

When operating, maintaining, or setting up fabricating machines or any other machinery or auxiliary equipment, the hands and body of all personnel should never be in the point of operation or any other hazard area. Employees around machinery must be protected at all times. Lockout/tagout energy-isolation procedures must be practiced and enforced.

This comprehensive product catalog offers and illustrates safety control packages, various safeguards, and other safety-related products for updating metal-fabricating (metal-forming) machines to comply with OSHA (Occupational Safety and Health Administration) standards, ANSI (American National Standards Institute) B11-series standards, and the NFPA 79 electrical safety standard. Fabricating machines emphasized include mechanical power presses (punch presses), hydraulic presses, and press brakes; however, numerous items can be applied to metal-cutting machines, robots, etc. If you do not find a product or application that satisfies your needs, please contact us and explain your requirements.

Before an employer (user) purchases and applies any of the products offered in this catalog, a risk assessment and/or a hazard analysis of your machinery and equipment must take place. This ensures correct decisions on the proper safety controls and safeguards to be used. As a supplier, we find that employers can make the best safeguarding decisions based on their maintenance ability, condition of their machines, type of operators, and their present and future production requirements.

As the largest single-source supplier of safety products for machinery, we have the products and knowledge to provide most of the safeguarding equipment recognized by the standards. Please review this catalog for the numerous choices of safeguarding equipment available. We also offer a series of monthly machine safeguarding seminars to educate the employer/user on the safety regulations.

This catalog is arranged so you can make your safeguarding choices quickly and easily. Below is a list of basic safety requirements for fabricating machines.

BASIC SAFETY REQUIREMENTS FOR FABRICATING MACHINES

- 1. SAFEGUARDING:** When safeguarding the point of operation on a fabricating machine, a guard, device, or other method must be used to protect the operator from the point-of-operation hazard. When determining your safeguard, please remember that the sides and back of the point of operation must also be safeguarded to protect the operator and other employees in the area.
- 2. CONTROLS:** Fabricating machines require control reliability of the clutch/brake, pneumatic, and hydraulic control systems. See specific pages in this catalog for details on the safety requirements.
- 3. DISCONNECTS:** All fabricating machines must have an electrical disconnect switch and air lockout capability. The disconnect switch must shut off all electrical power coming to the machine and be capable of being locked in only the off position. Also under OSHA 29 CFR 1910.147 lockout/tagout requirements, this same electrical disconnect can be used for lockout when repairing or maintaining the machine.
- 4. STARTERS:** All fabricating machines with motors must have a starter that will automatically drop out when the control voltage is lost to the machine. To restart the machine when power is restored, someone must start the motor with some type of overt action (for example, pressing the start push button). This prevents the machine from automatically restarting when the voltage is restored.
- 5. COVERS:** All fabricating machines must have mechanical power-transmission apparatuses covered (guarded) if below a 7' level from the floor or working platform. This includes flywheels, gears, sprockets and chains, sheaves and belts, shaft ends, etc. Most covers can be provided by the OEM, or a local fabricator can satisfy this requirement.
- 6. OTHER CONSIDERATIONS:** Auxiliary safeguarding equipment may be required to make fabricating machines as safe as possible. This equipment provides additional protection from injuries for all personnel in the machine area. It is used in conjunction with primary safeguarding devices. Auxiliary equipment includes safety interlock switches which can be used to interlock guarding systems. Safety mats can be used to protect operators and other employees in the machine area. Mats must not be used as primary safeguarding, but they are ideal for using around machines that require extra protection. Die safety blocks satisfy the lockout/tagout requirements for mechanical energy. Hand-feeding tools can be used for feeding and retrieving workpieces from the machine to keep hands out of the point-of-operation hazard. Signs are used to warn of the hazards on a machine.

POINT-OF-OPERATION SAFEGUARDING

Safeguarding for metal-fabricating machines falls into three categories: barrier guards, devices, and other safeguarding methods. The only exception to safeguarding is when the hazardous opening is ¼" or less [OSHA 29 CFR 1910.217(c)(ii)].

