Guarding Equipment

By: Belt Conveyor Guarding

www.conveyorguarding.com

(866) 300-6668

Why Do We Need Guarding?

The following are common answers or comments we get from workers and managers when we ask this question :

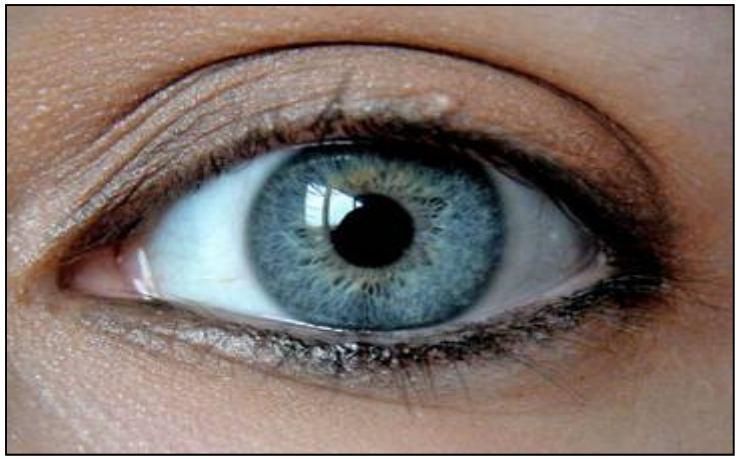
- Provincial and Government Agencies require us to do it.
- We were told too.

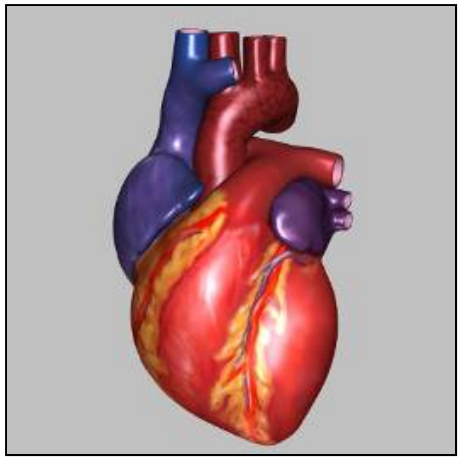
We need to change these answers!!!

What can happen in one second?

- A human eye can only blink twice in one second.

- While resting, the human heart beats once per second.





For the average person the time needed to react to an unexpected sensation is about one second.

Conveyor Belts Move Faster Than You!

Consider the following:

- A typical conveyor belt travels in the range of 600 feet per minute.
- This means the belt is moving at 10 feet per second.

The same conveyor belt moving at 600 feet per minute or 10 feet per second will draw…

- **Your tool**
- **Your loose clothing**
- **Your hand**
- **Your arm**

10 feet into the pinch point before you can react!!!

Motor Capabilities

- Small motors can remove fingers and grab clothing, causing serious injuries.
- Any motor over 8 hp can haul a person through a small opening, with horrible results.

Emergency Pull Cord

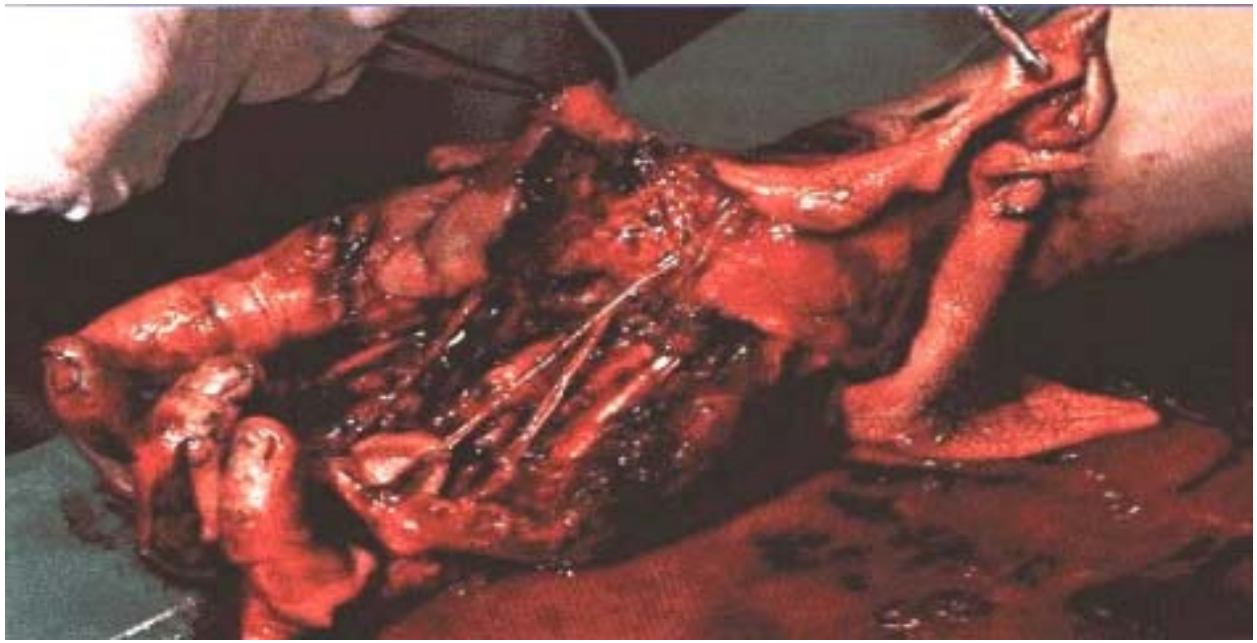
- Many people comment that they have an emergency pull cord which acts as a guard.
- The longer, faster and heavier loaded the conveyor belt is, the longer the conveyor belt takes to stop.
- How long does a conveyor take to stop when emergency pull cord is pulled?
- 3, 4 or 10 seconds? 25 to 90 feet?
- **Is it a guard?**

Competent Worker

- We hear the statement “you need to be a competent person to work around this rotating equipment”.

- The truth is the more time you spend around unguarded or poorly guarded rotating equipment the higher your chances of getting injured no matter how competent you are!!!

Man vs. Machine



Winner = MACHINE

Why Do We Need Guarding?

1. To protect the worker!
2. It’s the right thing to do!
3. Decrease liability from possible accidents.
4. Provincial and Government agencies require us to do it. These rules wouldn’t be in place unless something happened to make them necessary.

Why Do We Need Guarding?

The most important reason to make your workplace safe is not at work at all!!

