

Conveyors


CRITICAL PRACTICE


You will find gravel conveyors on any crushing site, both stand-alone machines and built into other equipment.

They don't look terribly dangerous but that look is deceiving.

Conveyors are not recognized as a hazard and workers often relax their safe behaviors.

What are some of the dangers?

- Working under or next to poorly guarded equipment
- Using incorrect tool or method tool to remove material from moving rolls or pulleys
- Trying to free stalled rolls while conveyor in motion
- Attempting to remove or install guards while conveyor is operating
- Not keeping work area clean
- Wearing loose clothing and hair around a moving belt and components
- Not blocking a stalled conveyor belt (potential energy can be stored in a stalled belt)
- Falling material
- Person falling — Use fall protection
- Electrocutation



Pause for Safety

- Hazards**
- Crushing injuries
 - Pinching (hands / feet)
 - Falling / tripping
 - Contact with moving belt

PPE



Additional PPE

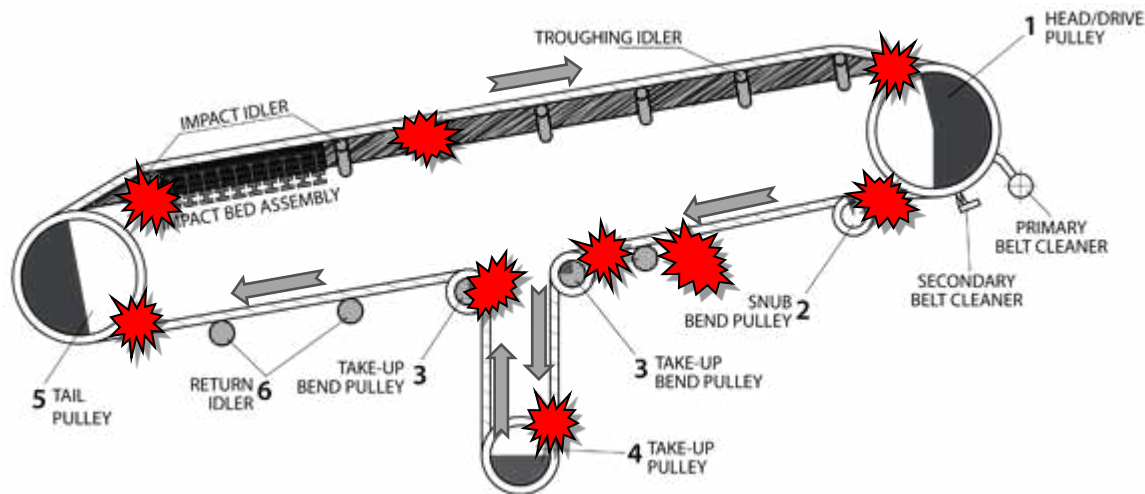


- Controls**
- Screens / conveyors
 - Replacement parts

- Hand tools
- Guards
- Clean work area
- Lock Out de-energizing procedures
- Communication

Strategies and Procedures

A typical conveyor system presents numerous pinch points and crushing hazards. Familiarize yourself with the equipment on your site and make yourself hyper-aware of the danger points.



You must receive training on conveyor hazards and general safe work practices. Site-specific training will include a review of conveyor work practices on a particular plant.

General guidelines:

- Keep clothing, extremities, hair and other body parts away from running and automatic-start conveyors.
- Do not climb, step, sit or ride on a conveyor at any time (unless crusher is shut down and everyone is locked out),
- Do not remove, alter or defeat conveyor guards or safety devices at any time except within specific maintenance procedures.
- Know the location and functioning of all stop/start and emergency stop devices.
- Keep all stopping/starting and emergency control devices visible and free from obstructions at all times.
- Test emergency stop systems on a regular basis and document such tests.
- Tower operators will utilize a pre-start alert system and ensure that all workers are clear of a conveyor prior to starting the unit.
- Keep the areas around conveyors clear of obstructions and slip/trip hazards.

General Maintenance Code of Practice

Due to the awkward and sometimes confined nature under, on and around conveyors it is necessary to follow proper procedures during any kind of maintenance work.

Only authorized, competent workers, or workers supervised by a competent person should perform adjustments or repairs to a conveyor.

The first line of defense is cutting the power supply to the equipment. De energizing the system removes the hazard of the conveyor or other systems inadvertently being started unexpectedly.

