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IRSST and IWH News

Machine safety—eliminating mechanical hazards • New tool to evaluate OHS programs • OHS Q&A

Research Report features news on projects and publications from two internationally recognized research organizations, Quebecís Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST), and Ontarioís Institute for Work & Health (IWH).

Eliminating Mechanical Hazards

A new guide published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST) describes methods for eliminating mechanical hazards at source and ways to protect against them by using fixed guards.

"Any improvement to a machine's safety," explains IRSST researcher Laurent Giraud, author of the guide, "supposes a good risk management procedure which involves two major steps: risk assessment and risk reduction."

The risk assessment includes a risk analysis, followed by a risk evaluation. A risk analysis has three steps:

- determining the limits of the machine. This step aims at establishing the limits of the risk assessment. At the end of this step, one must be able to describe the conditions in which the machine will be used: who will use it, for how long, with what materials, etc. This is the moment to establish the machine's life cycle: design, installation, use, unjamming, maintenance, and disposal, foreseeable uses, as well as the users' expected level of experience.
- identifying the hazards. This is one of the most important steps in the risk management process, and it consists of establishing a list of all energy sources, as well as all man-machine interfaces that can affect the health and safety of exposed workers. Examples include moving elements, electrified components, components that are too hot or cold, noise, vibration, visible or invisible radiation, hazardous materials, and awkward positions. All these hazards are then linked to the situations in which workers might be exposed.
- risk estimation. This step consists of comparing the different situations identified, and helps establish priorities.

Finally, the risk evaluation, the last step in the risk assessment process, consists of making a judgement about the estimated risk level. "At this step", continues Dr. Giraud, "one should determine whether the risk is tolerable or not. When the risk is considered intolerable, risk reduction measures must be selected and implemented. To ensure that the chosen solutions fulfill the risk reduction objectives without creating new hazardous situations, the risk assessment procedure should be repeated once the solutions have been applied."

The other major step in risk management is risk reduction. "Once the risk assessment step has been completed, one needs to take into account if the evaluation prescribes a reduction of the risk. The first and the most important step in the risk reduction process consists of implementing safe design measures." According to Giraud, a good designer tries to improve the machine's characteristics by

- creating a gap between the moving components to suppress trapping zones
- eliminating sharp edges
- limiting the drawing-in forces
- limiting the levels of the moving components.

"When we speak of energy levels we mean mass, velocity, and acceleration," adds Giraud.

A good way of reducing exposure to a hazard is to prevent access by installing a guard. Ideally, it is *fixed* and a tool must be used to remove it. However, a guard may have to be opened for periodic access to the danger zone; for example, for production, unjamming or maintenance purposes. These *movable* interlocking guards or interlocking guards with guard locking must send a stopping signal to the machine as soon as they are opened. If the machine stopping time is short enough for the hazard to stop before the worker can reach it, an interlocking guard is used. However, if the hazard stopping time is longer, an interlocking guard with guard locking is used which, in addition to performing the functions of the interlocking guard, locks the guard in the closed position until the hazard has completely passed.

"If a fixed or movable guard cannot be considered, one must determine if a protective device can be used. A protective device is any safeguard, other than a guard. For example, it can be an optoelectronic protective device, like a safety light curtain or surface detector. It can also be a validation device, a pressure mat, a two-hand control, etc. Usually, these devices are specially designed to reduce the risk associated with a hazardous situation," concludes Giraud.

The risk reduction or distance protection principles presented in the guide are appropriate for most machines. However, before applying generic solutions proposed in this guide for conveyors, metal presses, drills and rubber machines, consult related regulations and standards. The guide covers current protection principles. However, it is not an exhaustive collection of solutions.

To download a copy of *Machine safety — prevention of mechanical hazards*, visit www.irsst.qc.ca/files/documents/PubIRSST/RG-597.pdf. A

French version is available at www.irsst.qc.ca/files/documents/PubIRSST/RG-552.pdf.

Institute for Work & Health

How to Evaluate Your OHS programs

How do you figure out the implications of new OHS programs on your company's resources, such as staff time, health benefits and costs?

A new software tool, developed by IWH takes a step-by-step approach to helping you figure out the financial merits of an OHS program. Delegates attending Health & Safety Canada 2009 had an opportunity to test a prototype of the tool during an interactive workshop.