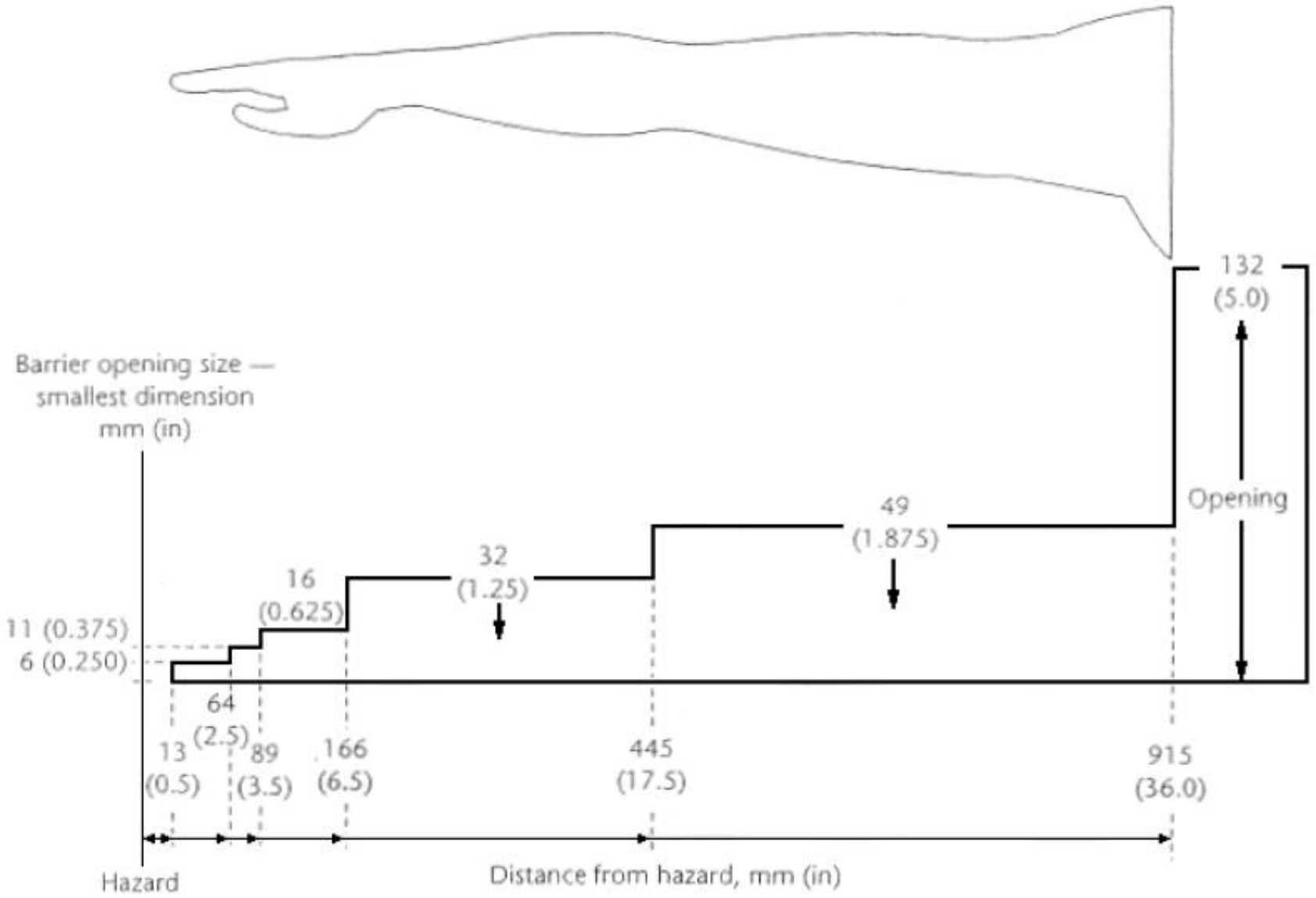
Guarding Belt Conveyors

1. Setting The Guarding Policy
2. Things to Consider When Building a Guard or Guarding an Area
3. Common Areas Requiring Guarding
4. Training

1. Setting the Guarding Policy

Company Guarding Policy

- Interpret the current Occupational Health & Safety Act to establish your guarding policy.
- Implemented by Owner/Management and Worker/Joint Health and Safety Committee
- Using Standards such as the “CSA-Z432 Safeguarding of Machinery”, for guidelines.
- Make sure all personnel are involved and understand why the guarding is necessary
- From this a guarding best practises can be developed


Barrier opening size —
smallest dimension
mm (in)
132
(5.0)
Opening
49
(1.875)
32
(1.25)
16
(0.625)
11 (0.375)
6 (0.250)
64
(2.5)
13
(0.5)
89
(3.5)
166
(6.5)
445
(17.5)
915
(36.0)
Hazard
Distance from hazard, mm (in)

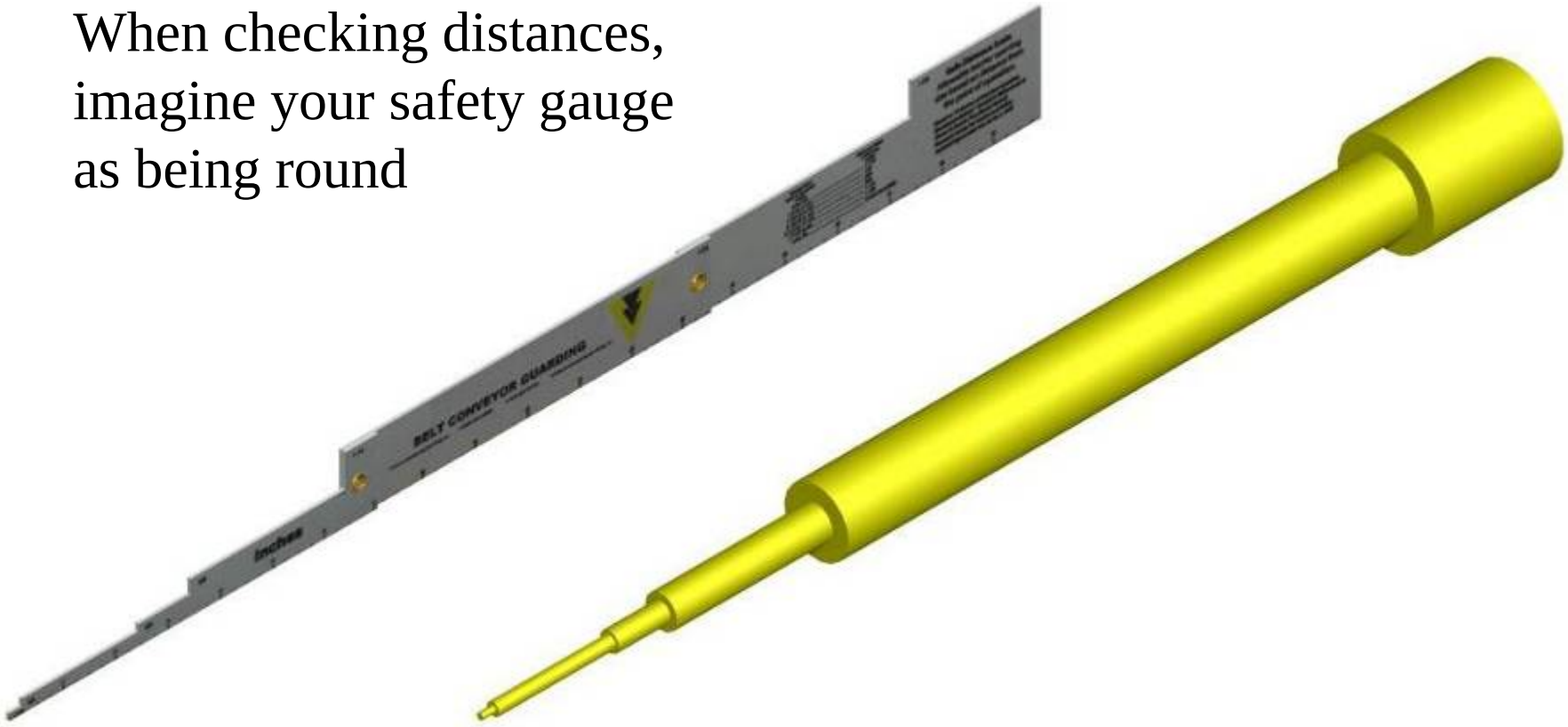
CSA-Z432 for Safeguarding of Machinery (Canadian Standards Association)

- It was developed to determine guard mounting distances based on the maximum opening sizes in the guarding.
- This standard ensures that any body part which can fit through the mesh won't be able to contact the pinch point inside.

Distance from Point of Operation (in)	Maximum Width of Opening (in)
0 to 1/2	Less than 1/4
1/2 to 2 1/2	1/4
2 1/2 to 3 1/2	3/8
3 1/2 to 6 1/2	5/8
6 1/2 to 17 1/2	1 1/4
17 1/2 to 36	1 7/8
Over 36	5

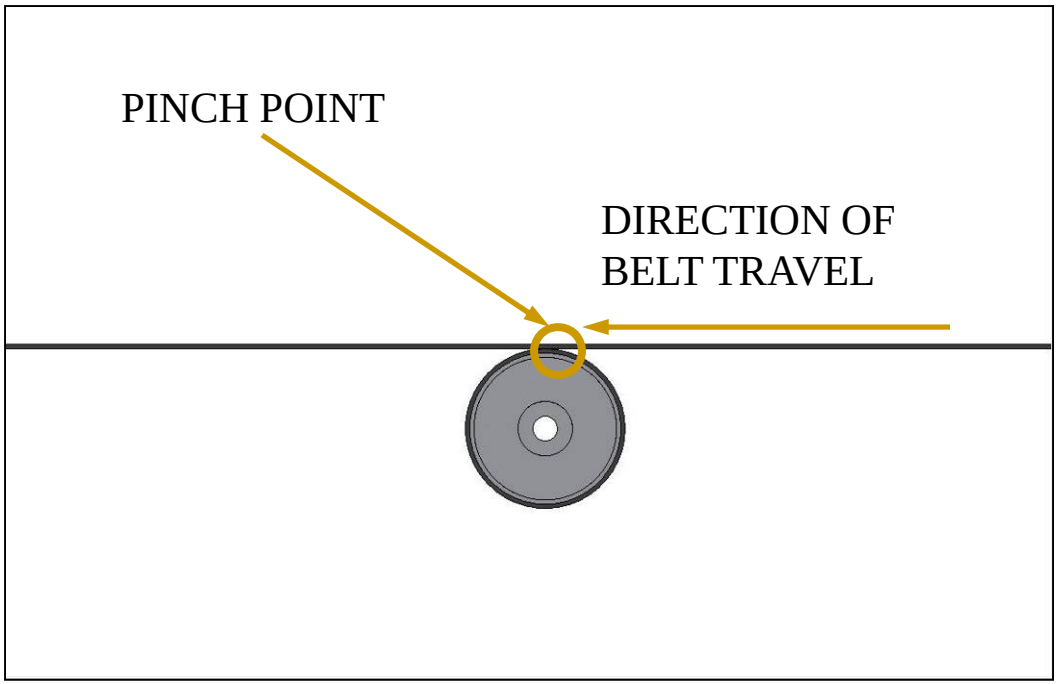
Safety Gauges

When checking distances, imagine your safety gauge as being round



Safety Gauge in Use

Not just the in-running pinch point?



