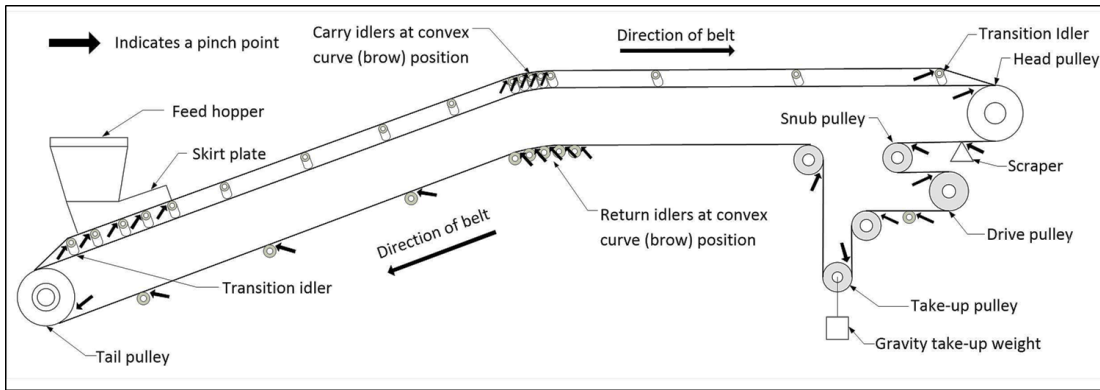


# Belt Conveyor Guarding



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# Agenda

- Pertinent legislations
- Ontario requirements pertaining to conveyor guarding in the workplace in mines and mining plants (Occupational Health and Safety Act, Regulation 854)
- Background and injury statistics
- Conveyor operation hazards and controls
- Summary and conclusion

# **Conveyor Guarding in Mines and Mining Plants**

***Workplace Safety North Mining Conference Workshop***

***April 11<sup>th</sup>, 2019***

## Disclaimer:

*This material has been prepared to assist the workplace parties in understanding their obligations under the OHSA and the regulations. It is not intended to replace the OHSA or the regulations and reference should always be made to the official version of the legislation.*

*While this material may also be available to Ministry of Labour inspectors, they will apply and enforce the OHSA and its regulations based on the facts as they may find them in the workplace. This material does not affect their enforcement discretion in any way.*

## Why is the Ministry of Labour (MOL) participating in a workshop?

- ☐ Between 2012 and 2018, there have been 7 critical injuries, 6 non critical, and 1 fatality related to workers exposed to unguarded running conveyors.
- ☐ Follow up to amendments made in July of 2016 to sections 196 and 196.1 of regulation 854 to improve worker safety around conveyors.
- ☐ To raise the awareness of employers, supervisors and workers about conveyors so that they better understand the risks associated with exposures to unguarded pinch points and running conveyors to reduce or eliminate the hazard

## IMPORTANT NOTE RE: Conveyor Guarding

- ☐ For guidance purposes, this presentation references specific sections of Regulation 854 (Mines and Mining Plants) under the Occupational Health and Safety Act (OHSA) to highlight some key areas of conveyor safety.
- ☐ It is the employer's responsibility to be aware of all relevant requirements that are set out under the OHSA and its regulations.
- ☐ Inspectors will take enforcement action, as appropriate, if they find violations of the OHSA and any of its regulations.
- ☐ Partnering with Workplace Safety North on delivering compliance support to the sector supports the goal of advancing worker safety.

## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

- 196.** (1) No person shall ride on a conveyor belt.
- (2) A conveyor shall have,
- (a) a means to safely apply belt dressing while the conveyor is in motion;
  - and
  - (b) if the conveyor is started automatically, by remote control or if a portion or portions of the conveyor are not visible from the operator's position, a start-up warning device.

## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

**196.** (3) Subsections (3.1) and (3.2) apply to the following pinch points on a conveyor:

1. The head, tail, drive, deflection and tension pulleys.
2. If the lift of the belt is restricted, the return rollers and the carry rollers.

(3.1) Subject to subsection (3.2), the pinch points referred to in subsection (3) shall be guarded by a guard that, unless \*it would render the pinch point inaccessible, extends at least 0.9 metres from the pinch point.

\*(the guard)

## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

- 196.** (3.2) If it is impracticable to comply with subsection (3.1),
- (a) a fence shall be in place that prevents access to the pinch points;
  - (b) a barricade shall be in place that prevents access to the pinch points; or
  - (c) a gate equipped with an interlocking device, which has a manual reset switch, shall be in place that prevents access to the pinch points while the conveyor is operating.
- (3.3) Subsections (3.1) and (3.2) do not apply if the position or construction of the conveyor provides equivalent protection that renders the pinch points inaccessible.

## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

- 196.** (4) Guards shall be provided beneath a conveyor,
- (a) that passes over a worker; or
  - (b) from which falling materials or parts may endanger a worker.
- (5) A conveyor in an underground mine shall have,
- (a) devices that guard against excessive slip between the belt and the driving pulley; and
  - (b) a fire suppression system at the driven end unless fire retardant belting is used or the conveyor is continually attended by a worker.

## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

- 196.** (6) A conveyor shall be stopped and the prime mover de-energized, locked and tagged out when the conveyor is undergoing repairs, adjustments or maintenance unless,
- (a) it is necessary to run the conveyor during such work; and
  - (b) effective precautions are taken to prevent injury to a worker from moving parts.

## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

**196.1** (1) Every conveyor shall have an emergency stopping system that operates a manual reset switch that stops the conveyor.

(2) If a conveyor is accessible to a worker, the emergency stopping system is required,

- (a) at any pinch point on the conveyor that is not set out in subsection 196 (3) and the emergency stopping system must be within easy reach of a worker at each of those pinch points; and
- (b) at any other locations along the conveyor in order to ensure that the system is always within easy reach of a worker.

## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

**196.1** (3) If a conveyor is inaccessible to a worker by any means listed in subsection (4), the emergency stopping system is required at a location or locations determined by the employer following consultation with the joint health and safety committee or health and safety representative, if any.

(4) For the purposes of subsection (3), the following are considered means by which a conveyor is inaccessible:

1. A fence.
2. A barricade.
3. A gate equipped with an interlocking device, which has a manual reset switch that renders the conveyor inoperative when the gate is moved or opened.
4. The location of the conveyor renders it inaccessible.
5. Any combination of paragraphs 1 to 4.

## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

**185.** (1) In this section,  
“machine” includes a prime mover, transmission equipment and thing.

(2) A machine that has an exposed moving part that may endanger the safety of any person shall be fenced or guarded unless its position, construction or attachment provides equivalent protection.

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## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Regulation 854

**5.1** (1) An employer shall conduct a risk assessment of the workplace for the purpose of identifying, assessing and managing hazards, and potential hazards, that may expose a worker to injury or illness.

(2) A risk assessment must take into consideration the nature of the workplace, the type of work, the conditions of work at that workplace and the conditions of work common at similar workplaces.

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## Blitz focus: Conveyor Guarding Mines and Mining Plants

### Additional Duties for Employers, Supervisors and Workers

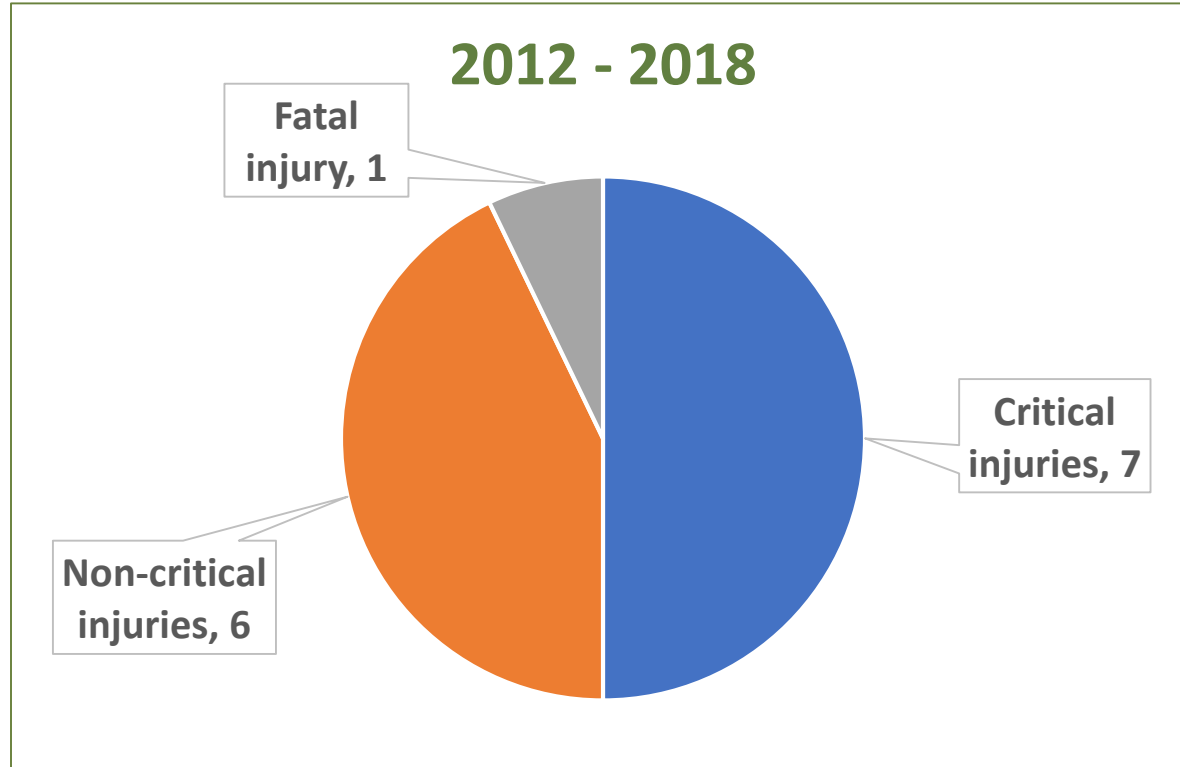
- ❑ Sections 25, 26, 27, 28 of the OHSA set out the general duties of all employers, supervisors, and workers, including those related to measures and procedures prescribed are carried out in the workplace

