Care and Maintenance

Introduction

Scandura is committed to assuring total satisfaction with its conveyor belting, including the technical assistance to help you avoid problems and to help solve them when they arise. Prompt service is available from your Scandura distributor or your Scandura representative. If you are having problems, and cannot solve them with the help of this manual, call the Scandura representative who calls on you.

And there is help from the home office if a problem cannot be solved in the field. Scandura's Application Engineers have many years of "hands-on" experience that is valuable for helping solve your belting problems. They are also experienced in the details of conveyor belt design and manufacture, so that a prompt, professional response is assured - including a trip to your jobsite if required.

Care and Maintenance

System Design and Belt Selection

The same channels are open to you for system design and belt selection as are open for problem-solving. Your Scandura distributor or company representative is the best source to turn to for help. Here again, both have total company backup in case a situation requires some consultation.

In addition, Scandura belting catalogs can help you make many belt selection decisions on your own. Use our Market Alerts and Keypoints Specification Sheets to collect and organize the pertinent information you need to help solve your material hauling problems.

Care and Maintenance

Splicing

In addition to Application Engineering Service, Scandura also offers a unique Field Splicing Service. Scandura's field splicing service offers technical assistance and training – we will assist you in selecting a Scandura certified splicer, and provide personal supervision if required.

Information about this splicing service can be obtained through your local Scandura representative or by calling the company direct.

Care and Maintenance

Count on Your Scandura Distributor

Your Scandura distributor is very skilled in handling all your belting needs – selection, care and maintenance and problem solving. Scandura keeps him abreast of the latest in conveyor belting technology and problem solutions, so he is an expert. Count on him. And when a problem stumps the Scandura distributor experts, Scandura's technical resources are available to help out.

Scandura and its distributors are deeply committed to the kind of service that will give you the best value for your belting dollar. You can count on it!

Care and Maintenance

Disclaimer

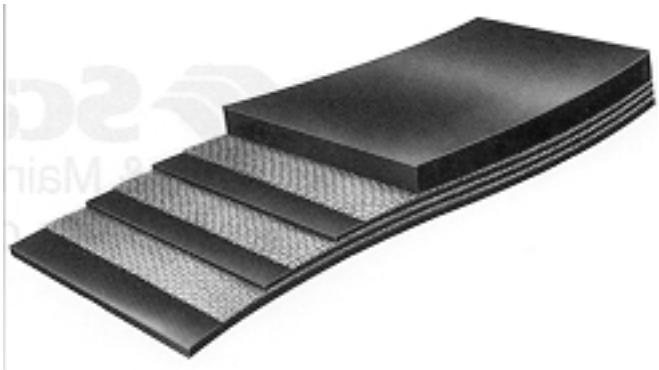
NOTICE: Scandura, Inc, provides data and specifications, written and verbal, as a service to our customers. As operating conditions and conveyor designs vary, system to system, no representation or warranty is made by Scandura, Inc. that the representative data and specifications provided herein are applicable to any individual system. Please contact Scandura, Inc. for determination of data and specifications for specific applications and designs.

Index Page

Care and Maintenance

Introduction

Understanding how conveyor belts are made will help you to properly maintain and protect your belting investment. It will also help you in selecting the best belt for your application. Basically a conveyor belt consists of a reinforced member, or carcass, and protective covers.



Care and Maintenance

Carcass Construction

A conveyor belt carcass can be made up of woven fabric, or steel cable. Scandura provides a wide variety of weaves designed for specific applications.

The strength of a rubber belt can be increased by combining several plies of fabric in the finished carcass or by increasing the fabric strength in the same number of plies; a 3 ply, 110 pound fabric belt has a per inch of width rating of 330 pounds per inch width (P.I.W.) whereas a 3 ply 150 pound fabric construction is 450 P.I.W. Each individual ply is covered with rubber skim coats that are joined together under pressure. Following application of the covers the entire unit is cured to form a lasting bond.