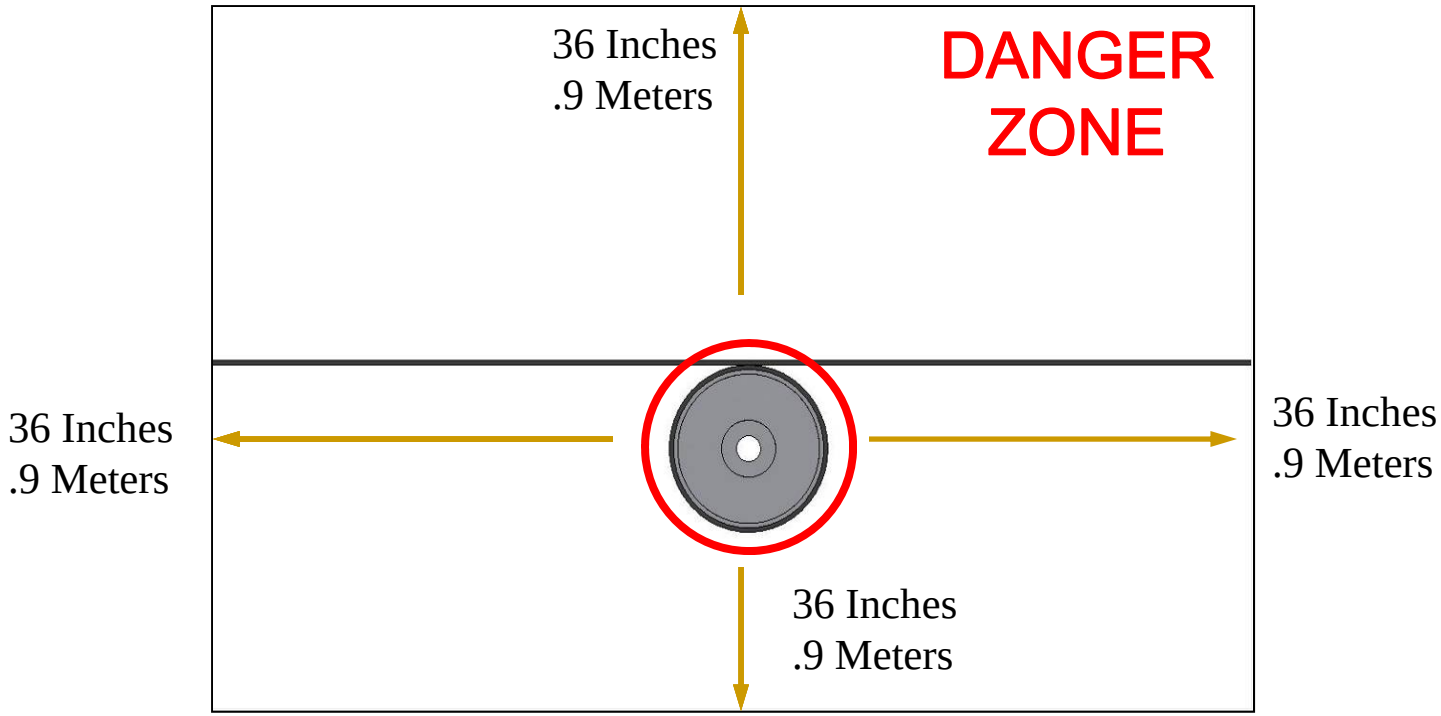
Where is the Danger Area?

- This area is the entire exposed rotating part (Shaft, Drum or return roller).

- The danger point is the in running pinch point plus the entire exposed area of the rotating or moving component. The exposed area of the component could get burred or have some type of build up or wear which could create another hazard.

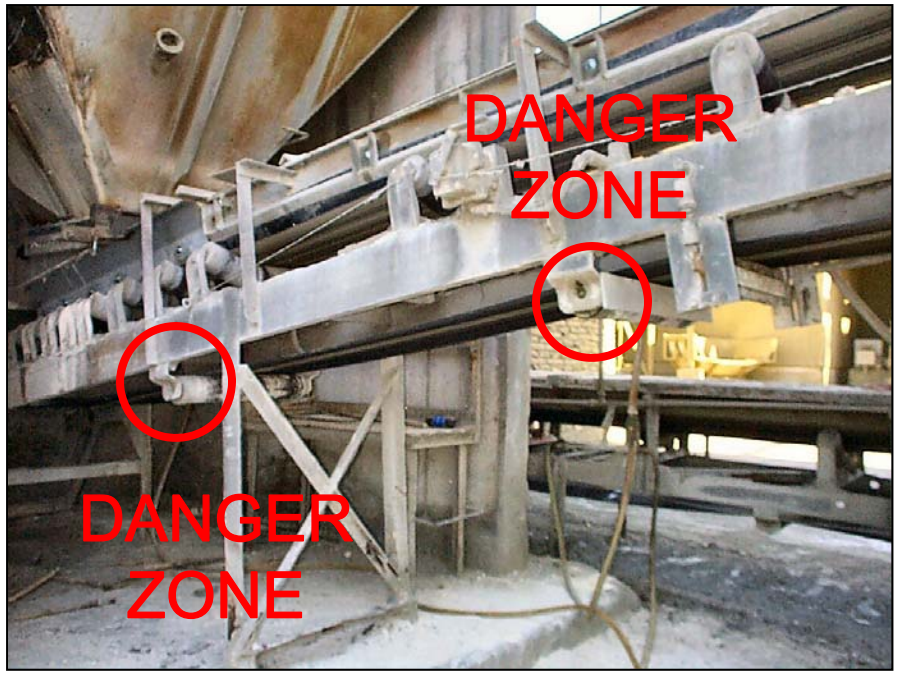
Distance from Danger Area

- Keep 36” away unless using mesh with proper opening size.



How Danger Area Can Change Over Time

Return Idlers



Example:

- The return roller could get worn and have a hole in the can or pickup other material which would cause the entire return roller to become the Danger Area.

How Danger Area Can Change Over Time

Pulleys

Example:

- The lagging on your pulley starts to loosen from the steel can or the can wears through.

2. Things to Consider When Building a Guard or Guarding an Area

Maintenance and Cleanup Friendly

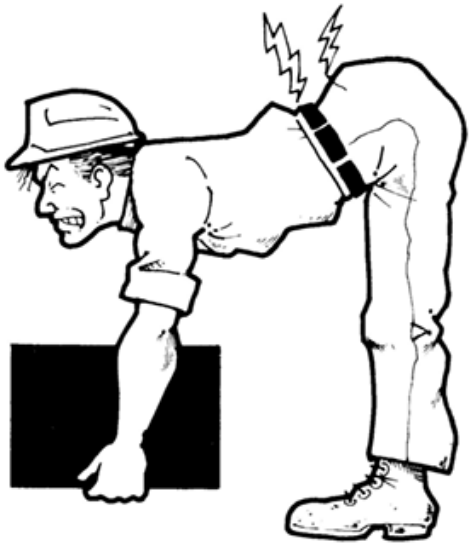
- Learn and know what the maintenance and cleanup issues are for the area being guarded

Special Requirements for Guarding

- Lubrication
- Vibration Analysis
- Heat Analysis
- Speed Sensing
- Over-Heating Concerns
- Corrosive Area
- Flammable Area

Ergonomics

- A well designed guard should not weigh more than 50 pounds
- It should not require more than one person to remove or install it



Simplicity

- Guards should fit into place easily with minimal thought or effort

Guard Strength

- Guarding SHOULD be constructed to withstand normal operational forces
  - Example – If an employee puts his/her weight on the guard it should be able to support them.
- Guarding DOES NOT need to be able to withstand catastrophic failures
  - Example – A shaft breaks and a wheel flies off.

Fastening System

Wedge Clamp

- Wedge clamp is never removed so your guard always has a place to go back on too

Fully Opened Position

Partially Opened Position

Closed Position

Wedge Clamp

- Using a tie wrap as shown requires a tool to open the wedge clamp (Side cutters)
- The tie wrap has no other purpose than to keep wedge clamp closed

Wedge Clamp – Definition of "Tool to Remove"

- *"A tool is any material or device that is not part of the body. Not your fingers, toes or teeth etc. The idea is you give conscious thought to use something because your body is not adequate to perform the task. As soon as you use something, a tool, you must shut down and lock out before making the guard ineffective or use another device to provide equivalent effective protection. In the case of ties a tool could be as simple as a broken piece of glass. It does not have to be something fashioned or designed for the purpose you use it for."*

Maintenance

- Do not design a guard that requires constant maintenance

Recognition

- Is the Guard recognizable as a “Guard”?
- Paint your guards a color which will standout from your equipment
- Standardize a color which means “Danger”
- Safety Yellow is the most common color

Adjustment

- Can adjustments be made to guarded components without:

  1) the loss of protection?

  2) the modification of the guard?

Inspection

- Can guarded components be inspected without removing the guard?

Create A Hazard

- Does the design, material & construction of the guard create a hazard?