The supervisor will ensure that no maintenance work commences until:

- Each involved worker is physically accounted for,
- Appropriate devices are switched off (Main Panel, Distribution Panel, and Disconnect),
- A lock is placed by worker(s) on the main breaker panel. (*Lock Out.*)
 - Each worker takes the key for his/her lock and keeps it secure on their person.
 - If practical, during daylight hours, the generator can be shut down totally eliminating the hazard of moving equipment.
- The conveyor being working on has had any stored energy removed and if required, the belt has been secured (blocked) to prevent stored energy release.

Belt Adjustment

When carrying out conveyor belt adjustment during plant operation you must:

- Verbally communicate intentions to the tower operator before proceeding near the conveyor.
- Inspect the jack to be adjusted and determine if it can be adjusted safely.
- Wear proper PPE (no loose or torn clothing).
- Not come in contact or lean against the conveyor frame.
- Notify the tower operator when the adjustment is complete.

After Lock Out and prior to starting any maintenance:

- A test will be performed to be sure the equipment cannot be operated at the STOP-START switch.
- This will confirm a "zero energy" state and that the equipment is de-energized.

After completion of maintenance:

1. remove padlocks and return to the lock box or lock out system in place,
 - Each worker must remove his/her own lock. Do not give your key to anyone. No one should ever remove a lock on your behalf.
 - *In an emergency, or if the worker who installed a lock or other securing device is not available, a Company-authorized worker may remove a lock or other securing device in accordance with a procedure that includes verifying that no worker will be in danger due to the removal.*
2. Physically account for all workers and confirm they are clear of all equipment.
3. Re-energize equipment and work can resume.
4. Applicable entries are made in the *Generator Shut Down/Lock Out* log.

Conveyor Shoveling

When shoveling beneath the conveyors, you must:

- Wear proper PPE (no loose or torn clothing).
- Not come in contact or lean against the conveyor frame
- Stay a safe distance away by standing perpendicular to the conveyor frame.
- Not climb under, on, or over the conveyor.
- Where a control tower is used, frequently make visual contact with the tower operator, to ensure that the tower operator is aware of your whereabouts.
- Be aware of material falling off the conveyor.
- Use proper equipment to remove materials from the conveyor pan (long handled shovel, not a "D" handled shovel).
- Not use hands or feet to remove materials.
- Not remove guards or shields while the conveyor is running.
- Ensure you're on even footing. Know your reach area and surroundings.
- Not do any shoveling under the tail pulley with the conveyor operating where there is an access restriction for cleaning purposes. (i.e. tail pulley is less than one foot above the ground).

Relocating Conveyors

When moving conveyors:

- Move conveyors with mobile equipment and a signaler.
- Lower the conveyors to its lowest point when moving from tail pulley.
- When pushing/pulling the conveyor attach slings or cables from the loader to the conveyor.
 - Utilize proper rigging techniques.
- Proceed with caution to prevent damage to equipment.

When positioning conveyors:

- Make sure wheels of conveyor are chalked.
- When lowering or lifting conveyors use lifting aids.
 - When using slings or cables, lift or push in areas as recommended or marked by manufacturer.

Lock Out procedures

Lockout/isolation (controlling hazardous energy) procedures or controls should be an integral part of overall maintenance and operating procedures.



Through the hazard/risk assessment process, the requirement for lockout(s)/isolation should be identified, evaluated and controlled.

Basic steps for controlling hazardous energy:

1. Bring equipment to a complete stop.
2. Disconnect and/or neutralize all sources of energy (electric, pneumatic, hydraulic, mechanical, thermal, chemical, radiation and gravity).
3. Remove all *accumulated* energy (by purging reservoirs, removing counter weights, unloading springs, etc.)
4. Apply personal padlock(s) to each energy-isolating device.
5. Block conveyors if there is a potential for stored energy or belt movement when performing work.
6. Test the equipment to verify that it will not operate or move



Preventing Conveyor Accidents

During Operation

- Keep guards in place
- Keep work area clean
- Do not overload conveyor
- Use correct Personal Protective Equipment (PPE)
- Removing build-up of material on belt
- Unauthorized people stand or stay clear of area
- Do not perform maintenance while conveyor is running
- Never walk under or around moving conveyor
- Lower conveyor to lowest point in wind 30 mph or greater