Some of the guards and devices described here can be used for auxiliary guarding and for large work-envelope safeguarding. Details can be found in each individual safeguarding section.

BARRIER GUARDS

Barrier guards are designed to prevent entry of the operator's hands or fingers into the point of operation. Please see pages 13 and 14 for detailed requirements.



Combination Fixed and Adjustable Guard on Press

There are four types of barrier guards that can be furnished. They are die enclosure guards, fixed guards, adjustable guards, and interlocked guards. Each of these guards must meet the requirements listed on pages 13 and 14.

SAFEGUARDING DEVICES

According to OSHA 29 CFR 1910.217(c)(i), *Point-of-operation devices* shall protect the operator by:

(a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation (presence-sensing); or

(b) Preventing the operator from inadvertently reaching into the point of operation; or withdrawing his hands, if they are inadvertently located in the point of operation as the dies close (pullbacks); or

(c) Preventing the operator from inadvertently reaching into the point of operation at all times (restraints); or

(d) [Reserved]

(e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands (two-hand trip or two-hand control); or

(f) Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide has ceased (type A gate); or

(g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke (type B gate).

These safeguarding devices fall into six categories. They are:

1. **Presence-Sensing Devices (pp. 45-73)**
2. **Two-Hand Control (p. 74)**
3. **Two-Hand Trip (pp. 75-76)**
4. **Pullbacks (p. 77)**
5. **Restraints (pp. 78-79)**
6. **Gates (A or B) or Movable Barrier Devices (pp. 80-86)**

PRESENCE-SENSING DEVICES

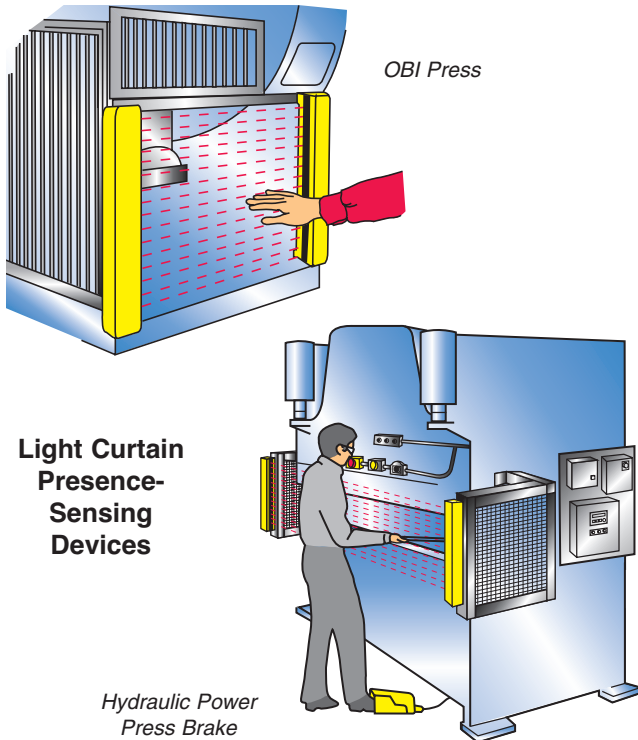
These devices are usually photoelectric light curtains or RF (radio frequency) units.

Presence-sensing devices are one of the most versatile and positive means to safeguard many different types of machines or equipment. When using presence-sensing devices, if an object such as an employee's hand, arm, or any part of their body enters the plane of light or light beams, either the cycle will not start or a stop signal will be given to the machine to stop the hazardous motion. Proper use of these devices provides protection not only for operators but also for other employees in the area. They also minimize operator resistance to these types of safety devices due to their nonrestrictive design.

Presence-sensing devices can be used for many types of applications. They can be used on power presses, press brakes, around robotic work envelopes, injection and compression molding machines, assembly systems, transfer lines, automated equipment, flexible manufacturing systems, assembling machines, tube mills, roll formers, and textile machinery. These devices can be used on any machine where the hazardous motion can stop quickly before an individual can reach the hazard.

(Continued on next page.)

