Equipment & Machinery

INCIDENT

A 20-year-old temporary worker, was killed August/2019 on his first day on the job when he was crushed by a palletizer machine. OSHA cited Bacardi Bottling with 12 alleged OSHA violations.

Davis was an employee of a temporary staffing service, Remedy Intelligent Staffing, which is contracted by Bacardi Bottling to provide workers for certain jobs. OSHA requires that employers protect the health and safety of all workers under their supervision and control, even temporary workers who are employed by other companies.

“A worker’s first day at work shouldn’t be his last day on earth,” said Assistant Secretary of Labor for Occupational Safety and Health Dr. David Michaels. “Employers are responsible for ensuring the safe conditions of all their employees, including those who are temporary.”

Bacardi sent a statement to EHS Today that says, in part, “As a family-owned company with a long history of operating as an industry leader in workplace safety, Bacardi takes seriously any accident and continues to extend its sincerest condolences to the family. Always looking to improve in safety measures and operational performance, Bacardi conducted additional employee re-training on lockout/tagout procedures, updated safety policies and procedures, and completed a thorough review of all equipment in order to prevent such an accident from happening again.”

Davis was cleaning glass from under the hoist of a palletizing machine when an employee restarted the palletizer. Bacardi Bottling had failed to train temporary employees on utilizing locks and tags to prevent the accidental start-up of machines and to ensure its own employees utilized procedures to lock or tag out machines. Proposed penalties for the willful and serious violations total $192,000.

Bacardi said that it worked with OSHA following the incident and “took immediate steps to correct any noted safety concerns identified by the inspector, rather than waiting until after the final report was issued … The company shares with OSHA the common goals of well-trained employees and safe workplace conditions.”

Two alleged willful citations have been issued for failing to develop, document and utilize lockout/tagout procedures for the control of potentially hazardous energy and train temporary workers on lockout/tagout procedures. A willful violation is one committed with intentional knowing or voluntary disregard for the law’s requirements or with plain indifference to worker safety and health.

“We are seeing untrained workers – many of them temporary workers – killed very soon after starting a new job. This must stop,” said Michaels. “Employers must train all employees, including temporary workers, on the hazards specific to that workplace – before they start working. Had Bacardi done so, this tragic loss of life could have been prevented.”

OSHA also cited Bacardi for nine alleged serious violations for exposing workers to trips, struck-by and fire hazards where fixed permanent conveyors crossed through the aisle; obstructing exit routes; exposing workers to falling bottles and debris from overhead conveyors and electrical shock hazards. The employer also failed to provide an adequate number of lockout/tagout devices to perform lockout/tagout procedures of energy sources on various equipment, conduct an adequate periodic review of the energy control procedures, perform servicing and maintenance on machines and equipment without training in the methods and means for energy isolation, and require workers to wear safety goggles and long sleeves when using air guns at 90 pounds per square inch. A serious violation occurs when there is substantial probability that death or serious physical harm could result from a hazard about which the employer knew or should have known.

NEED TO KNOW

Machines need to move to perform their tasks. Whether it’s a conveyor belt carrying raw material to a mixing tank, power presses bending sheet metal or a drill press punching holes in a piece of wood, they all operate by movements that cause a serious risk to workers.

The risks occur because workers sometimes put their hands or other body parts in the point of operation, get caught in between two moving parts or fail to use proper safety procedures to clear a jammed machine. Not a day goes by when someone isn’t killed by moving machinery or suffers a serious injury like an amputation because they got too close or didn’t follow basic safety procedures.

Working with machinery and equipment is always hazardous. But workers are especially at risk when they try to troubleshoot machinery that isn’t working properly. And troubleshooting is a common task in many workplaces. So given its inherent hazards, it’s important that you have a troubleshooting policy to ensure that workers can safely address machinery issues.

