Machine guarding

Crushed hands and arms, severed fingers, blindness — the list of possible machinery-related injuries is as long as it is horrifying. There seem to be as many hazards created by moving machine parts as there are types of machines. Safeguards are essential for protection from needless and preventable injuries.

A good rule to remember is: Any machine part, function, or process that may cause injury must be safeguarded. When the operation of a machine or accidental contact with it can injure you or others in the vicinity, the hazards must be either controlled or eliminated.

It’s very important for guards to remain in place and/or be properly adjusted. As a machine operator, you should know:

- The hazards of the machinery;
- The kinds of safeguards protecting them;
- What to do if something is wrong with a machine safeguard; and
- What protections are necessary when a safeguard is removed.

Where do mechanical hazards occur?

Dangerous moving parts in three basic areas require safeguarding:

- **Point-of-operation** — those are points where work is performed on the material (i.e., cutting, boring, shaping, forming, grinding, etc.);
- **Power transmission** — parts that move energy through the machine (i.e., flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, gears, etc.); and
- **Other moving parts** — these include reciprocating, rotating, and transverse moving parts; feed mechanisms; chips and flying material; sparks; etc.

These classifications often overlap. The key is to understand how the machine operates, identify the hazards, and determine how to appropriately guard for each hazard.

What machinery causes amputations?

Amputations occur most often when using unguarded or inadequately safeguarded mechanical power presses, power press brakes, powered and non-powered conveyors, printing presses, rolling and roll-bending machines, food slicers, meat grinders, meat-cutting band saws, drill presses, and milling machines as well as shears, grinders, and slitters.

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These injuries also happen during materials handling activities and when using forklifts and doors as well as trash compactors and powered and non-powered hand tools.

Besides normal operation, the following activities involving stationary machines also have the potential for amputation hazards:

- Setup/threading/preparation for regular operation of the machine;
- Clearing jams or upset conditions;
- Making running adjustments while the machine is operating;
- Cleaning of the machine;
- Oiling or greasing of the machine or machine pans;
- Scheduled/unscheduled maintenance; and
- Locking out or tagging out.

Follow machine operation safety rules
Understanding how a machine operates is the first step in understanding how machine guarding provides protection. Always follow all of a machine’s operating instructions, and don’t attempt to operate a machine until you’ve received training. You may have to observe and learn from an experienced machine operator before you can safely operate equipment on your own.

Review safe work practices
It isn’t enough to know the hazards and the machine’s operating instructions. Be sure to follow established safe work practices to avoid hazards.

Often, tools are used to feed stock into a machine or to hold material in place while it’s being worked on. Using the tool helps keep your hands away from a point-of-operation hazard. Other types of work practice safeguarding aids include using awareness barriers (chains, warning lights, alarms, safety signs, etc.) and portable protective shields.

Don’t wear loose-fitting clothes, jewelry, torn clothing, shorts, open-toed shoes — or personal protective equipment — that can get caught in a machine’s point of operation. Also, contain long hair that can become entangled in moving machine parts.

If a machine hazard is out of reach during normal operation, additional protection isn’t required. For example, an exposed gear higher than seven feet off the ground might not require shielding because it is too far away from you during normal operation. The same may be true of moving parts shielded from you because they are against a wall and are not accessible. Positioning a machine as a safeguarding option is called guarding “by location.”

Other safeguards must be in place when safe work practices and machine location don’t provide enough protection.

General types of machine safeguarding
Depending on the machinery and hazard, there can be any number of safeguarding options. Machine safeguarding with the following equipment is the best way to control amputations caused by stationary machinery:

- **Guards** — Provide physical barriers that prevent access to dangerous areas. Guards come in three types: fixed (can’t be removed easily — these provide the most protection), interlocked (shut off or disengage power when removed — these are designed to be occasionally removed), and adjustable (adjust for different machine set-ups).
- **Devices** — Stop a machine or prevent it from starting until the operator is in a safe position. These are used mostly for point-of-operation hazards. Devices come in five types: presence-sensing (light, radio frequency, etc.), pullback, restraint, safety controls (tripwires, two-hand trips, etc.), and gates.
- **Automated feeding and ejection methods** — Limit hazards associated with feeding stock into or ejecting material from a machine. These methods come in three types: automatic feed or ejection, semi-automatic feed or ejection, and robotics.

Importance of safeguards
Safeguards are in place to prevent injuries and death. Machines are not safe to operate if any safeguard is missing or damaged. Always report missing or damaged safeguards right away. If a machine has adjustable guards, always make sure they are adjusted properly for the job before you start the machine. Never bypass a safeguard.

Safeguards may only be removed during repair and maintenance activities. Repair workers follow a strict lockout/tagout program to ensure that a machine will not start unexpectedly during repairs or maintenance. Lockout/tagout plays an essential role in the prevention and control of machine-related injuries.