PRESENCE-SENSING DEVICES (continued)



Presence-sensing devices **cannot** be used on full-revolution-clutch presses or on any other machine that cannot quickly stop the hazardous motion. At the time of this printing, they **cannot** be used as a tripping means (PSDI—presence-sensing device initiation) on mechanical power presses. However, PSDI can be applied to other machines, such as hydraulic power presses and press brakes. Please consult the factory for details if this is a consideration.

Each machine safeguarding application can be placed in one of the following categories:

- **Point of Operation**—protects operators from machine point-of-operation hazards where work-pieces or materials are processed.
- **Perimeter/Work-Envelope Safeguarding**—detects entry into a larger area where hazardous motion occurs.

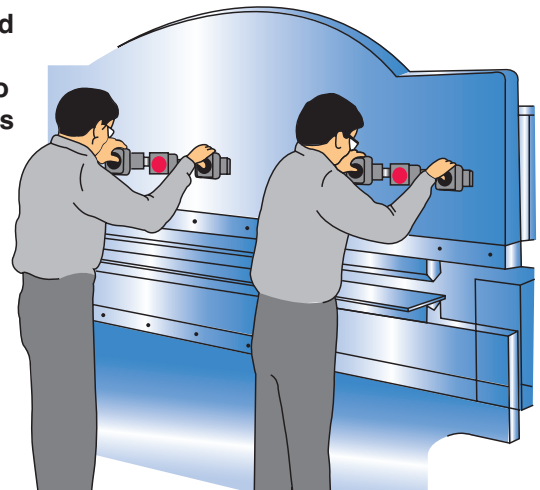
The products and information found in this catalog cover applications for the above types of safeguarding. Please do not consider using a perimeter/work-envelope safeguarding device in a point-of-operation type of application.

Presence-sensing devices used for point-of-operation safeguarding must be installed on a machine so that it protects operator's fingers and hands from point-of-operation hazards. Safety standards also state that "guards shall be used to protect all areas of entry to the point of operation not protected by the presence-sensing device."

TWO-HAND CONTROL

Two-hand control can be used as a point-of-operation safeguarding device as long as the palm buttons are located at the proper safety distance. This means the palm buttons must be located so that the slide has traveled far enough on the down-stroke, or can stop fast enough to prevent the operator from getting into the point-of-operation hazard before the machine can stop. See page 74 for further information on the two-hand control requirements.

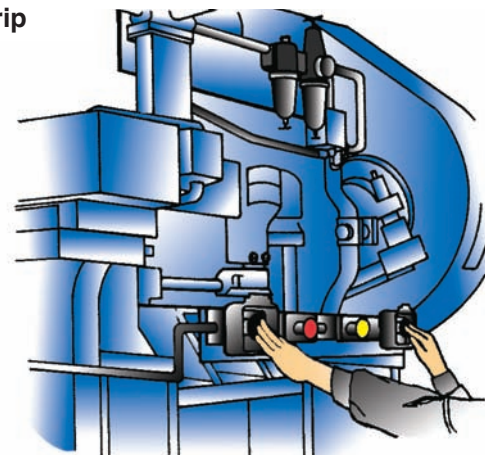
Two-Hand Control With Two Operators



TWO-HAND TRIP

Two-hand trip is similar to two-hand control. It can be used on both part- and full-revolution presses as a point-of-operation safeguard as long as the palm buttons are placed at the proper safety distance. Two-hand trip requires only momentary actuation of the palm buttons. Once these palm buttons have been depressed, they can be released quickly and the machine will make one full cycle. Please see pages 75-76 for further details on using two-hand trip as a point-of-operation safeguard.