The potential hazards, and include:

Safety hazards

- Contact with moving parts
- Contact with electricity, heat, fire, cold, and other energies
- Contact with pressurized gas or liquid

Health hazards

- Contact with harmful chemicals or biological hazards
- Contact with harmful noise, radiation, and/or vibration
- Exposure to ergonomic or MSD hazards
- It’s a simple fact: Machines need to move to perform their tasks. Whether it’s a conveyor belt carrying raw material to a mixing tank, power presses bending sheet metal or a drill press punching holes in a piece of wood, they all operate by movements that cause a serious risk to workers.
- The risks occur because workers sometimes put their hands or other body parts in the point of operation, get caught in between two moving parts or failure to use

proper safety procedures to clear a jammed machine. Not a day goes by when someone isn't killed by moving machinery or suffers a serious injury like an amputation because they got too close or didn't follow basic safety procedures.

Mechanical Equipment Failures That Cause Workers to Suffer Long-Term Injuries or Death

Employers are increasingly using mechanical equipment and tools to increase productivity. While this can reduce the amount of manual labor some workers must perform and reduce the types of injuries workers once suffered, mechanical equipment and tools can be dangerous. Workers can suffer debilitating injuries or deaths when machinery and smaller tools fail or malfunction.

Reasons for Equipment, Machinery, and Tool Failures

Mechanical failure of equipment, machinery, and tools can involve many problems, such as misalignment of parts, power surge overloads, broken gear sets, chips or breaks of parts, and oil contamination. In some cases, the breakdown of a part can cause further damage to the machinery and lead to its malfunction and a worker being injured. There are many reasons why equipment fails and causes accidents including:

- **Wear and tear.**Parts in machinery and tools will wear down over time due to their constant use. At some point, they must be replaced due to wear and tear. When employers fail to replace them due to the cost, they will malfunction—sometimes repeatedly if only minor repairs are done.
- **Defective design or manufacture.**In some cases, the machinery, equipment, or tools were designed or manufactured improperly. If the defect is serious enough, it can cause a catastrophic workplace accident if the machinery malfunctions or breaks down.
- **Lack of training.**Workers must be trained in the safe use of heavy equipment, like forklifts, bulldozers, and other heavy machinery and equipment, before using them on the job. Even drills, power saws, and other power tools can be extremely dangerous if workers use them without training in their safe use. Many tragic accidents occur when employers do not take their workers' safety seriously and do not invest the time to properly train their employees.
- **Improper maintenance.** Employers have a duty to inspect, repair, and replace machinery, equipment, and tools on a regular basis. Unfortunately, many employers do not do this, which can result in a tragic workplace accident.
- **Operator error.**Many accidents occur when operators of equipment and machinery make errors or engage in negligent actions. This can lead to their own injuries or the injuries of others, such as when a heavy machine operator hits a nearby worker.
- **Third-party negligence.**In some cases, a third party, such as a sub-contractor or supplier, may have provided the machinery, operated it, or maintained it and may have caused an accident due to negligence. For example, a sub-contractor's employee could cause an accident using a forklift or crane on a construction site that leads to other workers' injuries.

BUSINESS/ REGULATIONS

Workplace machine safety law in Ontario is based on the Occupational Health and Safety Act (OHSA). Regulations specified under the Act that are applicable to specific workplaces.

In the Act, the sections dealing with responsibilities of employers (s.25), supervisors (s.27) and workers (s.28) set out general duties with respect to machine safety.

Moving machine parts create workplace hazards and potential machinery-related injuries, making machine guards vitally important. Machine safeguarding **can help you protect workers from preventable injuries.**

OSHA's requirements for machine guarding are found in **29 CFR 1910 Subpart O**, **Machinery and Machine Guarding.** The regulation is broken down into these components:

1910.211 – Definitions 1910.212 – General requirements for all machines 1910.213 – Woodworking machinery 1910.214 – Cooperage machinery [Reserved] 1910.215 – Abrasive wheel machinery 1910.216 – Mills and calendars in the rubber/plastics industries 1910.217 – Mechanical power presses 1910.218 – Forging machines 1910.219 – Mechanical power-transmission apparatus

General requirement 1910.212(a)(1) states that one or more methods of machine guarding must be used to protect operators and other employees from hazards, including those created by point of operation, in-running nip points, rotating parts, flying chips and sparks.