- Free of:
  - Burrs
  - Sharp Edges
  - Pinch Points

Standardization

- It is easier to install new guarding if you are using a common standard
- Also, it is easier to educate new and existing workers on safe guarding practices

Guarding verses Hand Railing

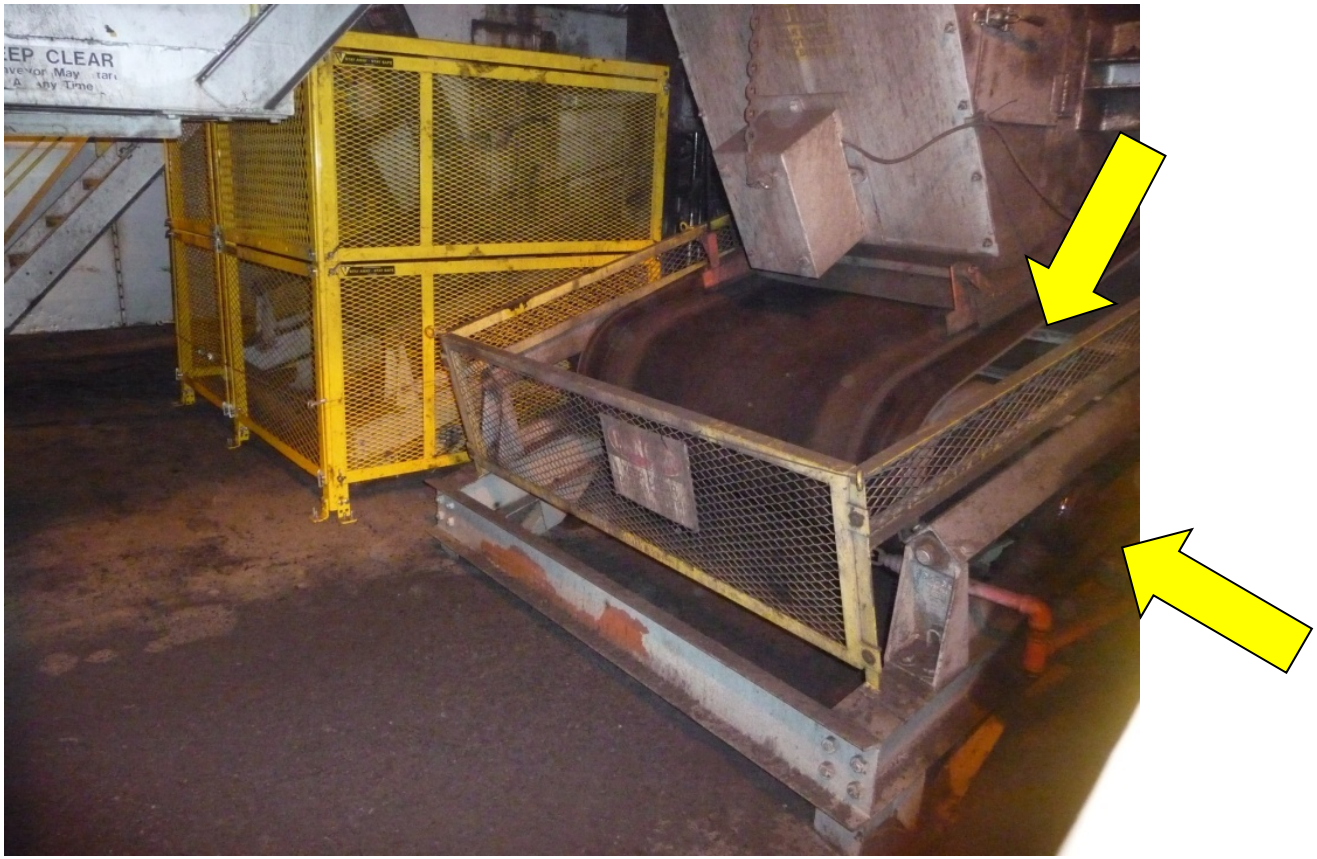
- We see many areas where there is a hand railing in place where guarding should be

- Hand railing is NOT ACCEPTABLE to limit access to a pinch point as it can be breached easily

3. Common Areas Requiring Guarding

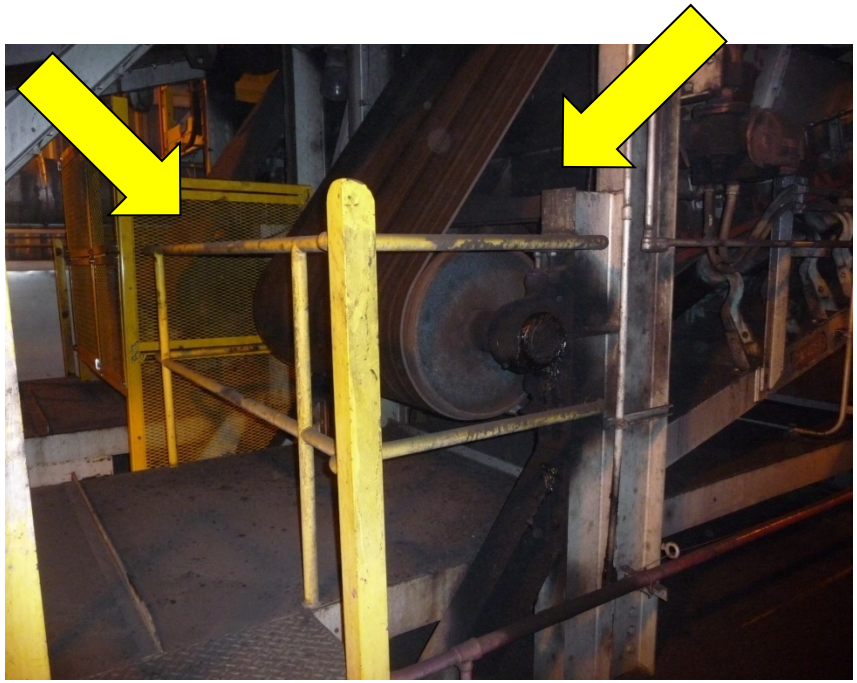
Tail Pulley

Before & After



Guarding verses Hand Railing

Before



After

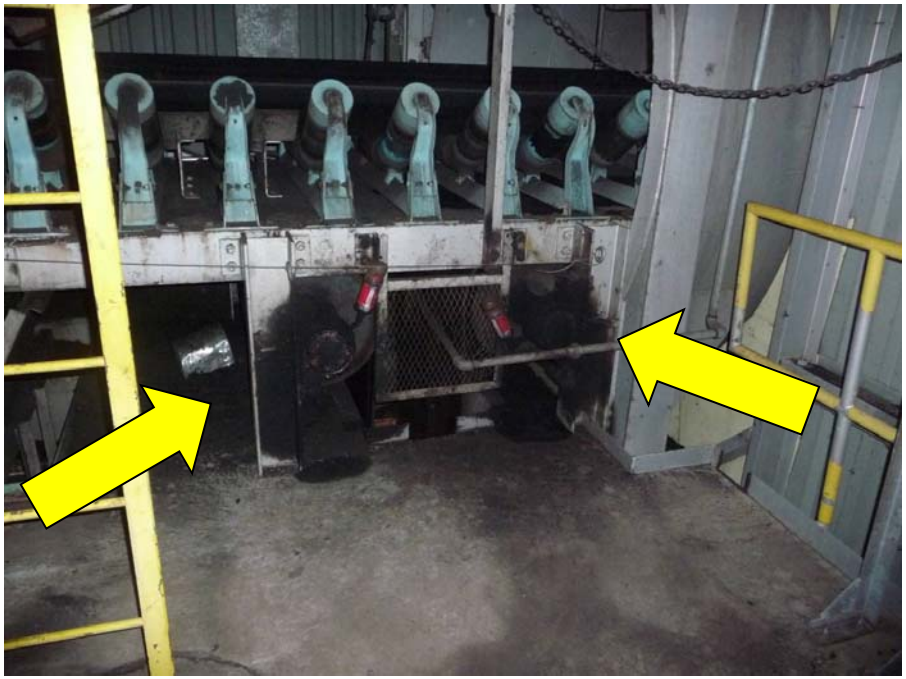
Receiving Hopper/Skirt Boards

Uprights or Obstructions Which Could Trap

Receiving Hopper/Skirt Boards

Gravity Take Up (Conveyor Level)

Before



After

Gravity Take Up Counter Weight

(Two Conveyors)