Guarding Moving Parts

- Keep guards in place unless performing maintenance and have properly performed Lock out / Tag Out / Block Out before removing
- Keep guards in place during operation
- Return roll guards installed on roller 8ft height or less
- Typical guarded areas:
 - Tail and head pulleys
 - Chains and belts
 - Moving parts below a certain height

Hydraulics

- Hydraulic parts can be hot, let cool before performing maintenance
- Hydraulic system under pressure, escaping fluid can penetrate skin and cause injury, use correct PPE
- Block extended cylinders to keep from moving or retracting

Conveyor Start-up

- When entire length of conveyor is visible, operator must check to see if all persons are clear before starting the conveyor
- When the entire length is NOT visible, use a visible or audible warning system

Proper training on equipment includes:

- Lock out and block out procedures
- General safety practices of working around conveyors
- Performing inspections and maintenance safely
- Know and follow safety decals on equipment and components
- Identifying conveyor conditions that cause problems
 - Belt conditions
 - Tension areas
 - Eliminating fugitive material
- Belt tracking procedures
- Reading the owner's manual

Perform Lock out, Block out

- Lock out
 - The placement of a lock out device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
- Block out
 - Safely securing belt movement from stored energy. Belt may be under high tension and might have the ability to move even when system may be locked out.

Block Out - Why is it needed?

- Belt under tension is like a stretched rubber band, when tension is removed or the jam-up is cleared, the energy stored in the belt could cause the parts to move even when all electrical energy is cut to the machine.
- A belt that has no stored energy can move even with the weight of the person on it completing work."
- A belt clamp must be placed before the area being serviced then remove belt tension by pulling chain or cable come-along the opposite direction of belt travel
- Block out should be used in conjunction with Lock out / Tag out

E-Stops

- Operators should know the location and how to operate all emergency stop devices
- If safety devices are not functioning properly do not use the conveyor



Safeguards for Maintenance Activities

Hazard assessment must be done for each activity.

ACTIVITY	SAFEGUARDS
Repairs; changing mechanical, electrical, hydraulic or pneumatic parts on conveyors or related accessories	Lockout or de-energize conveyor or related accessory.
Belt replacement and splicing	Lockout or de-energize and application of a written safety procedure.
Welding and cutting	<p>Lockout if conveyor is located under the welding area, if practicable. Conveyor belts can be left running if hazard assessment determines no danger to workers.</p> <p>Lockout if the unprotected danger zone is less than 3 metres from the work area.</p>
Adjustment and fit	<p>Authorized at all times, provided adjustment points (for example, scraper, drum and take-up system adjustment) are outside the danger zone.</p> <p>Lockout if adjustment points are inside the danger zone.</p>
Greasing and oiling (lubrication)	<p>Authorized at all times where grease points are outside the danger zone.</p> <p>Lockout if grease points are inside the danger zone.</p>
Housekeeping under and around conveyor; disposal of material recovered on the belt	<p>Authorized at all times as long as the danger zone remains protected by a guard.</p> <p>Particular attention should be paid to the space under an inclined belt located less than three (3) metres from the floor (belt risk analysis).</p> <p>Reminder: An opening one (1) foot from the floor, will help in housekeeping.</p> <p>Lockout if the danger zone is not protected with a guard.</p> <p>Note: Should frequent removal of material accumulation from an operating conveyor be required, consider installing an operator workstation.</p>
Conveyor parts cleaning or maintenance (drums, rollers, chassis, etc.)	Lockout procedures apply. Operation authorized if housekeeping can be done with an automated (air or water) jet.

ACTIVITY	SAFEGUARDS
Inspection	<p>Visual and auditory inspection: permissible at all times as long as the worker remains outside the danger zone.</p> <p>If the conveyor remains operational while the worker enters to make contact with a machine part (for example, to measure vibrations), the point where the measurements are taken must not create a hazard to the worker.</p> <p>Lockout for all other cases (for example, mechanical free play measurements).</p>
Unclogging, unjamming ¹	Lockout procedures apply.
Maintenance activities not covered above	Lockout procedures apply at all times.

Equipment is designed and engineered to allow routine maintenance.

Adjustments, greasing, lubricating, temperature monitoring, vibration monitoring, cleaning, un-jamming, unclogging, and more can be done away from danger zones and without having to remove guards or other protective devices.

¹ *Unclogging may create new specific hazards (such as the hazard of falling into a hopper, etc.), which must be analyzed before starting work.*