Hazardous Mechanical Motions and Actions

Identifying hazards is the first step toward protecting workers and promoting safety in the workplace.

Federal Law Mandates

Under federal law, you are entitled to a safe workplace. Your employer must provide a workplace free of known health and safety hazards. If you have concerns, you have the right to speak up about them **without fear of retaliation**. You also have the right to:

- Be trained in a language you understand
- Work on machines that are safe
- Be provided required safety gear, such as gloves or a harness and lifeline for falls
- Be protected from toxic chemicals
- Request an OSHA inspection, and speak to the inspector
- Report an injury or illness, and get copies of your medical records
- See copies of the workplace injury and illness log
- Review records of work-related injuries and illnesses

STATISTICS

Employee exposure to unguarded or inadequately guarded machines is prevalent in many workplaces. Consequently, workers who operate and maintain machinery suffer approximately 18,000 amputations, lacerations, crushing injuries, abrasions, and over 800 deaths per year.

Occupational Safety & Health Administration (OSHA) nominated OSHA's top ten cited violations in 2017. Machine guarding was NO.8 on this not so famous list with 1.933 violations. In 2018, machine guarding was NO.9.

A lack of machine safeguarding also held the dubious distinction of making the list of OSHA's ten largest monetary penalties for the year – not once but four times. In fact, the largest proposed monetary penalty, a staggering $2.6 million (USD), arose from an incident where a worker was crushed to death while clearing a sensor fault in a robotic conveyor belt.

According to the most recent Bureau of Labor Statistics data, manufacturing plants reported approximately 2,000 accidents that led to workers suffering crushed fingers

or hands, or had a limb amputated in machine-related accidents. The rate of amputations in manufacturing was more than twice as much (1.7 per 10,000 full-time employees) as that of all private industry (0.7).

There was an average annual decrease of 2.8% in overall machine-related fatality rates from 1992 through 2010. Mobile machine-related fatality rates decreased an average of 2.6% annually and stationary machine-related rates decreased an average of 3.5% annually. Groups that continued to be at high risk included older workers; self-employed; and workers in agriculture/forestry/fishing, construction, and mining.

RECOMMENDATIONS

Identifying and controlling the hazards of operating and maintaining equipment or machinery is the start of the process to reduce and eliminate serious injury or death in equipment / machinery operations.

The following are five **Recommendations** safety checklist.

1. **Employer Responsibilities:**

- Have a copy of the machine or equipment operator’s manual available for your workers to read and ensure they have read and understood it.
- Ensure workers who operate mobile equipment are properly trained and competent.
- Ask yourself: Have you provided adequate instruction and information to your workers on how to properly operate the equipment or machine?
- Ensure all machines or equipment are in good working condition and ready for operation.
- Ensure all machine shields and guards are in good condition and safety labels are on the equipment.
- Maintain your equipment as per the manufacturer’s instructions (i.e., clutch, brakes, steering).
- Ensure all equipment has a roll-over protective structure (roll bar).
- Confirm equipment brakes are working well in both directions (forward and reverse).
- Confirm all equipment requiring seatbelts have one in good working order.
- Check that the machine has guards where moving parts could injure workers.
- Ensure lock-out procedures are clearly posted and followed.

2. **Worker responsibilities**

- Wear proper foot protection.
- Wear eye and hearing protection.
- Regularly apply sunscreen in accordance with instructions, or wear sun-protective clothing.
- Ensure all clothing is close-fitting, and secure long hair with a hat or some other means.

3. **Pre-operational safety checks**

- Locate and ensure you’re familiar with all machine or equipment operations, controls, and lock-out procedures.
- Ensure all equipment or machine shields and guards are fitted, secure, and functional. (If any machine parts are missing or in need of repair, do not operate the equipment.)
- Read the operator’s manual and review the safety labels attached to the equipment before installing or using power take-off equipment (PTO). (If labels on equipment are missing, affix new labels before using it.)
- Use only implements that meet the specifications listed in the machine operator’s manual.