# Background

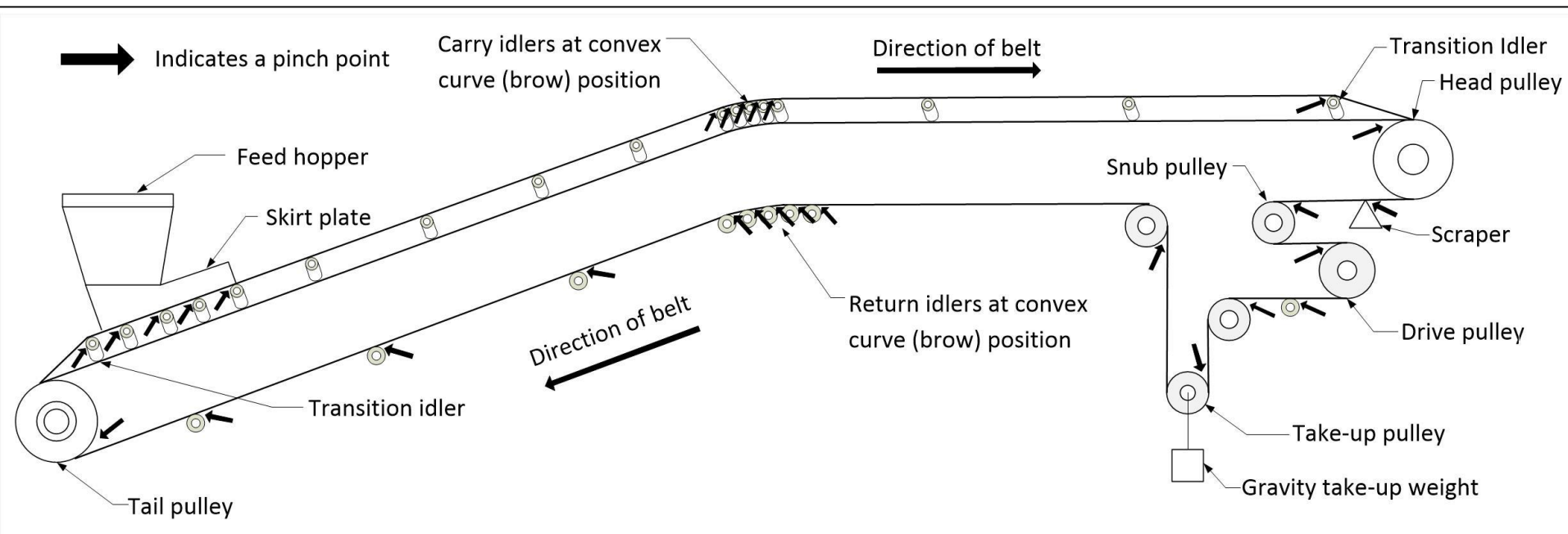
- Conveyors are widely used in Ontario mines - workers may be exposed to certain hazards associated with conveyor belts and related equipment.
- Ontario workers have been killed and injured while working around belt conveyor systems and associated equipment.
- By law, accessible pinch points must be guarded including at the head, tail, drive and deflection pulleys, the return rollers and carry rollers.
- Safety policies and practices in the workplace, such as locking and tagging procedures when repairs, adjustments or other maintenance work is performed on conveyors.