Minor servicing activities that are performed during normal production operations (such as lubricating, cleaning, releasing jams, and making machine adjustments) don’t require lockout/tagout if the activity is routine, repetitive, and integral to the production operation. In this situation, there must be alternative safeguards in place to provide effective protection.
Safety focus: Use of ATVs in the workplace

Over the past 30 years, all-terrain vehicles (ATVs) have grown increasingly popular as a form of recreation and more recently, as a valuable work asset whether it’s in law enforcement, agriculture, construction, oil production, or facilities management. With more than 10 million in use, the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) believe it is important for employers and employees to know the hazards associated with ATVs and how to operate them safely.

Load limitations

Serious injuries and fatalities often result from excessive and unbalanced loads as well as not following safe operating procedures.

According to OSHA, ATVs are engineered for certain operating conditions and for handling specific loads. The cargo (front and rear racks) and passenger weight limits should not be exceeded because it affects the vehicle’s maneuverability and performance.

Further, ATVs are not typically designed to carry passengers, and a common mistake made by operators is to allow a passenger. To effectively steer and control an ATV, the driver often needs to make quick body weight shifts combined with acceleration and braking. A passenger can impair the safe operation and maneuverability of the ATV and the additional passenger weight may exceed the manufacturer’s weight limit.

Terrain and safe operation

One reason employers may elect to use ATVs is that they enable employees to traverse rough terrain and get to remote locations quickly. However, it is very important that operators drive at a safe speed to accommodate the changing terrain (rocks, logs, ditches, and other obstacles) and to reduce the risk of overturning or rolling over the ATV. Traversing a slope also presents a rollover hazard to operators. Rolling over an ATV can result in fatal injuries.

OSHA says that ATVs are specifically designed for off-road use and are not intended to be driven on concrete or paved roads. Injuries and fatalities can occur as a result of collisions with other vehicles and as a result of the difficulty of controlling an ATV on pavement.

OSHA strongly recommends use of personal protective equipment (PPE) when operating ATVs. This includes a DOT-approved helmet, appropriate boots, gloves, and goggles.

Operator qualifications and training

Inexperienced drivers face a higher risk of injury according to the recreational data collected by Consumer Product Safety Commission (CPSC). During the first month of operation, new recreational ATV drivers have an injury rate 13 times higher than the overall average injury rate for ATV operators. Further, the CPSC’s data indicate that almost half the injured drivers had less than one year of experience and one-fourth of the injured drivers had less than one month of experience. The often severe terrain and operating conditions, along with the unique handling of ATVs, necessitate proper training, practice, and experience.

In addition, NIOSH has recommended work practices for the safe use of ATVs in the workplace:

- Wear PPE including a helmet, eye-protection, long pants, and sturdy boots.
- Participate in hands-on training in the safe handling and operation of an ATV.
- Conduct a pre-ride inspection of tires, brakes, headlights, etc., and follow the employer’s maintenance polices for upkeep of the ATV.
- Understand how implements and attachments may affect the stability and handling of the ATV.
- Never exceed the manufacturer’s specified hauling and towing capacity or weight limits and ensure cargo is balanced, secured, and loaded on provided racks.
- Be aware of potential hazards such as trees, ruts, rocks, streams, and gullies, and follow posted hazard warnings.
- Drive at speeds safe for weather and terrain and never operate ATVs on surfaces not designed for ATVs such as paved roads and highways.
- Never permit passengers on the ATV, unless the ATV has an additional seat specifically designed to carry them.
- Never operate an ATV while under the influence of drugs or alcohol.
Skin type, other factors influence your skin cancer risk

**Skin type**
People with certain skin types are at greater risk for skin cancer. There are six skin phototypes, ranging from light to dark. While individuals with lighter skin (types I and II) are at higher risk for skin cancer, those with darker skin (types V and VI) can also get skin cancer. In fact, those with darker skin tend to be diagnosed with skin cancer in its later stages, which often means the cancer is more advanced and potentially fatal.

**Outdoor work**
Construction workers and others who work primarily outside are at high risk for skin cancer. The face, back of the neck, hands, and arms are particularly susceptible to sun damage.

**Certain drugs**
Taking certain prescription or over-the-counter drugs may increase a person’s sensitivity to sunlight and risk for sunburn. These drugs include certain antibiotics, painkillers, acne medications, and diuretics.

**Indoor tanning**
A person can be exposed to dangerous UV rays when using a tanning bed, booth, or sunlamp. As with excessive sun exposure, indoor tanning is associated with an increased risk of melanoma, and basal cell and squamous cell cancer.

**Your car or office**
You may not give a second thought to the risk of sun exposure while inside your car or office, but research shows that skin exposed to sun shining through window glass can lead to significant skin damage over time. In the U.S., dermatologists have noticed more skin damage on the left side of patients’ faces and arms. Likewise, in countries where the driver’s side is on the right, skin damage is more pronounced on that side of the body.

**Other risk factors**
A person’s risk for skin cancer can also be increased by:
- Family history of skin cancer;
- Personal history of skin cancer; and
- History of sunburns, especially early in life.