessment tools to identify potential violence risks as part of legally required workplace violence hazard assessment
- High-definition cameras, facial recognition software, motion sensors and other surveillance technologies to continuously monitor high-risk workplace locations, operations, or hours and detect and alert security of personnel of unusual activities in real-time.
- Advanced video analytics and behaviour analysis software to detect suspicious behaviour patterns.
- Natural language processing systems to scan files, emails, and other large bodies of text for threatening, harassing, bullying, or other inappropriate language.
- Voice recognition systems that can detect such language in real-time.
- Biometric scanners, smart cards, and other access control systems to keep unauthorized people out of sensitive areas.
- Panic buttons and mobile apps enabling workers to immediately notify security or law enforcement personnel

of threats or actual violent activity.

4. Using AI to Prevent Musculoskeletal Injuries (MSIs)

The combination of AI and wearable sensors can dramatically improve ergonomic hazard assessment required by OHS laws by generating data on awkward postures, repetitive motions, contact stress, vibration, bending, twisting, and other MSI risk factors. OHS coordinators can use AI technologies to model and analyze the data and select appropriate engineering and administrative solutions to minimize the risks they identify. Wearables also enable real-time detection and notification of hazardous motions, postures and movements by workers, which you can then get the worker to correct before injury results.

5. Using AI to Prevent Excessive Stress & Fatigue

Many companies use wearables and AI to keep workers healthy, alert, productive, and fit for duty. Thus, for example, real-time monitoring of heart rate, blood pressure, steps taken, and other key health metrics can help protect workers who've recently suffered injuries or who work in hazardous health conditions, such as inside confined spaces with hazardous environments or outdoors during a heat wave or in subzero temperatures. You can also use these technologies to safeguard workers' long-term physical and mental health and wellbeing, both on and off the job, such as by monitoring and analyzing sleep patterns to detect elevated levels of fatigue or stress.

6. Using AI to Prevent Hazardous Exposures

Use of AI-powered systems to monitor workplace environmental conditions can help ensure compliance with OHS regulations requiring companies to ensure workers aren't exposed to unsafe levels of hazardous chemicals, radiation, noise, heat, cold, and other physical agents. These systems will immediately sound the alarm if exposure levels exceed permissible

limits.

7. Using AI to Improve Incident Analysis & Reporting

Automated AI systems allow you to streamline the investigation, analysis, and reporting of workplace incidents. The capacity to categorize incidents based on severity, cause and impact can also provide a better overview of your current OHS program and identify key safety and compliance details and trends that human analysis and auditing might overlook.

8. Using AI to Improve PPE

Another common application of AI for safety is the use of "smart PPE" with embedded sensors, detectors, data transfer modules, and other technologies that actively monitor and adapt to changing environmental conditions while providing users real-time alerts to detected dangers. For example, smart helmets equipped with a global positioning system (GPS), radio frequency identification (RFID), ultra-wideband (UWB), and around-view monitor (AVM) sensors that monitor workers' locations, activities, and environment may provide better protection while working inside confined spaces or near gas lines. Smart boots may also be equipped with AI algorithms and sensors capable of detecting and warning of slippery or uneven surfaces and other slip, trip, and fall hazards in the worker's path.

9. Using AI Bots to Perform Jobs that Are Dangerous to Workers

OHS laws require you to use a "hierarchy of controls" to manage the hazards you identify. At the very top of that hierarchy is, if reasonably practicable, substituting hazardous tasks with safer alternatives. One potential reasonably practicable substitute is using "bots," or automated AI software programs designed to perform specific tasks, to carry out operations that are hazardous to humans, such as handling toxic chemicals, servicing high-energized

electrical equipment or entering confined spaces.

10. Using AI Drones to Monitor or Inspect Work Sites

OHS coordinators can use drones embedded with video cameras, GPS, sensors, communication equipment, and AI algorithms that fly over a work site and relay real-time information to perform aerial inspections and monitoring to ensure that all required safety measures and procedures are being properly implemented. Using drones instead of workers to inspect equipment or conditions in elevated surfaces or spaces may also be an effective way to minimize vertical fall hazards.

11. Using AI to Enhance Safety Training

AI has become a valuable tool for safety training, particularly virtual reality (VR) technologies enabling workers to learn how to handle dangerous equipment or situations via simulation exercises rather than real-life experience. This is especially useful in high-risk industries such as construction, mining, oil and gas production, healthcare, firefighting, and emergency response.

Legal Risks of Using AI for Workplace Safety

For all of its advantages, AI solutions may be expensive and require a significant investment in hardware, software, and training. Another downside of using AI to carry out OHS activities are the potential legal risks.

Product Flaws May Result in Bad Safety Decisions & Higher Risk of Injuries

Pitfall: AI is far from perfect. Use of systems that contain glitches, data that’s incomplete, outdated, or inaccurate, and other flaws may actually increase risks of serious and even fatal injury for which the employer may be liable under OHS

laws.

Solution: Exercise due diligence in selecting AI products and vendors and include language in the purchase contract that protects you against risk of liability for AI-driven decisions:

- Thoroughly vet the AI products you use before you deploy them for any OHS purpose.
- Ensure that the vendor performs rigorous testing and validation of its own products.
- Get the vendor to instruct and train your staff how to use the product properly.
- Require AI vendors to warrant that their product is suitable for your intended safety purposes.
- Require the vendor "to indemnify" you against any liability-related costs you incur as a result of using the product.

Product May Not Comply with Your Province's OHS Laws

Pitfall: Buying AI safety and compliance products off the shelf may be risky to the extent each province has different OHS laws. Thus, for example, monitoring systems designed to keep noise levels at or below permissible exposure limits in one province won't work in another province with stricter PELs. Sites within the same province may also be subject to different standards based on industry. Thus, a product engineered for manufacturing plants in Ontario may be unsuitable for construction, diving, or mining sites in the province.

Solution: Verify that the AI tools you buy meet the specific OHS standards of not only your province but also your

industry. Select vendors that are aware of variance in legal requirements and prepared to engineer their product to meet your own specific needs.

Data Gathering & Monitoring May Violate Privacy

Pitfall: Wearables, facial recognition systems, surveillance cameras, and other AI tools gather protected information about workers that it's illegal to collect, use, or disclose without consent. Ditto for systems that analyze large volumes of personal data.

Solution: Have the vendor warrant that the product complies with the *Personal Information Protection and Electronic Documents Act* (PIPEDA) and other personal privacy laws and that it has robust security protocols to prevent unauthorized access or misuse of sensitive data. If you're in Ontario, you may also have to create a written policy disclosing the AI monitoring systems you use, why you use them, the data they collect, and how you use that information.

Biased AI Algorithms May Result in Discriminatory Safety Decisions

The data built into AI algorithms may incorporate the subtle prejudices and biases of the human beings that supply it. So, relying on these products to make safety decisions may lead to inadvertent discrimination against the individuals those decisions affect. For example, a company may single out a worksite with high numbers of black workers for stricter disciplinary rules based on an AI tool with skewed data that disproportionately flag black workers as more likely to engage in unsafe behaviour.

Solution: Select vendors who take active measures to detect and eliminate potential algorithmic bias in their products such as performing regular end-to-end systems testing to ensure that algorithms are similarly predictive across

different races, sexes, etc., and capable of making necessary adjustments to correct for any disparities they detect.