

Safety Factsheet: Hazards of Conveyors

Conveyors are used to transport materials horizontally, vertically, at an angle, or around curves. Hazards depend on the type of conveyor, the material conveyed, the location of the conveyor, and how close the conveyor is to workers.

Conveyors eliminate or reduce manual material handling tasks, but they introduce amputation hazards associated with mechanical motion.

Conveyor-related injuries often involve a worker's body parts getting caught in **nip points or shear points** when:

- Cleaning or maintaining a conveyor, especially when it is still operating.
- Reaching into an in-going nip point to remove debris or to free jammed material.
- A cleaning cloth or clothing gets caught in the conveyor and pulls fingers or hands into the conveyor.

Other conveyor-related hazards include improperly guarded gears, sprocket and chain drives, horizontal and vertical shafting, belts and pulleys, and power transmission couplings.

Overhead conveyors warrant special attention because most of the drive train is exposed. Workers have been injured or killed while working in areas underneath conveyors and in areas around lubrication fittings, tension adjusters, and other equipment with hazardous energy sources.

Safeguarding Conveyors

Because conveyor hazards vary, each conveyor should be evaluated to determine what primary safeguarding methods and energy control (lockout/tagout) practices are required.

Some conveyors need mechanical guards to protect workers from *nip points, shear points, and other moving parts*, including power-transmission apparatus. Guards may include barriers, enclosures, grating, fences, or other obstructions that prevent physical contact with operating machine components, such as point of operation areas, belts, gears, sprockets, chains, and other moving parts.

Typical Conveyor Hazards and Safeguarding Methods

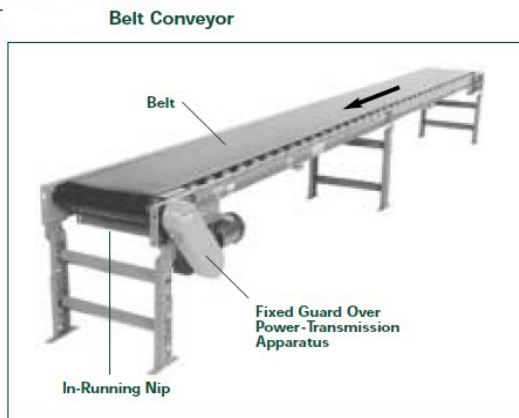
Belt Conveyors

Hazards:

- belt-conveyor drive mechanisms and conveying mediums
- conveyor take-up and discharge ends
- where the belt or chain enters or exits the in-going nip point
- where the belt wraps around pulleys
- snub rollers where the belt changes direction, such as takeups
- where multiple conveyors are adjoined
- on transfers or deflectors used with belt conveyors.

Controls:

- Nip and shear points must be safeguarded.
- Side guards (spill guards) can prevent contact with power-transmission components, in-going nip points, and the conveying medium.
- *Secondary safeguards* include railings or fencing, or safeguarding by distance (location), and hazard awareness devices, such as pre-



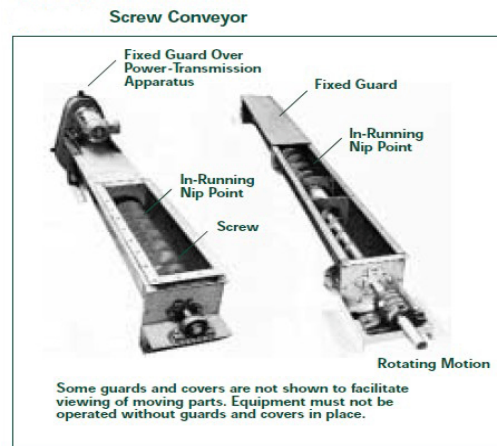
start-up signals and warning signs.

Screw Conveyors

Hazards: Screw conveyors are troughs with a revolving shaft with a spiral or twisted plate. In-going nip points for the entire length of the screw conveyor exist between the revolving shaft and trough. Because the trough may not be covered and the conveyor may be located at or near floor level, screw conveyors can be particularly dangerous.

