

# Shear

Mechanical power shears are self-contained machines with a ram that moves a non-rotary blade (knife), at a constant rake, past the edge of a fixed blade to perform shearing or cutoff operations. Shears may be mechanically, hydraulically, hydra-mechanically, pneumatically, or manually powered and are used to perform numerous functions such as squaring, cropping, and cutting to length.

In the basic shear operation, stock is fed into the point of operation between two blades. A hold-down may then be activated that applies pressure to the stock to prevent movement. One complete cycle consists of a downward stroke of the top blade until it passes the lower fixed blade followed by an upward stroke to the starting position.

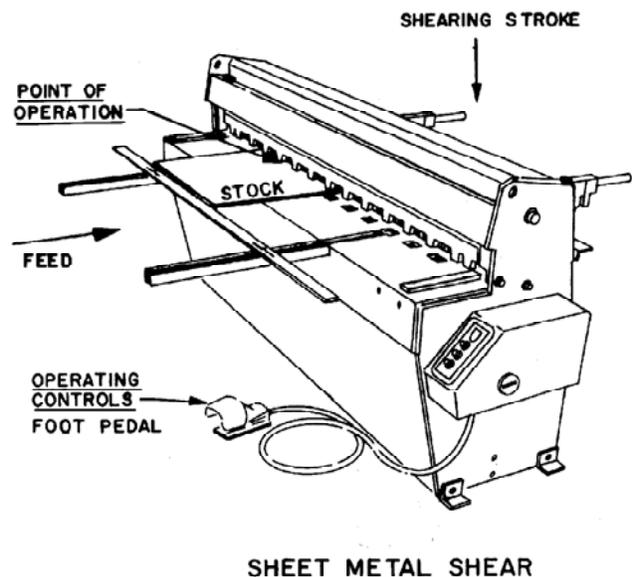
**Operator Involvement.** The operator feeds or places the stock between the blades, sees that it is properly positioned, activates the cutting cycle with foot controls and removes the completed part. A manual operation requires the operator to work in close proximity to the cutting zone to guarantee proper stock placement.

**Hazards:** Primarily an amputation hazard from the shearing action of blade and the crushing hazard from the hold downs. The point of operation consists of both the blade area and the hold downs. Hazards are also created from the pinch points between the ram and any stationary objects of the shear or its auxiliary equipment.

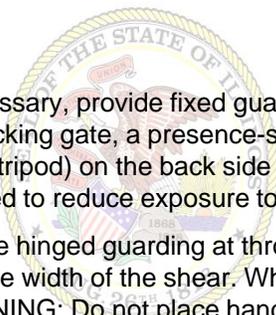
### Safeguarding:

Provide safeguarding. The most common method is to install a fixed or adjustable point of operation guard at the in-feed side to prevent operator contact with the shear's point of operation (POO). Safeguarding devices can also be used in certain situations. **Note** point of operation is the area in the shearing plane between the upper and lower blades and the area beneath the hold-downs. Fixed guarding to comply with the table below.

Point of Operation Guard - Dimensions in Inches		
Maximum Opening Under Guard	Minimum Distance to POO (Hold-down or Blade)	Maximum Openings (Horizontal or Vertical) in the Guard
1/4	1/2	3/8
3/8	1-1/2	3/8
1/2	2-1/2	1/2
5/8	3-1/2	1/2
3/4	5-1/2	5/8
7/8	6-1/2	3/4
1-1/4	7-1/2	7/8
1-1/2	12-1/2	7/8
1-7/8	5-1/2	1-1/4
2-1/8	17-1/2	1-1/4
Over 2-1/8	31-1/2	1-1/4



**References:** 29 CFR 1910.212; ANSI B11.4



If necessary, provide fixed guards on the back side of shears, or install an awareness barrier guard with an interlocking gate, a presence-sensing device (light curtain), or a safety trip control (safety tripwire cable or safety tripod) on the back side of the shear. Rear guarding is not always required; aisle guarding may be required to reduce exposure to non operating personnel.

Provide hinged guarding at throat or gap located at side of shear if used for shearing or slitting material longer than the width of the shear. When guard is removed, instructions warning the operator must be visible. "WARNING: Do not place hands or fingers in this area. Replace guard when not slitting."

### Foot Pedals and Foot Treadles

- ❖ Ensure that springs used for single stroke mechanisms (when furnished), foot pedals and foot treadles are of the compression type, not tension springs.
- ❖ Provide a nonslip pad on contact area (contact area should be greater than 8 square inches) for pedals and foot switches
- ❖ Protect all foot operated controls to prevent unintended operation. For foot switches, a guard will provide the protection. For foot treadles (operating bar that extends the full length of the machine) or pedals (operating lever that can be positioned anywhere along the full length of machine), suggested methods include (1) locking pin for the foot treadle, foot pedal or switch; (2) on/off switch for the foot switch; (3) removal of the foot pedal Foot treadle - the operating bar that extends full length of machine.

Guard all power transmission apparatus - all gears, chains, pulleys and belts.

Provide main power disconnect switch capable of being locked only in the OFF position. Note that a circuit breaker can be used to meet this requirement.

Provide single stroke capability for those machines used in single-stroke operations.

### Safer Work Practices

- ❖ Develop and implement safe operating procedures for shearing machines and conduct periodic inspections to ensure compliance. Safe operating procedures should contain this information:
  - A description of the assigned task
  - The function of controls to be encountered in performing the assigned tasks
  - Hazards associated with the tasks
  - Designated method of feeding
  - Designated safeguarding
  - Methods of function-testing or otherwise assuring the proper function of the shear
- ❖ Instruct employees not to perform activities on the back side of a shear while it is operating or still energized.
- ❖ Require workers to perform servicing and maintenance activities under an energy control program.
- ❖ In event of any failure, malfunction, unusual noise or unsafe condition, stop the machine, disconnect it from its power source and report to your supervisor.

### Case Study

A 37-year-old machine operator was acting as a shear operator's helper. Sheared components had become stuck, so the employee reached under the back of the machine with his hand to remove the parts. The operator did not know the helper was behind the shear, and activated the shear. The helper's right hand received crushing injuries when the new sheared parts mashed his hand against the stuck parts.