- Keep records of your pre-operational checks.
- Ensure someone knows where you are, what you will be doing, and when to expect you back.

4. **Operational safety checks**

- Ensure your roll-over protective structure (roll bar) on the machine is in the up position.
- When operating machines, fasten your seatbelt before you move the equipment.
- Operate the machinery using a lower speed, unless the operator's manual specifically states that it's safe to use the higher speed.
- Keep all bystanders away from powered equipment and machines.
- Assess the machinery by walking around the operating equipment.

5. **Ending operations and cleaning up**

- Ensure you shut down, disengage any powered equipment, and shut off the machine engine once you're done work. Remember to remove and take the keys with you before leave.
- Keep warning labels clean and free from obstructing material. Replace damaged or missing labels with new labels available from the equipment supplier.
- Wait until all moving components have completely stopped before getting off equipment or connecting, disconnecting, adjusting, cleaning, or servicing any powered equipment.
- Keep the work area safe, clean, and tidy.

6. **Check-lists**

- Pilots must go through a **pre-flight checklist** which helps ensure the safe operation of the airplane and checks that the emergency response system is ready to be used.

The same type of check should be done before operating any machinery or equipment

One kind of pre-work check is known as the circle check for vehicles. Here are examples of how it is accomplished.

- Walk around the equipment and check for any signs of problems. In the case of a motor vehicle for instance, check to make sure tire pressure is adequate, lights and turn signals are working correctly, there is sufficient oil, fuel, and battery fluid, and windows are clear/clean.
- Another type of circle check is useful before starting up any vehicle. Walk around the vehicle, but this time look over the surroundings. Make sure there is nothing you will strike when the vehicle begins to move, such as another vehicle, a child playing behind the vehicle, or an overhead obstruction such as a power line. This type of circle check is especially important if you must back up.

1. Make sure it will not cause danger to another person when you start the machinery. If anyone is doing repairs or adjustments on the equipment it should be labeled with lockout-tagout information, and the power should be disconnected.
2. Check over the machinery for any signs of wear or damage which could affect safe operation. In the case of office equipment, you would pay particular attention to the condition of electrical cords and connections.
3. Make sure machine guards are in place and functioning correctly.
4. When examining machinery prior to start up, use only a safe source of light. For example, never check a vehicle battery while using a match for light—you could be injured in an explosion.

5. Check yourself. Are you wearing the appropriate Personal Protective Equipment (PPE)—such as eye protection when using a power tool?

PREVENTION

1. **TRAINING/INFORMATION**

Training is required to use work equipment

Training must be sufficient to ensure that all people know how to competently use any equipment they use at work, without unnecessary risks to the health and safety of themselves or others. Training therefore depends on the task, and to what extent an employee already has relevant knowledge and experience. Individual training needs are likely to be greatest when a person is first recruited, although further training may also be required in any of the following examples:

- if the work task and its associated risks change;
- if new technology or equipment is introduced; and
- if the system of work changes

In many industrial sectors, there are well-recognized standards for training, whether delivered in-house or by external providers. These are often accompanied by some form of competence assessment to help ensure minimum standards of attainment. However, for many simple tasks, on-the-job training, which is locally assessed and backed up with simple records, will suffice. There will also be a need for refresher training to ensure that skills don't decline. Again, the nature and frequency of refresher training should be sufficient to ensure ongoing health and safety, so far as reasonably practicable.

To be appropriately trained to prepare and check work equipment, doesn't always mean formal, certificated training. Often the work to prepare or check equipment prior to use can be carried out following manufacturer's instructions using basic skills and common sense. However, for certain types of equipment, there are well-recognized industry schemes that cover, for example, the mounting of abrasive wheels. There are also certain equipment-specific legal requirements.

Information Needed in Use of Work Equipment

Any worker who uses or operates work equipment, or any other person who may be affected by the use of the equipment, **must be made aware of the hazards involved**.

Any person using work equipment must be **properly trained** in the safe use of the equipment or machinery. There should also be **proper supervision** and **inspection of the use of work equipment** to ensure that safety procedures are followed correctly.

