

Chapter 3: Hazards Which Require Guarding

As the previous chapter detailed, hazards in a design should be determined early in the design process and dealt with accordingly. Many hazards can be removed through design. Some hazards of products are inherently dangerous. It is these hazards that require guards. Designers should be aware of any moving part that is exposed. Any moving part has the potential to be a hazard. There are three main areas on a machine that present hazards which must be designed away or guarded if there is no design solution. These areas include:

- Point of operation: This is where a machine performs action on a part
- Power train: This includes all moving parts that are acting to transmit power from the power source to the point of operation
- Auxiliary parts: This includes feeding mechanisms and other moving parts of a machine

Product hazards that should be guarded can be broken down into categories of the nature of the hazard.

Nip Points

A nip point is a hazardous area created by two or more mechanical parts rotating in opposite directions in the same plane in close proximity to each part. Examples of nip point hazards can be found on the drive mechanisms of conveyors, gears and pulleys.

These mechanisms are extremely dangerous as a machine operator can get pulled into the machine, causing potential catastrophic body damage.

Pinch Points

A pinch point is any location where a person or part of a person's body can be caught between two or more moving mechanical parts. Examples of pinch points can be found on brake presses, power drills, clamps, and anywhere that a crushing hazard exists.

Shear Points

A shear point is any point where part of the operator can be caught between a moving mechanical part and a stationary part of the machine that create a cutting motion.

Examples of shear point hazards include shear, punch presses, etc.

Point of Operation

The point of operation is the location where work is performed on a part. The point of operation often presents a hazard due to the nature of the mechanical action being performed. Machines that alter and shape metals will have hazardous points of operation, due to the magnitude of forces required for these operations. Guarding of the point of operation is confounded by the required accessibility to the point of operation. Unless a machine has an automatic feeding system, a machine operator will have to position the part in the point of operation. This prevents a solution using fixed guards that guard the point of operation. Any guard that covers the point of operation will have to be accessible and temporarily removable by the user. Guards that protect the user from the point of operation have to be interlocked to prevent tampering. Operator training and instruction is essential to safe operation.

Power Transmission

Power transmission is the system that transfers the energy produced by the power source to the point of operation. Components of the power transmission system transfer power from one mechanism to the next and have inherent hazards. These components include gears, pulleys, belts, clutches, brakes, cams, shafts, rods, and any other component that is transmitting energy in a machine.