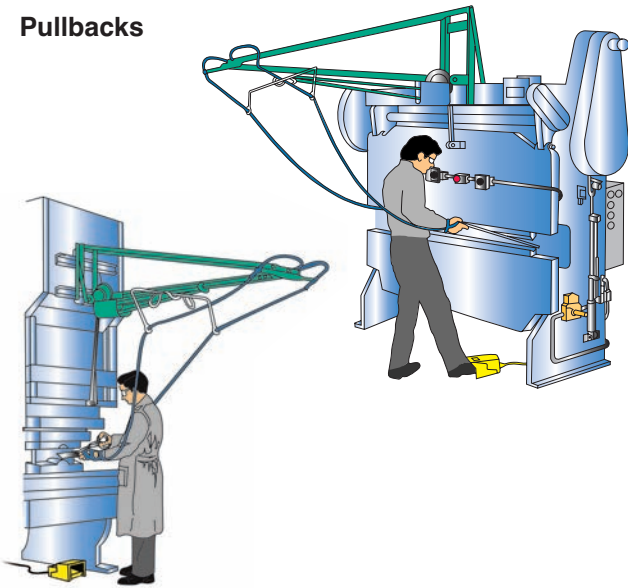
Two-Hand Trip



PULLBACKS

Pullbacks, sometimes referred to as pullouts, are designed to either prevent the operator from ever reaching into the point of operation, or if the hands are inadvertently located in this area, to pull them out before the dies close. Specific requirements include the need for attachments (wristlets) for each of the operator's hands.

Pullbacks

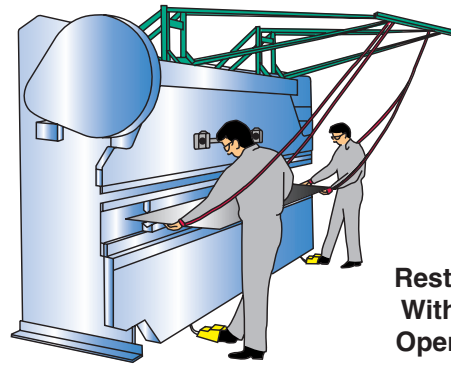


The pullback device is attached to either the slide or upper die. The operator wears wristlets connected to the pullback. The cable on the device can be adjusted to allow the operator to manually feed workpieces into the point of operation before a machine cycle. The pullback device will withdraw the operator's hands from the danger area if the hands are inadvertently left in the hazardous area as the dies close. All operators must have their own pullback. Pullbacks must also be inspected and checked for proper adjustment at the start of each operator shift, following a new die setup, and when operators are changed. If any maintenance or repair is required, it must be accomplished before the machine is operated. Records of inspection must also be kept in accordance with OSHA 29 CFR 1910.217(e)(1), *Inspection and Maintenance Records*.

RESTRAINTS

Restraints, sometimes referred to as holdouts, are anchored and adjusted so that the operator's hands can **never** reach the point-of-operation hazard. Specific requirements include:

1. Attachments (wristlets) are required for each of the operator's hands.
2. Operators should have their own restraint.
3. Inspections must be done on a periodic and regular basis.



Restraints
With Two
Operators

To use a restraint device, the workpiece must be long enough for the operator to hold one end while stamping or bending the other end; if not, the operator must use a hand-feeding tool.

GATES (A OR B) OR MOVABLE BARRIERS

There are two basic types of gates (movable barriers): an A gate and a B gate. The A gate is designed to enclose the point of operation before the press stroke can be started, and it must remain closed until all ram motion has stopped. The following is a typical sequence of operation of a complete cycle on a press which uses an A gate.

1. Initiate the cycle and as long as there are no obstructions, the gate will close by gravity.
2. The machine will make one complete cycle and return to the end of the cycle and stop.
3. The gate will open, **after** the cycle has stopped.

The B gate only protects the operator on the down-stroke of the press ram. The following is a typical sequence of operation of a complete cycle on a press which uses a B gate.

1. Initiate the cycle and as long as there are no obstructions, the gate will close by gravity.
2. Once the machine reaches the portion of the stroke where the pinch point has been eliminated and **before** the cycle has stopped, the B gate and the ram go up at the same time.

According to OSHA, an A gate can be used on either part- or full-revolution-clutch presses. Best safety practice dictates that the A gate should only be used on full-revolution-clutch presses. Both A and B gates can be used on hydraulic presses.



Gates