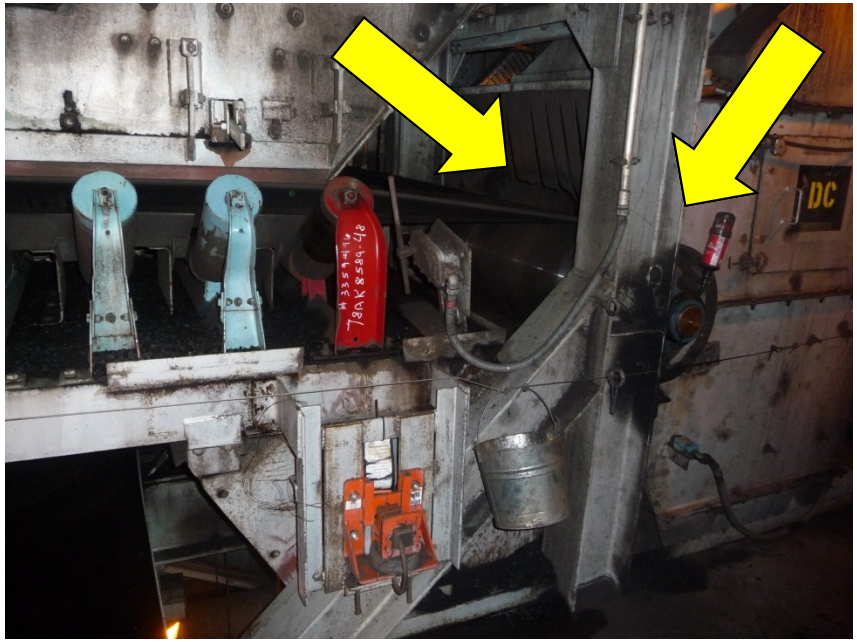
Gravity Take Up Counter Weight

(Two Conveyors, make sure to isolate each conveyor)

Gravity Take Up Counter Weight

Head, Drive or Snub Pulleys

Before



After

Head, Drive or Snub Pulleys

Before

After

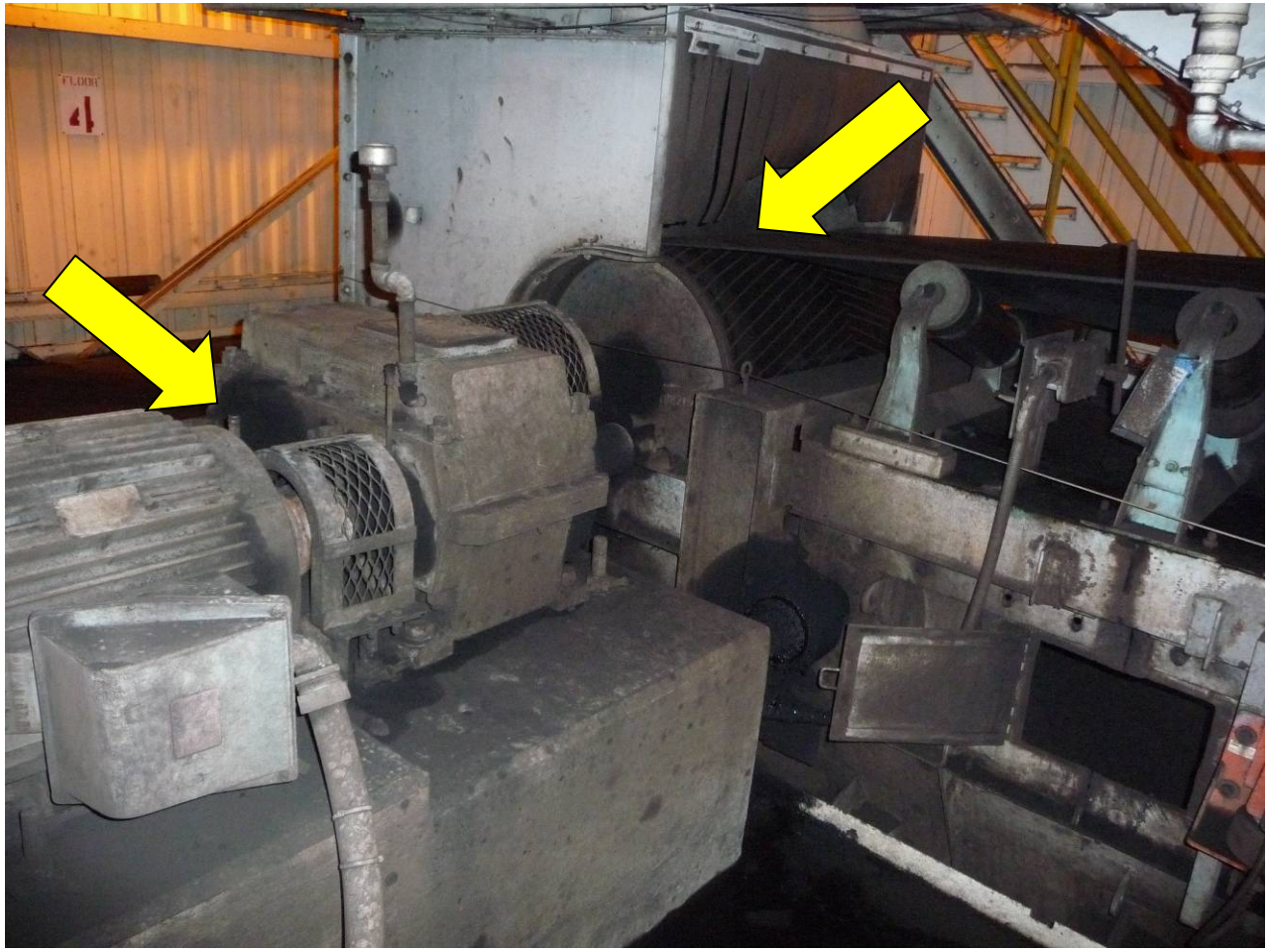
Head, Drive or Snub Pulleys

Coupling

Before

After

Couplings and Head Pulley



Coupling and Head Pulley

Coupling and Head Pulley

Return Rollers - within 8 ft from the ground or walking and working surfaces

- Example – If a return roller is 6 feet above a walkway , and the area is 50 feet above the ground, it needs to be guarded

Return Rollers - within 8 ft from the ground or walking and working surfaces

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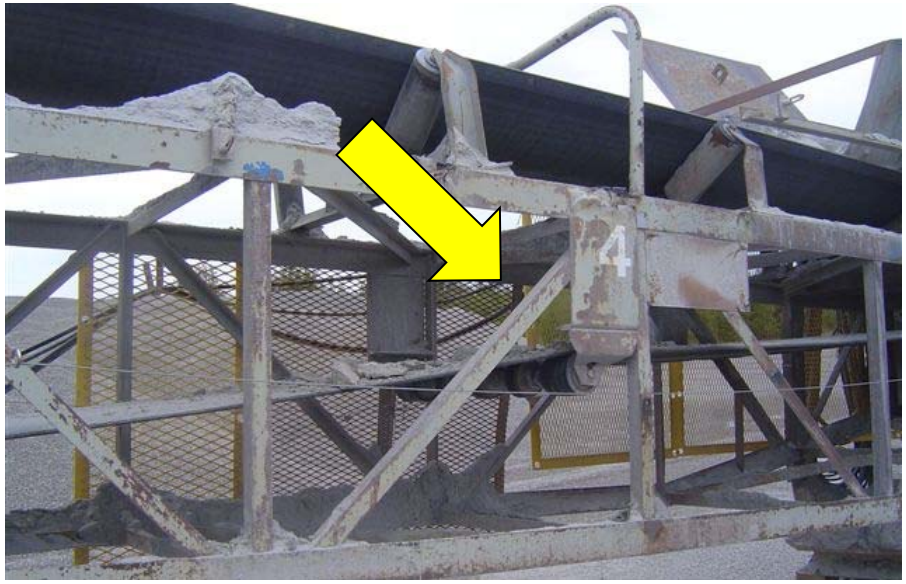
Before