The quality of modern textiles, adhesives, and manufacturing techniques makes separation of these elements virtually impossible. However, if the carcass is penetrated in operation, moisture and/or abrasive materials can cause separation of the plies. Excessive wear on belt edges, which is usually the result of poor conveyor maintenance or improper belt training, can also initiate a ply separation.

Constructions are typically cut edge, - a development that has been made possible with newer adhesive systems and synthetic fabrics.

In the Scandura line, Royalon and Usflex I are outstanding examples of rubber cut edge belting. ATI is a PVC cut-edge belt. With Royalon or Usflex I you can take full advantage of volume slab production, low manufacturing costs, and durable covers and carcasses. Usflex II is a rubber molded-edge belt, and Goldline HP is a PVC molded-edge belt.

Scandura belting is designed for strength, impact, and abrasion resistance. However, it can be damaged in several ways. Belt edges can rub against skirt boards or conveyor frames. Spilled material on the return side can damage pulleys, idlers, and belting. Tension settings that are too high or too low can also adversely affect belt performance.

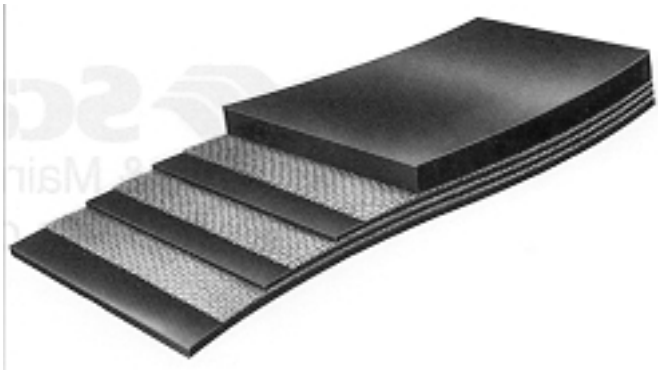


Figure 1 A cross-sectional blueprint of a Scandura cut-edge Royalon belt.

Preventive maintenance and regular inspections are the key to obtaining long, satisfactory service from your Scandura conveyor or elevator belts.

Care and Maintenance

Belt Covers

The function of covers is to protect the carcass from impact, abrasion and environmental factors. As with carcasses, Scandura provides many cover compounds designed for different service applications.

In selecting covers, temperature, speed, impact force, oil, chemical and loads must be considered so that limitations of carcasses and covers are not exceeded.

Index Page

Care and Maintenance

Storage, Handling, and Installing a New Belt

After the belt passes the manufacturing points of curing and inspection, it is wound on a 6" to 12" diameter steel, wood or compressed sawdust core with a square bar-hole. Heavy gauge polyethylene plastic is then wrapped around the roll and securely strapped to prevent damage during shipment.

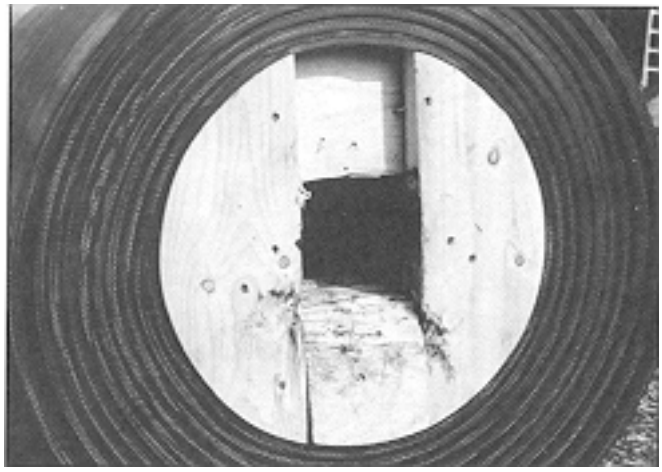


Figure 2 Scandura rubber belting is wound on a wood core with a square bar-hole.

