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# Machine Guarding - Preventing Amputations

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# Machine Guarding - Preventing Amputations

The operation of saws, shears, slitters and power presses can be extremely dangerous, often resulting in injuries that can lead to death or permanent disability. Anyone working around stationary equipment should be able to identify potential amputation hazards. Understanding the mechanical components of machinery, the mechanical motion that occurs at or near these components, and specific worker activities performed in conjunction with machinery operation will help workers avoid injury.

## Injury Rates from Amputation

In 2010 in the U.S., 5,260 non-fatal amputations were reported by private sector. From 2003 to 2008 non-fatal amputations declined over time, with the greatest number of injuries in 2005 (8,450) and the lowest in 2010 (5,260). The incidence rate in 2010 in the U.S. was 6/100,000 full-time workers. The median number of days away from work for those with an amputation was 21 days in 2010.

## Causes of Amputations

The top two sources of amputations are saws and presses, however, shears and slicers are also often the cause. The manufacturing industry comprises approximately 44 percent of all non-fatal amputations. As might be expected, the overwhelming majority of amputations (96%) involved a finger. The industries with the largest number of amputations included production, transportation and material moving, and construction and extraction.

## What are the Hazards

The following types of mechanical components present amputation hazards:

- Point of operation – the area of a machine where it performs work on material.
- Power-transmission apparatus-flywheels, pulleys, belts, chains, couplings, spindles, cams and gears in addition to connecting rods and other machine components that transmit energy.
- Other moving parts-machine components that move during machine operation such as reciprocating, rotating and transverse moving parts as well as auxiliary machine parts.

## Safeguarding Employees

Employees should be trained to recognize, identify, manage and control amputation hazards commonly found in the workplace.

Work practices, such as lockout/tagout, employee training and administrative controls can help prevent and control those hazards. Guarding stationary machinery can be accomplished by utilizing:

**Guard** – they help provide physical barriers that prevent access to hazardous areas. They should be secure and strong, and workers should not be able to bypass, remove or tamper with them. Guards should not obstruct the operator's view.

**Devices** – help prevent contact with points of operations and may replace or supplement guards. Devices can interrupt the normal cycle of the machine when the operator's hands are in the point of operation or withdraw the operator's hands if they approach the point of operation when the machine cycles.

## Training Tips

- Review the employee handout.
- Explain work processes that present amputation hazards. List or demonstrate the machine safeguards that are in place.

For more information:

- See 29 CFR 1910 Subpart O—Machinery and Machine Guarding.
- See 29 CFR 1910 Subpart P—Hand and Portable Powered Tools and Other Hand-Held Equipment
- Visit [www.osha.gov/Publications/OSHA3170/osha3170.html](http://www.osha.gov/Publications/OSHA3170/osha3170.html)

# Machine Guarding Preventing Amputations

The operation of saws, shears, slitters and power presses can be extremely dangerous. Often, resulting injuries can lead to death or permanent disability. Employees should be able to recognize and avoid amputation hazards.

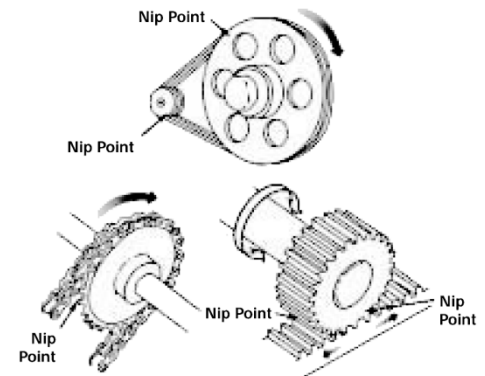
## The Mechanical Hazards

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All mechanical motion is potentially hazardous. In addition to in-running nip points, known as pinch points, which occur when two parts move together and at least one moves in a rotary or circular motion that gears, rollers, belt drives and pulleys generate. The following are the most common types of hazardous mechanical motion:

- Rotating
- Reciprocating
- Transversing
- Cutting
- Pinching
- Shearing
- Bending



## Guarding Requirements

The purpose of machine guarding is to protect the machine operator and other employees in the work area from the hazards created by ingoing nip points, rotating parts, flying chips and sparks. Examples of this are barrier guards, light curtains and two-hand operating devices. Machines that expose an employee to injury must be guarded. The guarding device must:

- Conform with any appropriate OSHA standards.
- Prevent the operator from having any part of his/her body in the danger zone during the operating cycle, if specific standards are not available.
- Be attached to the machine, where possible. If the guard cannot be attached to the machine, the guard must attach elsewhere.

Special handtools used for placing and removing material from the point of operation areas must allow easy handling of the materials without the operator placing a hand in the danger zone. Such tools do not replace the guards required by OSHA.



*In-Running Nip Points, also known as pinch points, develop when two parts move together and at least one moves in rotary or circular motion. In running nip points occur whenever machine parts move towards each other or when one part moves past a stationary object.*

Machine Guarding - Preventing Amputations Sign-Off Sheet

The employees of \_\_\_\_\_ Company Name \_\_\_\_\_, have taken part in a training session Machine Guarding - Preventing Amputations. The session covered:

- Operations at this facility which expose to amputation hazards.
- The hazards associated with moving machine parts.
- Work practices used to prevent accidents.
- Machine guards and why they are important.
- Devices and how they work.

DATE OF TRAINING: \_\_\_\_\_

FACILITY: \_\_\_\_\_

EMPLOYEE SIGNATURE

PRINT NAME

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*Supervisor's Signature*