The tool, with a working name of "OHS Smart Planner," will have different versions for the manufacturing, service and health-care sectors.

"We want to make this tool accessible and easy to use," says project lead Dr. Emile Tompa, a scientist and economist at IWH. "Yet at the same time, it's grounded in economic research in the OHS field, so the final product takes a comprehensive view and is as accurate as possible."

The software tool has a number of features and can be used in various ways. It

- can help you calculate the full cost of a specific workplace incident
- has a database to track all your OHS incidents and costs
- allows you to compare costs and benefits before and after a new program is put in place
- can compare the impact of an OHS program in one work unit with another unit that did not run the program or that ran a different program
- can help calculate the costs and benefits of starting a new program
- prints out summary reports that can be used at meetings and presentations
- has sample scenarios and a glossary of terms

In technical terms, the tool performs an "economic evaluation" of OHS programs. It takes into account all possible costs and benefits, and then does calculations for you. "There are a number of online tools that calculate incident costs, but none does a full economic evaluation the way this tool does," says Tompa.

The IWH team is working in partnership with IAPA, the Ontario Service Safety Alliance and the Workplace Safety and Insurance Board (WSIB) to develop the tool. Development has been supported by grants from WSIB's Research Advisory Council and WorkSafeBC.

It will be available for free in fall 2009 on IWH's website at www.iwh.on.ca. Sign up online for an IWH e-alert to receive news about its release.

Test Your OHS Knowledge

Recent research conducted by IWH provides answers to a number of common questions, as indicated below. Visit www.iwh.on.ca/q-and-a to see the research studies that answered these questions.

1. What kind of OHS support do small businesses need? Small businesses need support that

- respects the often personal nature of working relationships
- accommodates their economic constraints
- recognizes their culture of independence and lack of formal OHS systems/resources
- helps them understand OHS rules and approaches
- tailors information and services to their specific size and sector

2. Which IWH-researched OHS programs are effective and financially worthwhile? Programs that both protect health and save resources include:

- disability management programs across all sectors
- ergonomic and other musculoskeletal disorder (MSD) prevention programs in the manufacturing and warehousing sector

3. Should you consider arm supports to prevent upper body MSDs? Yes. Research shows that providing arm supports for computer and other workstations in a range of job environments can help prevent and manage painful musculoskeletal disorders of the neck, shoulders, upper arms, elbows, forearms, wrists and hands. Arm supports are an important design strategy for reducing muscle loading in the upper extremity.

4. How can you involve workers in MSD prevention? Workers can be involved in preventing MSDs through participatory ergonomics (PE). PE gives workers and supervisors enough knowledge and power to plan and control a good part of their work activities in order to prevent MSDs. PE programs, which have been shown to reduce MSD-related symptoms, days lost from work and workers compensation claims, are more successful when

- PE teams are created with the right mix of members, including workers, supervisors and advisors
- key facilitators of and barriers to putting PE into practice are addressed, such as management support and resources
- the right people in the workplace, beyond those on the team, are involved in the overall PE process
- ergonomics training is provided
- a PE champion is involved to guide and monitor the process
- the responsibilities of those involved in the PE process are defined; these usually include problem-solving, developing solutions and implementing changes
- decisions are made through group consultations

5. Should you use back belts to prevent injury? No. An IWH systematic review of studies on back belts shows that they do not prevent low-back injuries. Indeed, the US National Institute for Occupational Safety and Health (NIOSH) does not support the use of back belts in the workplace. NIOSH's Back Belt Working Group found that using back belts may

- produce some strain on the cardiovascular system
- limit mobility and reduce back muscle elasticity, potentially contributing to injury
- create a false sense of security, increasing the risk of lifting too heavy or too awkward loads

When it comes to MSD prevention, there are usually no quick fixes.

6. How many new workers receive safety training: 2%, 53% or 86%? An IWH study shows that across Canada, only one in five workers—21%—received safety training in their first year with a new employer. In Ontario, the rate was 28%. This was the case even for new workers in high-risk groups, such as young workers or workers in physically demanding jobs. Even though provincial laws mandate safety training for new employees, this training isn't happening.

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TAKING THE NEXT STEP

For a list of IAPA's machine guarding resources, turn to "Sources," page 42.

SOURCES