Risk assessments:

Before any work equipment or machinery is used or installed a risk assessment must be carried out. The purpose of the risk assessment is to identify the hazards and risk of injury that may arise when using the work equipment. The risk assessment should also identify ways in which the hazards and risk may be eliminated or reduced.

1. **Hazards**

There are many ways in which work equipment and its use can create a risk of injury. The most common hazards are:

- **Entrapment**– for example when fingers are caught in the moving parts of a machine

- **Impact**– when workers are crushed by moving parts of equipment or by other items being processed by a machine
- **Contact**– when the body comes into contact with sharp edges, hot parts or live electrical items
- **Entanglement**-when clothing, hair or jewelry become caught in parts of a machine
- **Ejection**– when workers are hit by parts or objects flying out or off machines

1. **Maintenance**

Maintenance work should only be undertaken by those who are competent to do so, who have the necessary knowledge and experience to:

- know what to look at
- know what to look for
- know what to do, and
- be aware of, and able to avoid, unnecessary risks to themselves and others

In some cases, workers undertaking maintenance on certain types of equipment should have specific training which is relevant to that work (eg where they may encounter asbestos).

1. **Employers have the duty to provide suitable work equipment that is well designed and suitable for the job.**

When selecting new work equipment employers should:

- obtain full information about the safe use of the equipment
- ensure that the equipment has a CE safety mark to show that it complies with standards
- arrange adequate training for using the equipment

1. **Inspections**

Employers, you are legally required to provide safe equipment for use in connection with your work. Where the safe of equipment depends on the installation conditions or is exposed to conditions causing deterioration liable to result in dangerous situations, you must inspect your equipment to identify whether it can be operated, adjusted and maintained safely. Doing this on a regular basis can help you detect any deterioration and take action before it results in any health and safety risk.

Inspection frequencies depend on the type of work equipment, its use and the conditions to which it is exposed. This should be determined through:

- risk assessment, taking full account of any manufacturer’s recommendations
- the advice of others, such as trade associations and consultants
- other sources, such as published advice on health and safety

Different types of inspection include:

- quick checks before use (eg the condition of electric cables on hand-held power tools, functional testing of brakes)
- weekly checks (eg tire pressures, presence of guarding, function of safety devices)
- more extensive examinations, undertaken every few months or longer (eg the general condition of a ladder, close examination of a safety harness, portable appliance testing).

1. **Use of personal protective equipment and clothing:**

This may be necessary when certain hazards from work equipment cannot be avoided. Examples of personal protective equipment and clothing that may be necessary when using work equipment are:

- safety helmets
- gloves
- safety goggles
- ear protectors
- safety footwear
- types of clothing – for instance high visibility garments

Personal protective equipment or clothing must:

- be suitable for the task being undertaken
- give adequate protection against the hazard
- fit properly and comfortably

Here Are A Dozen Basic Machinery Safety Tips:

- Only operate machinery if you've successfully completed the required training and are authorized to do so.
- Know how to stop the machinery before you start it.
- Check to see if the area around the machine is tidy and free of obstructions.
- Wear the required personal protective equipment (PPE), such as safety footwear and eyewear.
- Do not wear loose items including gloves, dangling chains, rings or unrestrained long hair. These could get caught in the moving parts and pull you in.
- Make sure all machine guards are fitted correctly and securely and are maintained in good working order.
- Do not remove or disable machine guards, unless the machine requires repair or maintenance, you are authorized to conduct those repairs or maintenance AND the proper Lockout-Tagout procedures are followed.
- Never attempt to start a machine that has a lockout tag on it.
- Before using the machine, first, ensure that it's working properly. Inform your supervisor if you discover any problems.
- If the machine malfunctions while you are operating it, report the problem immediately to your supervisor and do not continue to use the machine until it has been inspected and determined safe to operate.
- Never place your hands or any other body part in the point of operation or other moving parts.

The essence of providing a safe work place is encapsulated in the **BIG THREE:**

- Training
- Maintenance
- Inspections / Risk assessment