# Ontario Mining Industry

## Fatal, critical and non-critical injuries...

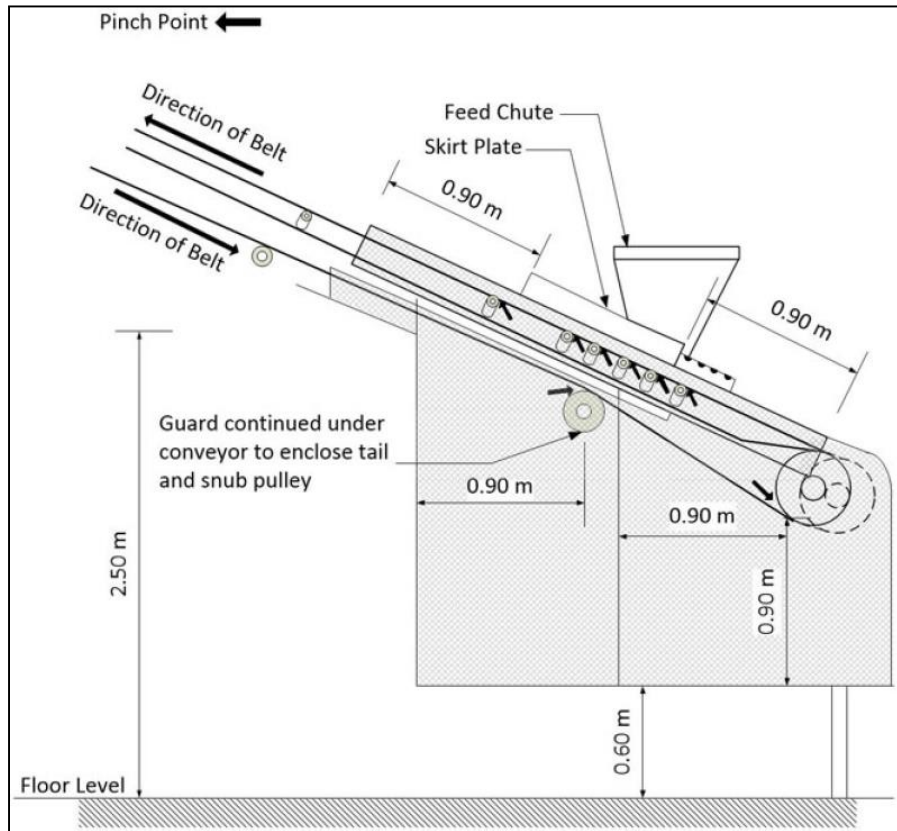


# Typical conveyor mechanical hazards

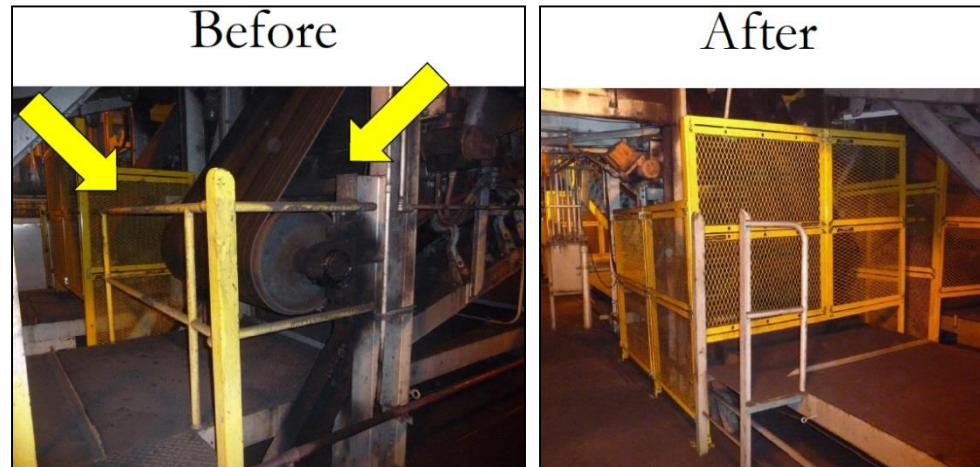


Belt conveyor diagram (source: MOL Conveyor Guarding Guideline).

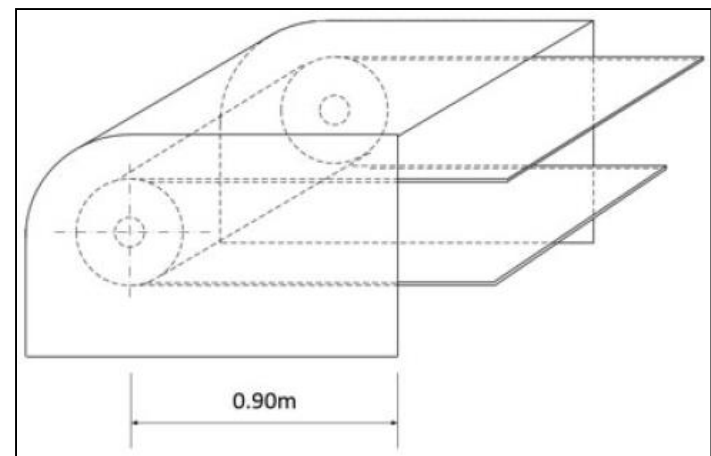
# Guarding examples - vicinity of pulleys



Example guarding in the vicinity of a tail pulley  
(source: MOL Conveyor Guarding Guideline).