Controls:

- A screw conveyor housing must completely enclose moving elements (screw mechanism, power transmission apparatus), except for loading and discharge points. Permanently affixed grids or polycarbonate can be installed for visibility purposes to allow the operator to see the operation.
- Alternatively, trough side walls should be high enough to prevent workers from reaching into or falling into the trough.
- If open troughs are used, workers must be protected by secondary safeguarding methods, such as a railing or fence. Feed loading and discharge points can be guarded by enclosures, screening, grating, or some other interruption across the openings which allow the passage of materials but do not



allow entry of a part of the body.

Chain Conveyors

Hazards: Nip points occur when a chain contacts a sprocket. Nip points also occur at drives, terminals, take-ups (automatic take-ups may also have shear points), and idlers. Clothing, jewelry, and long hair may also get entangled and caught in the moving chain conveyor.

Controls:

- Enclose moving chains if possible.
- If moving chains cannot be enclosed without impairing the functioning of the conveyor, barrier guards can be installed around moving parts, or nip and shear points can be eliminated by a guard at the nip point or shear point.
- Other secondary safeguarding options include safeguarding by distance (location) and the use of awareness devices.



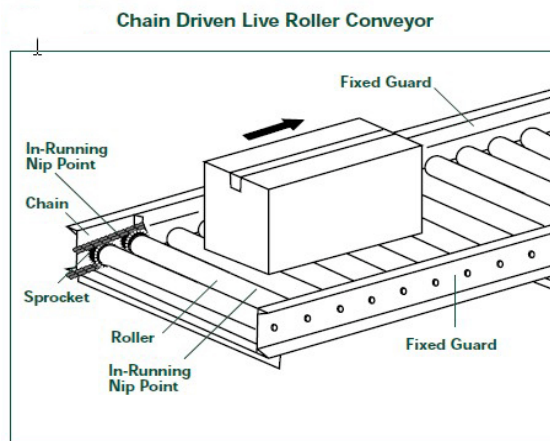
Roller Conveyors

Hazards: Roller conveyors are used to move material on a series of parallel rollers that are either powered or gravity-fed. Powered roller conveyors can snag and pull hands, hair, and clothing into the area between the rollers and the stationary components of the conveyor.

In-going nip points may exist between the drive chain and sprockets; between belt and carrier rollers; and at terminals, drives, take-ups, idlers, and snub rollers.

Controls:

- Enclose roller conveyors if possible.
- Install permanent barrier guards to protect workers from nip and shear points. For example, the unused section of rollers closest to the worker should be guarded when transporting small items on a roller conveyor that do not require the use of the entire roller width.
- Eliminate or minimize projections from the roller through the use of pop-up rollers.
- Other secondary safeguarding options include safeguarding by distance (location) and the use of awareness devices.



Secondary Controls for Conveyors

Secondary safeguarding methods, work practices, and equipment can be used to supplement primary safeguarding or alone or in combination when primary safeguarding methods are not feasible.

Caution - secondary methods are less protective than primary methods.

- Safeguarding by safe distance (by location) — where possible, locate unguarded moving parts away from workers or workers away from unguarded moving parts.
- Use awareness devices such as warning signs or lights.
- Allow only qualified workers to operate or maintain conveyors.
- Visually inspect the entire conveyor and immediate work area prior to start-up to ensure that operation will not cause a hazard.

- Inspect and test conveyor safety mechanisms, such as alarms, emergency stops, and safeguarding methods.
- Install emergency stop devices on conveyors to enable workers to shut off the equipment in an emergency.
- Install only emergency devices that they cannot be overridden from other locations.
- When conveyors are arranged in a series, all should automatically stop whenever one stops.
- Emergency stop controls must require manual resetting before resuming conveyor operation.
- Install clearly marked, unobstructed emergency stop buttons or pull cords within easy reach of workers.
- Provide continuously accessible conveyor belts with *emergency stop cables* that extend the entire length of the conveyor belt to allow access to the cable from any point along the belt.
- Ensure that conveyor controls or power sources can accept a lockout/tagout device to allow safe maintenance.

Adapted from: Safeguarding Equipment and Protecting Employees from Amputation (OSHA 3170-02R, 2007)