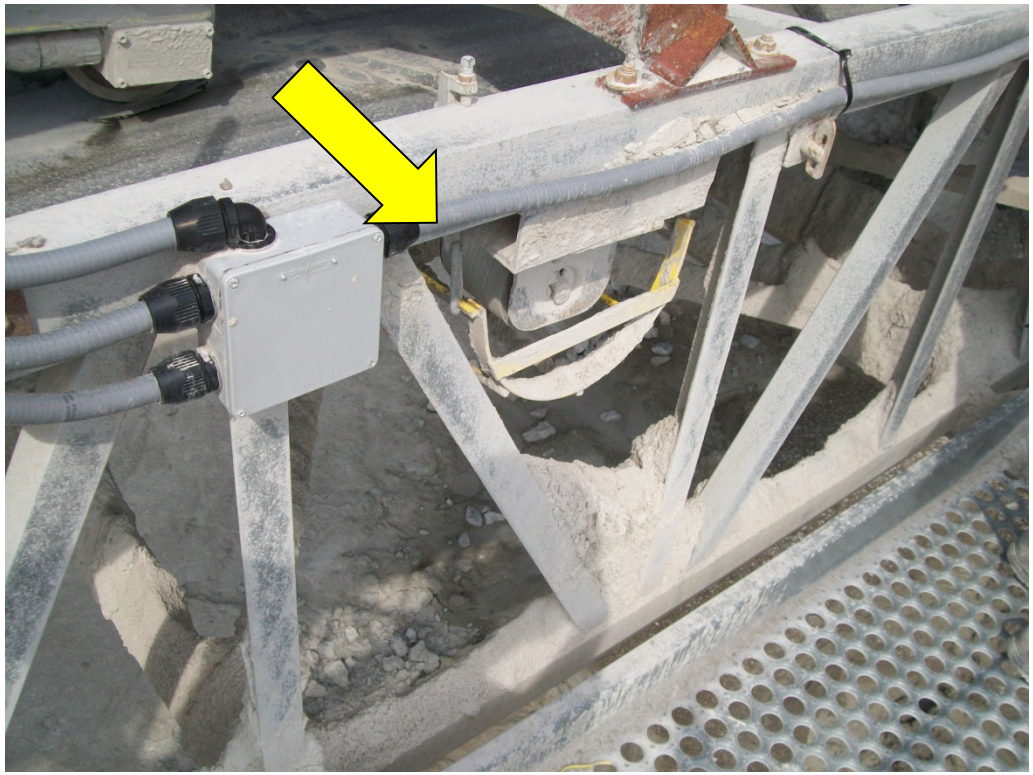


After

Return Rollers - within 8 ft from the ground or walking and working surfaces

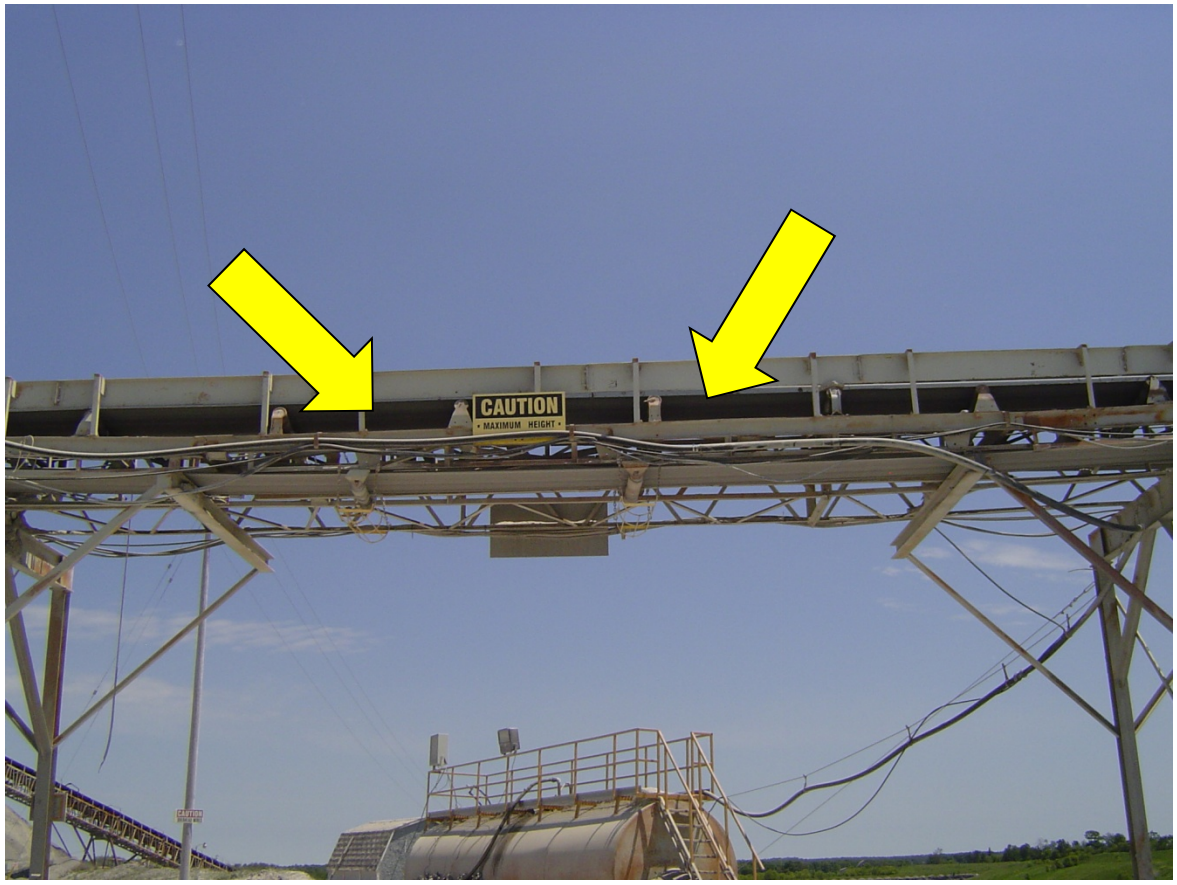
Return Rollers – along Walkways

Before



After

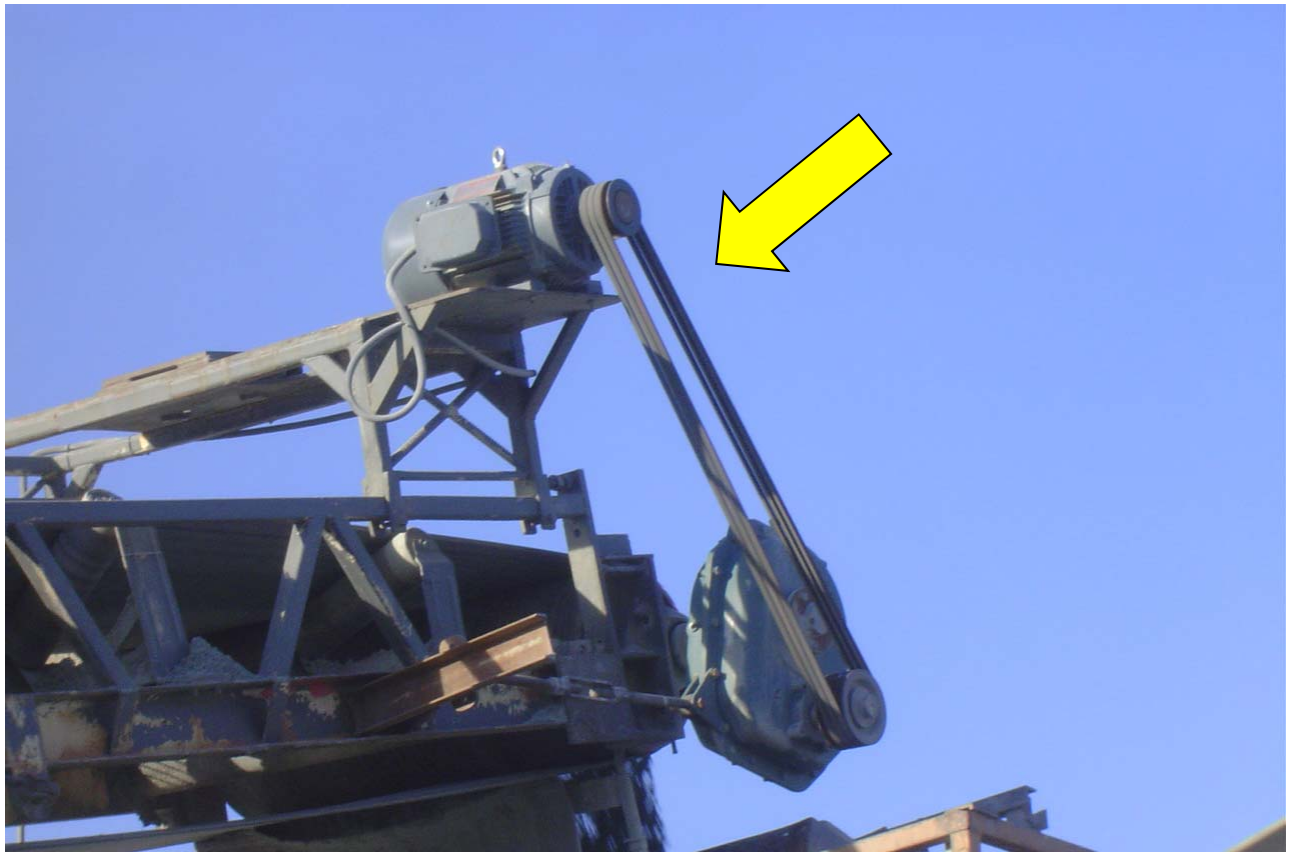
Return Rollers - above 8 ft from the ground