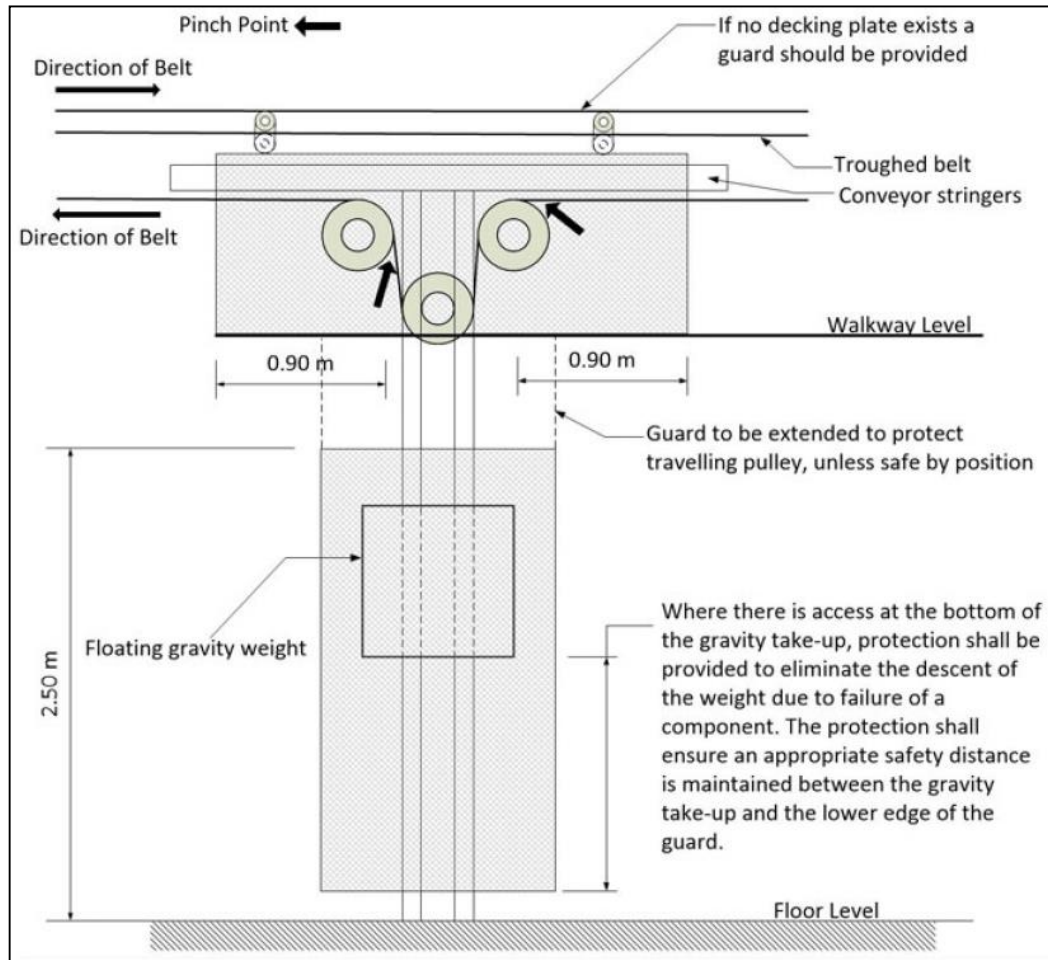


(source: Belt Conveyor Guarding)



(source: MOL Conveyor Guarding Guideline)

# Guarding examples - vicinity of take-ups and counterweights



Example guarding in the vicinity of take-ups and counterweights (source: MOL Conveyor Guarding Guideline).

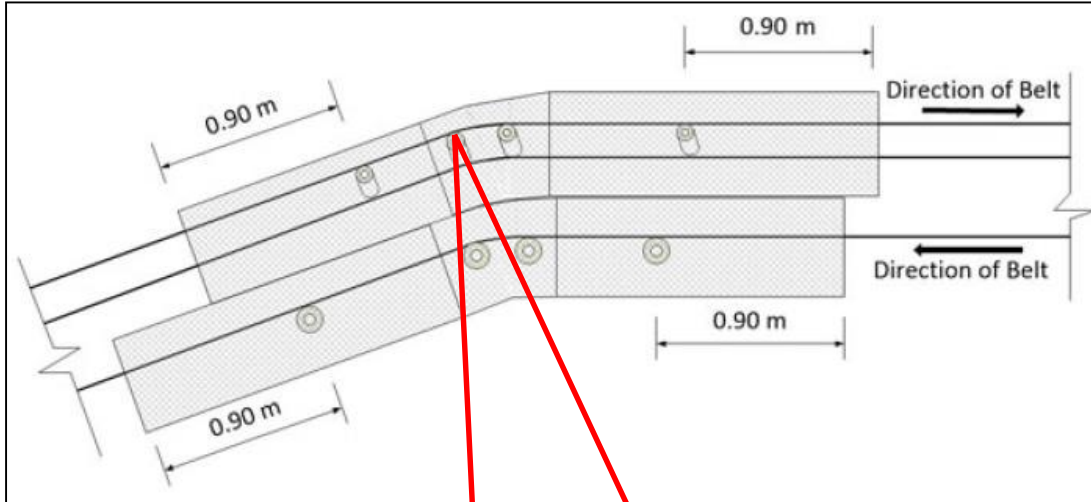


Single conveyor gravity take-up counterweight guarding (source: Belt Conveyor Guarding)



Two conveyor gravity take-up counterweight guarding (source: Belt Conveyor Guarding)

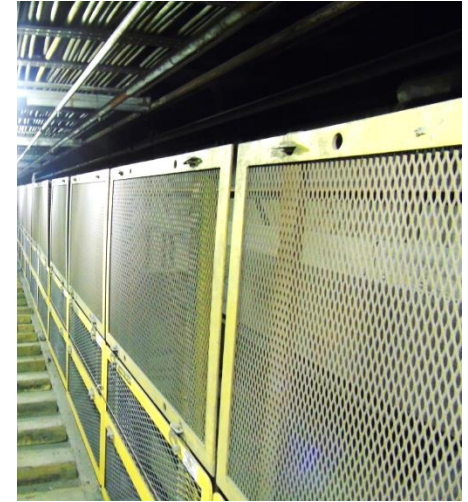
# Guarding examples - vicinity of carry and return idlers when belt lift is restricted



Example guarding in the vicinity of carry and return idlers when belt lift is restricted (source: MOL Conveyor Guarding Guideline).



Unguarded pinch point - convex curve of a belt where the lift is restricted must be guarded (Section 196.(3)(2.)).

