Safety Hazards

Introducing New Technology at the Workplace

On this page

Why should a workplace care about how new technology is introduced?

What hazards could be introduced by new technology?

What should be considered before introducing new technologies in the workplace?

What is the ALARA principle?

Why is it important to involve workers?

Why should a workplace care about how new technology is introduced?

With recent technological advances, organizations are increasingly adopting new machinery and processes. From additive manufacturing and artificial intelligence to augmented reality and robots, cutting edge technologies are becoming more and more common.

New innovations can be beneficial in many ways, such as increasing productivity, decreasing waste, and reducing harm. However, new innovations also have the potential to introduce new hazards and risks, such as new chemical and physical hazards, or hazards related to changing cognitive, physical, and performance demands on workers.

Introducing new devices to a workplace can also place additional psychosocial demands on workers, especially if the introduction could drastically change how their work is performed or if the new technology feels unfamiliar.

While these technologies may be new, we can use established health and safety techniques to make sure their introduction does not create new hazards and is beneficial to everyone in the workplace.

What hazards could be introduced by new technology?

When used appropriately, technological innovations could improve workers' health and safety by monitoring and reducing hazard exposure, and by increasing the detection of leading indicators and early symptoms. At the same time, it is important to consider whether the technology could create any new hazards.

Hazards that could be introduced by emerging technologies include:

New chemical and biological hazards: for example, raw materials and waste generated by additive manufacturing (i.e., 3D and 4D printing, bio-printing, etc.) could introduce new hazards.

New ergonomic hazards: automation of processes could introduce a new work pace or make work more repetitive and less diversified, increasing the potential for repetitive strain injuries. New assistive technologies could tempt workers to take greater risks, such as lifting heavier loads, increasing the potential for musculoskeletal injuries.

New physical hazards: exposure to noise or vibration from working alongside new technologies.

New psychosocial hazards: artificial intelligence and wearable sensor technologies that monitor and manage workers could result in increased micromanagement, performance pressure, competitiveness, social isolation, and decreased privacy and trust. Workers may also fear being replaced if they cannot keep up with automated or robotic technologies. Jobs may lose variety and become less satisfying because of automation. These experiences could increase anxiety, disengagement, stress, or job insecurity.

New safety hazards: machines that work closely with workers such as collaborative robots, exoskeletons, or autonomous vehicles could result in impact, entanglement, or trapping hazards if they malfunction or break down. Awareness of surroundings could also decrease while using virtual or augmented reality technologies, increasing the potential of incidents such as slips, trips, and falls.

What should be considered before introducing new technologies in the workplace?

To make sure new machinery, devices, or processes do not introduce new hazards to the workplace, assess all potential hazards and risks and develop appropriate control measures.

Identify hazards and assess risks

The goal of assessing hazards and risks is to answer the following questions:

Workers can be a very valuable resource for hazard and risk assessment. See below for more information.

This assessment can be part of a pre-operation inspection before allowing the new technology to be used in your workplace.

To learn more about hazard and risk assessments, see our OSH Answers factsheets on Hazard and Risk, Hazard Identification, and Risk Assessment.

Develop and implement control measures

The goal of developing control measures is to answer, “How can we eliminate or minimize the identified hazard sources or reduce the likelihood and severity of the consequences?”

When developing control measures, guidance can sometimes be found in health and safety legislation, standards, and industry good practices. For example, occupational exposure limits for airborne chemical concentrations can help the workplace determine whether control measures are needed to reduce exposure to new hazardous products.

Sometimes there may not be a lot of information about the hazards identified, especially when the technology or device is on the cutting edge. In this situation, workplaces can apply the ALARA principle (see below for more).

No matter the amount of information available about the hazard, it is always important to follow the hierarchy of controls . This hierarchy help workplaces prioritize control methods from the most effective level of protection to the least effective level of protection.

No matter the type of control measure, worker education and training on how to conduct their work safely helps to minimize the risk of exposure and is a critical element of any complete workplace health and safety program. Training must cover not only how to do the job safely, but it must also ensure that workers understand the hazards and risks of their job. It must also provide them with information on how to protect themselves and co-workers.

To learn more, see our OSH Answers fact sheet on Hazard Control.

What is the ALARA principle?

The ALARA principle, or “as low as reasonably achievable”, means that exposure should be eliminated or reduced as much as possible. You may also see this principle as ALARP, “as low as reasonably practicable”. Reasonably practicable has been described by the Labour Program (Canada) as taking precautions that are not only possible, but that are also suitable or rational, given the situation.

ALARA is generally used when:

- Exposure limits for a hazard have not been established yet.
- It is not possible to establish an exposure limit under which exposure would not likely cause harm (e.g., carcinogens and ionizing radiation).

Since health and safety requirements for new technologies need time to develop, exposure limits and best practices are sometimes unavailable. When this is the case, workplaces should follow the ALARA principle to make sure hazards are addressed as much as possible.

Why is it important to involve workers?

One of the fundamental principles of health and safety is matching the job to the worker (i.e., ergonomics). In other words, designing tasks and environments with the worker in mind. Workers have direct knowledge of the details of each task and process on the front line. Involving workers in the process of introducing new technologies can help identify the tasks that are best suited for technology and reduce the chance of creating new health and safety hazards.

Workers' perception, understanding and trust will influence how they interact with emerging technologies. If perception, understanding and trust in emerging technologies are poor, workers may avoid using them. Involving workers in hazard and risk assessment can encourage positive curiosity and foster trust and acceptance of the new machinery or process. For example, drop-in sessions to learn about the new technology and provide feedback can encourage workers to approach the introduction with curiosity instead of fear.

Before consulting workers, it is important to determine what is possible within available resources and technological limitations. Facilitating discussions with "what is possible" in mind can help manage expectations and increase the likelihood for worker input to result in tangible contributions. When workers feel they have meaningful input into their work they are more likely to be engaged, have higher morale, and take pride in their organization. This feeling, in turn, increases the willingness to make an extra effort when required.

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