Return Rollers - above 8 ft from the ground

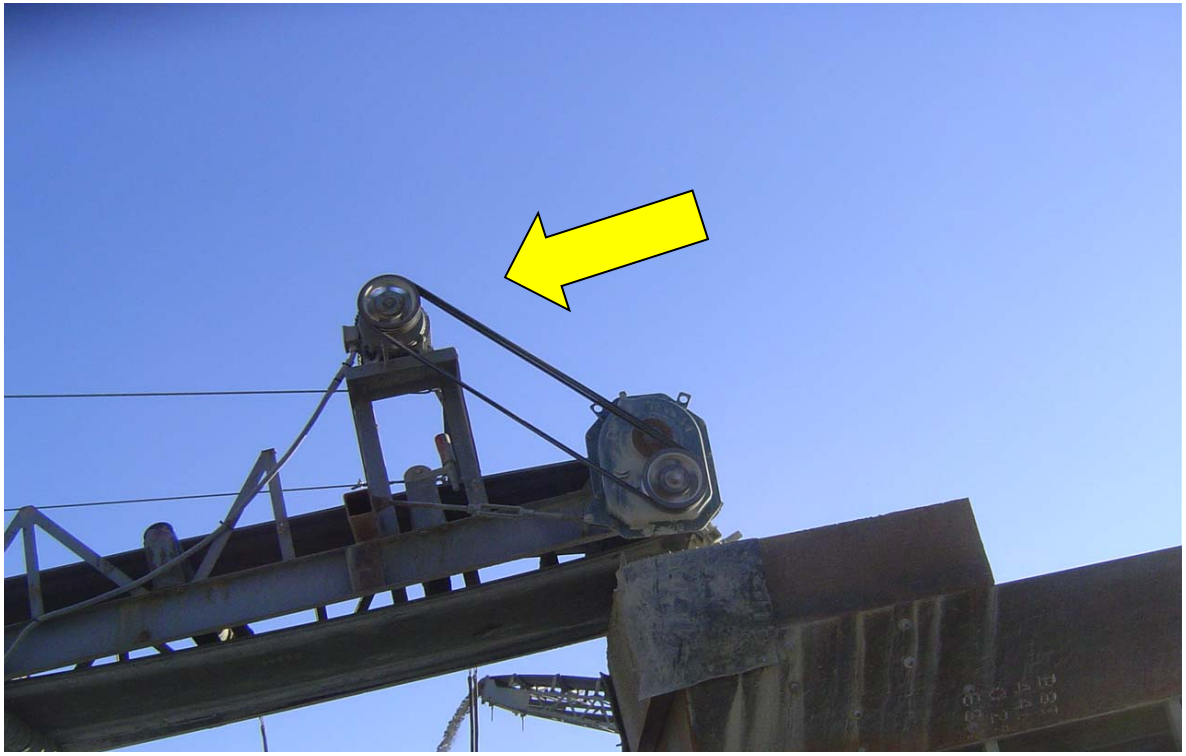
V-Belt

(Worker can Access)



V-Belt

(Worker can not access but belt could fly off and hit some one)