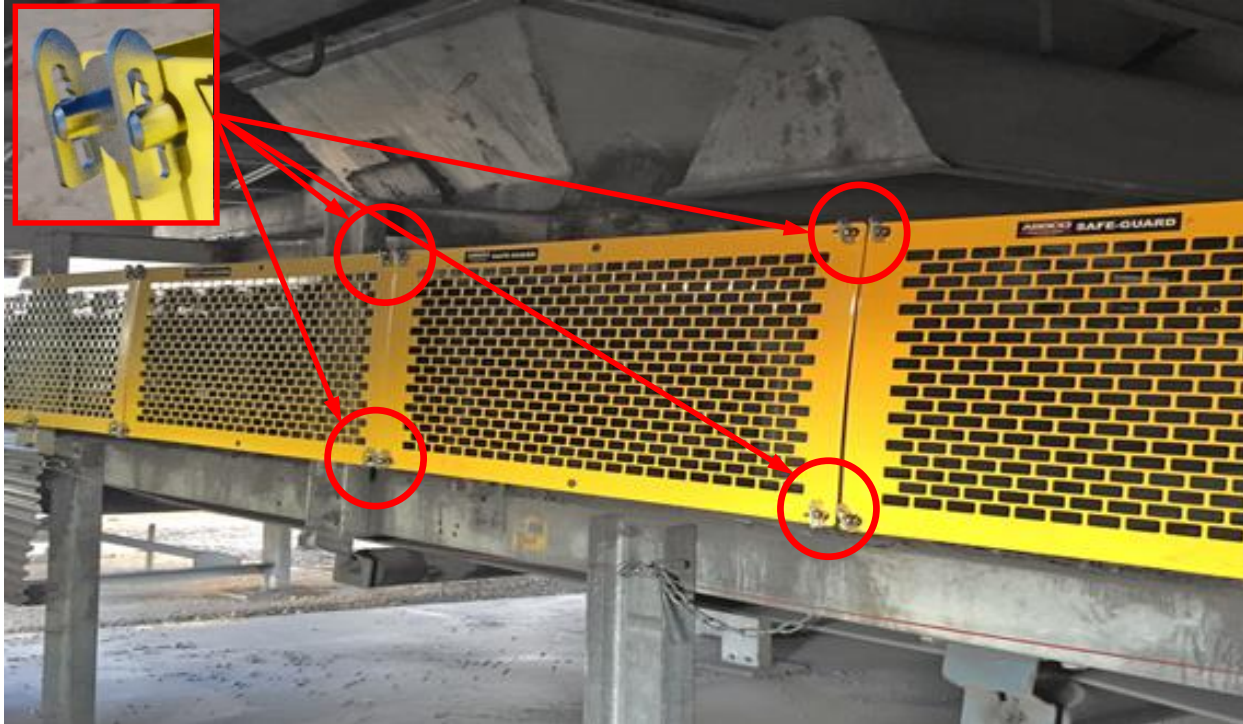


Example of well guarded belt conveyor pinch points and rotating parts; movable guards are equipped with wedge clamps.



Example of a totally guarded conveyor.

# Guarding lock device examples



Example of conveyor guarding lock device that requires a tool to remove requiring proper maintenance - some manufactures instructions suggest the use of a tie wrap as part of installation of these types of devices

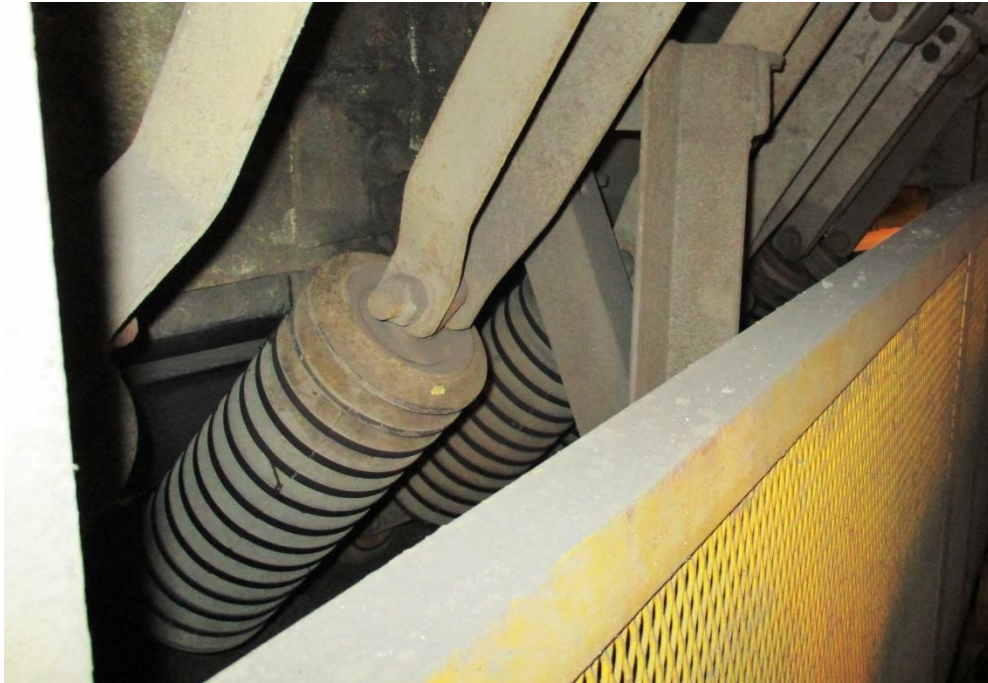


Wedge clamp that requires a “tool to remove” - according to manufacturer, “the use of the clamp complies with OHSA and CSA Standards.

# Guarding examples - vicinity of hoppers, chutes, loading, unloading and discharge points



Example guarding in the vicinity of a hopper  
(source: Belt Conveyor Guarding).

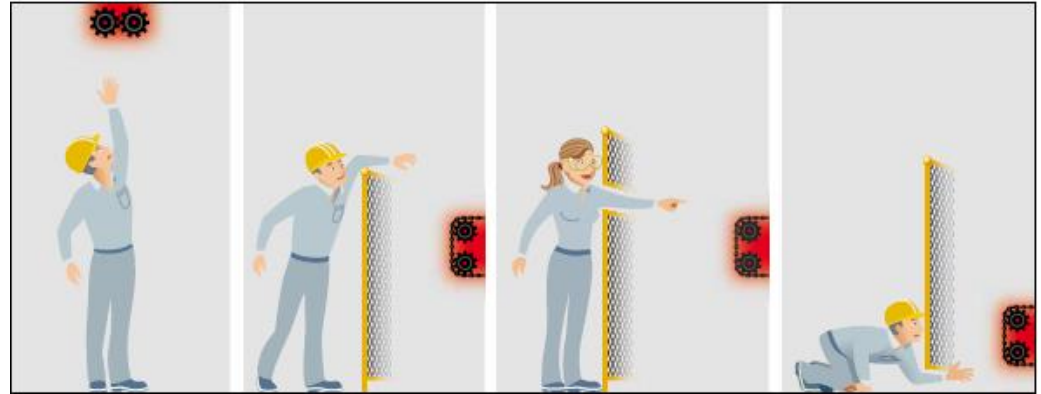


Example of guarding vicinity of a transfer chutes.

# Guarding examples - guard by location, overhead protection and other means to prevent worker access to pinch points or moving parts



Overhead protection (Source: 2014 Health and Safety Conference).

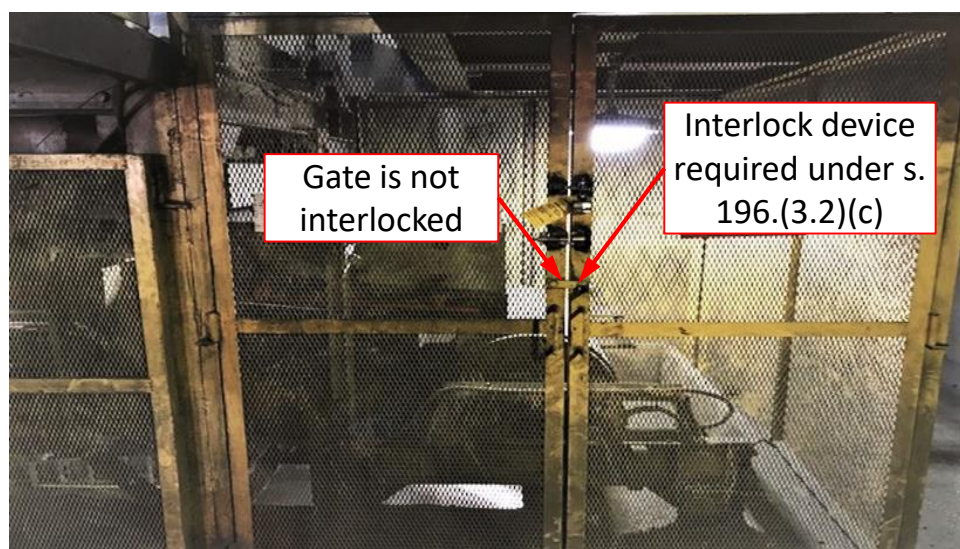


Guarding example for different situations in which the distance protection principle applies (source: Fixed guards and safety distances safety GUIDE RG-597, CSST, IRSST).

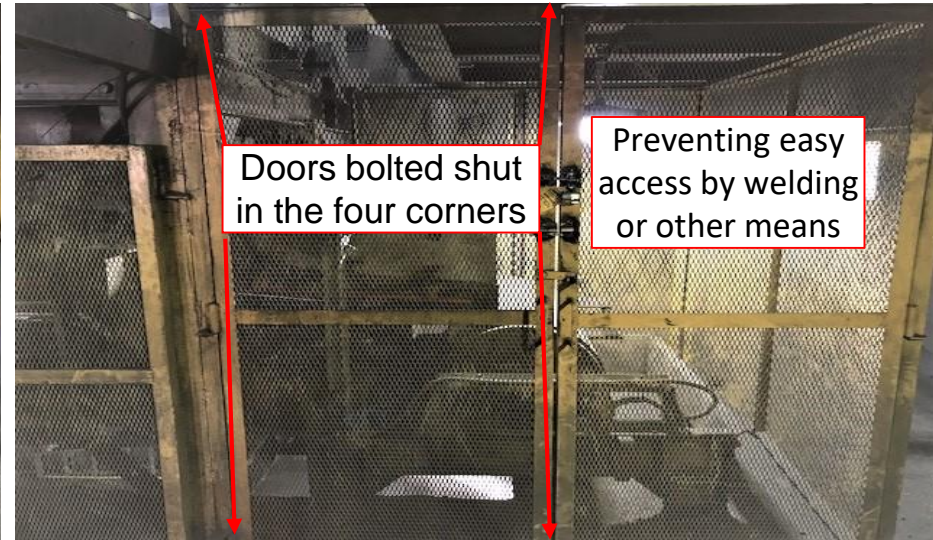


Guarding example with excessive space between guards are noted where the whole upper limb or extremity of a person can be inserted.