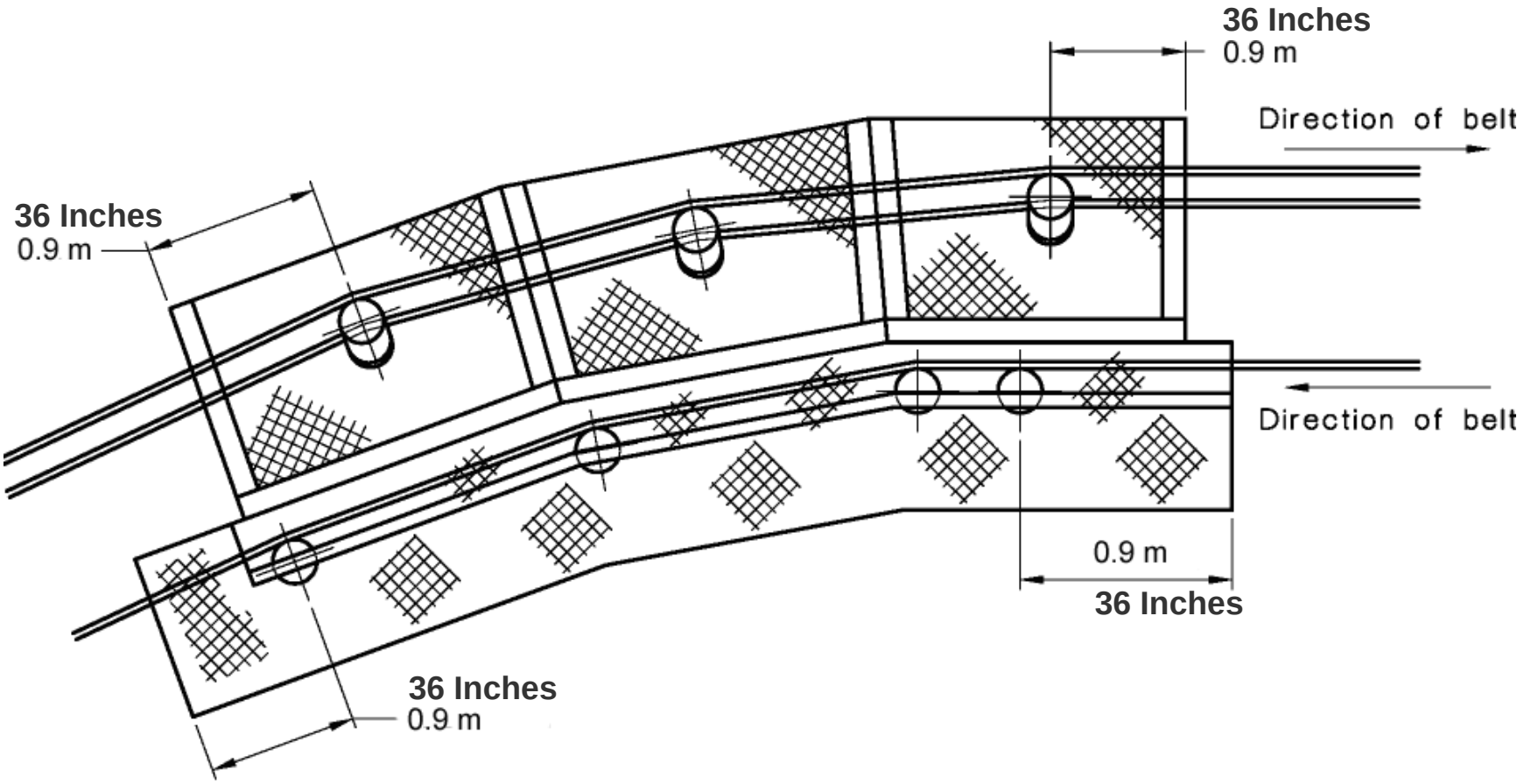
V-Belts

V-Belts

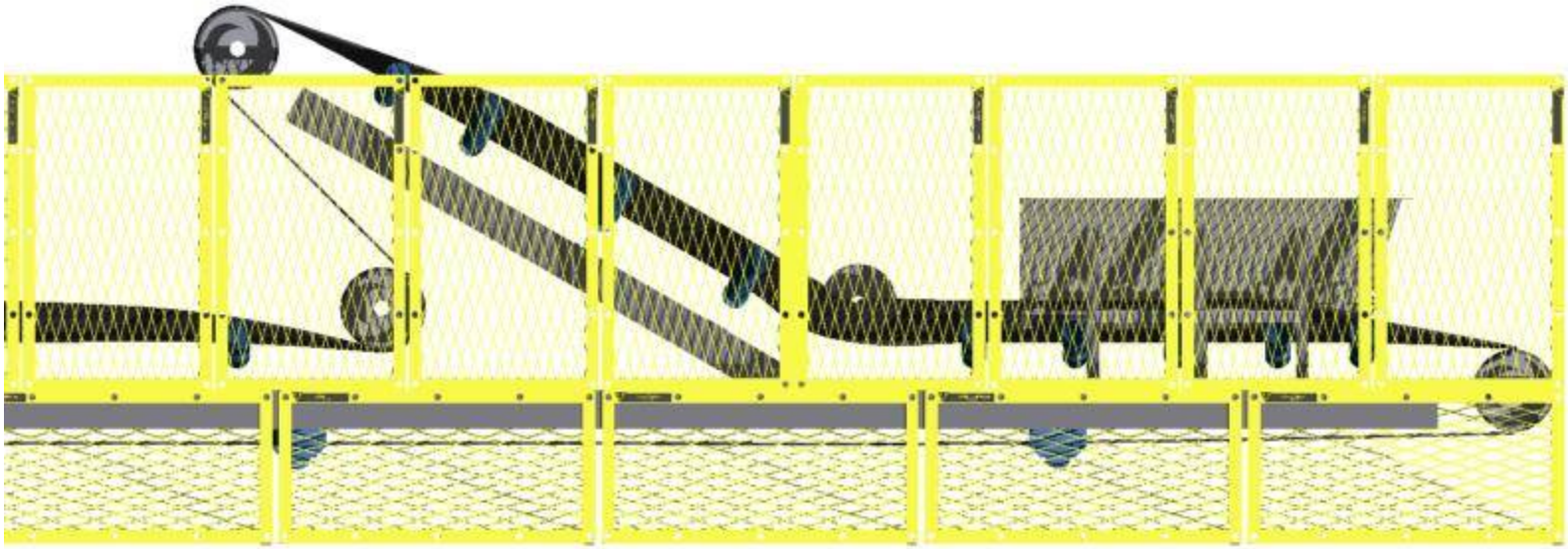
V-Belts

Other Circumstances to Consider

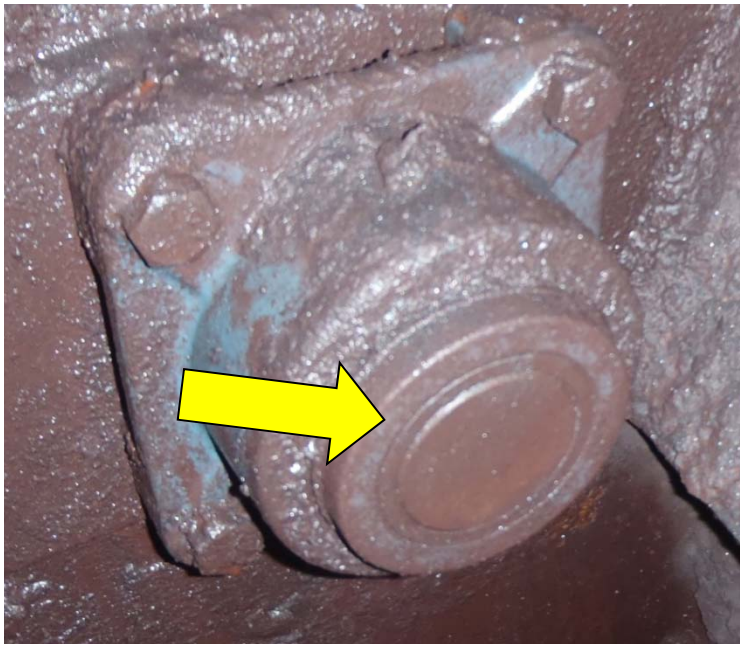
Conveyor Bends

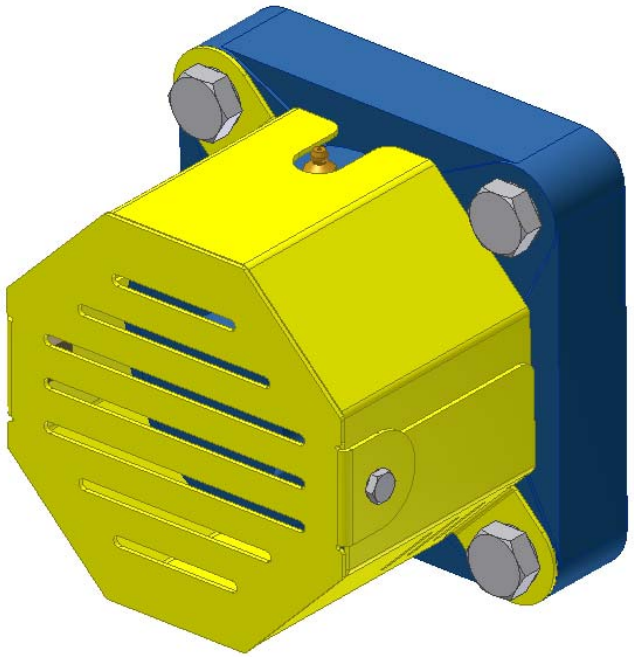


Tripper Conveyors



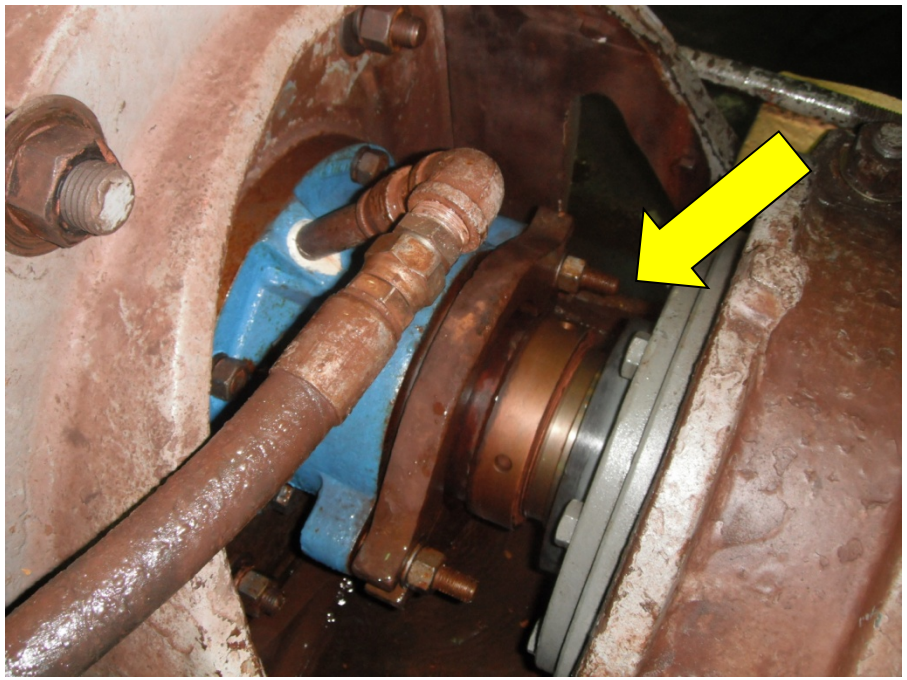
Flange Bearing Guards

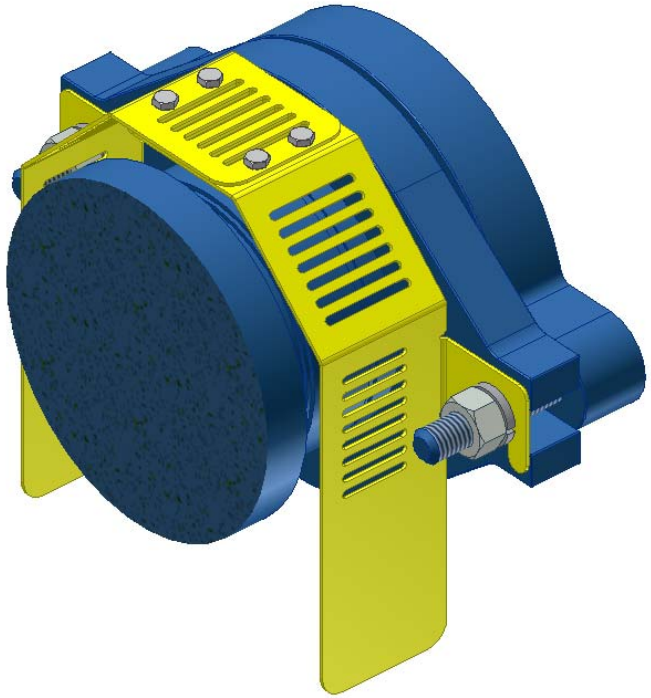




Pump Guards

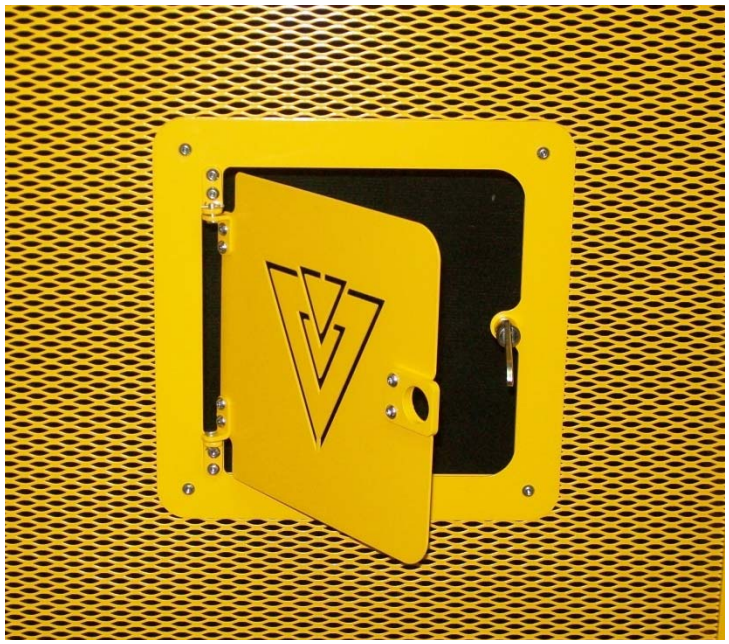
Gland Seal Guards





Inspection Doors

Can be installed on new and existing guarding.



4. Training

Training

- Training should involve instruction and hands-on training.

- Specific training is a crucial part of any effective guarding system.

3 Questions to Ask Your Workers:

1. How do the guards provide protection for the specific pinch point?

2. How and under what circumstances, can guards be safely removed and when must the guards be replaced?

3. What do you do if a guard is damaged or missing?

Conclusion

1. Keep it simple !!!
2. Stay Away, Stay Safe.
3. Standardize your guarding.
4. Properly train personnel explaining, why guarding is in place and why it is critical to keep it in place.

Thank You!

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