# Guarding examples - fence with access gates or doors



Example of a fence installed with gate or door to prevent access to the pinch points while the conveyor is operating - it should be equipped with an interlocking device, with a manual reset switch.



Example of doors/gates are permanently closed by welding could be considered guards. Doors/gates that are securely bolted may also be considered effectively guarded if they do not provide easy access.

# Conveyor guarding overview

## ***“Impracticable”***

- The term “impracticable” involves an assessment into whether the requirement for guarding conveyors is capable of being accomplished.
- Unlike the term “impossible”, “impracticable” provides for an element of ‘reasonability’ into the assessment and allows a form of good faith analysis that takes into account the exact circumstances.
- However, “impracticable” is not the same as “inconvenient”. It sets a higher standard.
- The general primary requirement, and should always be the starting point for compliance, is that all belt conveyor pinch points should be guarded (subsection (3.1)).
- If guarding (subsection (3.1)) is impracticable, a fence shall be in place that prevents access to the pinch points (Subsection (3.2)).
- The responsibility is on the employer/owner to demonstrate the case.

# Guarding examples – machine guarding

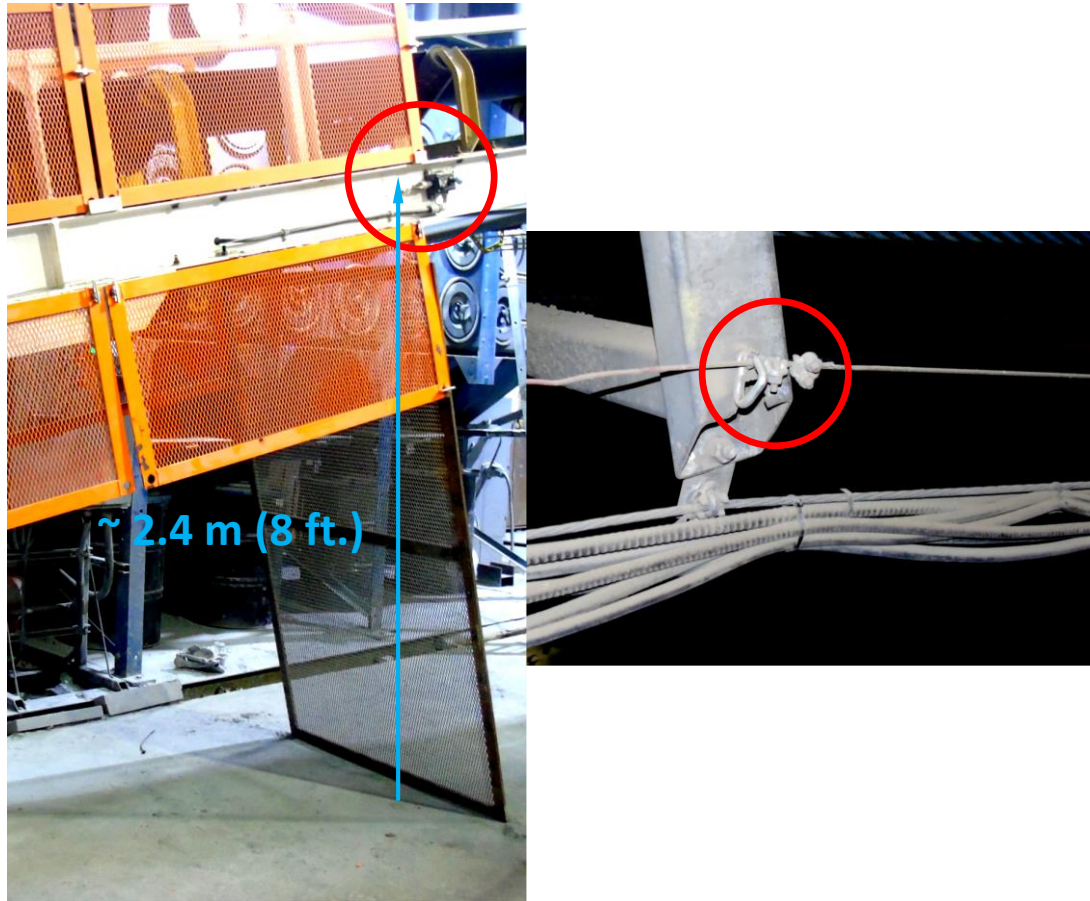


Example guarding in the vicinity of a grinding mill  
(source: Belt Conveyor Guarding).



Example of guarding the flywheel of a crusher.  
(source: Belt Conveyor Guarding).

# Emergency stopping system – pull cords



Example of inefficiently installed and defective pull cord system.



Example of clearly visible and properly installed pull cord and re-set button.

# Summary and conclusion

- When machines/belt conveyors are operating, pinch points and rotating parts of the machinery can pose a risk to the health and safety of workers, safe guarding equipment by taking reasonable precautions include:
  - a. As a general primary requirement, guarding should be the starting point for meeting compliance for all pinch points moving and rotating parts on conveyors and machines.
  - b. If impracticable to guard a conveyor, other measures can be considered such as a fence or barrier that prevents access to the pinch points.
  - c. If gates or doors are installed on fences to provide access to a conveyor, they must be equipped with an interlock device, with a manual reset switch, to ensure conveyor is stopped for the protection of workers.

# Questions???