More:

Belt Storage and Handling
Unloading
Pre-Installation Checklist
Unrolling
Installing the Belt

Care and Maintenance

Belt Storage and Handling

You can assure successful installation of your belt by remembering these important facts:

- Check for any damage as soon as the belt is received.
- Review the Packing List to be sure this is the belt you have ordered.
- NEVER DROP THE BELT
- Move belt by rolling (in the same direction as it was wound on core); moving on a skid; or hoisting with a bar through the core and a spreader.
- Store belt in a cool dry location with a temperature between 50°F and 70°F and a relative humidity between 20% and 70%.
- Leave belt packaging on belt as protection from oils, solvents, corrosive liquids, ozone and sunlight.
- Store belt in an upright position, preferably on a stand with each roll supported by a bar through its core. Prevent accidental rolling by blocking.

Index Page

Care and Maintenance

Unloading

Conveyor belting should be handled very carefully during unloading. If it is dropped or handled roughly, the protective package could break, causing the belt to unroll in a telescoping twist. Once telescoping has occurred, rerolling properly is almost impossible.

Moving the belt by rolling any great distance is not recommended. If it must be rolled, roll in the direction the belt is wound. Rolling belt in the opposite direction can cause it to loosen and telescope.

The preferred way to move a belt is with a hoisting bar and a sling or cables. If cables are used protect belt edges with special spreader bars or short wooden planks. A sling should never be used around the circumference of a roll of belting. Slings are very unstable and can cause personal injury or belt damage.

Avoid storing at temperature extremes. Even at temperatures a little below 40°F rubber compounds can harden or stiffen. When put into use, the belt may take a while to adjust to the system. Belts with Neoprene covers are especially subject to stiffening at temperatures below 40°F. Prolonged mild temperatures are required to restore its flexibility.

At temperatures over 90°F for an extended period of time, belting can undergo softening, aging, and lowered impact resistance.

Belting should be stored out of direct sunlight whenever possible. To minimize the possibility of ozone attack, belt should be stored some distance from electric generators or arc welders. Unused belt should be stored in its protective packaging until ready for use.

Care and Maintenance

Pre-Installation Checklist

Prior to installing the belt, be sure that pulleys, idlers, loading devices and other components are functioning properly.

1. Square up all pulleys.

2. Center and level all idlers in a straight line. Details for squaring idlers will be given later.

3. Buildup, especially around idlers and pulleys should be cleared away.

4. Align the belt with the conveyor. Support belt weight and level the roll.

If possible, mount belt on a stationary frame with a bar running through center. In this way, the belt will be stabilized for unrolling and threading. Good alignment is essential for good tracking onto the conveyor.

Index Page

Care and Maintenance

Unrolling

Keep solid discs in place while unrolling to help prevent telescoping.

Although belting is usually rolled with the carrying side up, check to see if this is so. Therefore, if you are threading through the carrying side of the conveyor, the belt must lead off the top of the roll. If you are threading through the return idlers, the carrying side must lead off the bottom.

Keep the belt taut as you start unrolling, to help prevent telescoping. Ropes can be used to snub the roll so it does not overrun.

If headroom is limited or if a frame and shaft cannot be used for unrolling, the belt can be pulled off the roll and reefed. This is done by laying it in large loops to prevent strain. Be careful not to kink or twist belt loops. The belt can also be mounted on a turntable with a vertical spindle. In this case, be careful the edges are not damaged in the twist that will be required.

Index Page

Care and Maintenance

Installing the Belt

Before the belt can be pulled around the conveyor some method must be used to fasten the belt ends to the pulley mechanism (bulldozer or crane winch). The preferred method is metal plates bolted to the belt end with a link for the pulling cable. Install 3/8" to 1/2" diameter bolts, uniformly spaced, across the entire belt. If the belt is being pulled over troughing idlers, bolt the pulling plate to the bottom side of the belt. The bolted plate method is much more preferred to cutting a single hole through the center of the belt or notching the corners for the pulling rope or cable. If an old belt is being replaced it can be cut and attached to the lead end of the new belt, allowing the new one to follow as the old belt is pulled off. Bolting the trailing end of the old belt beneath the leading end of the new belt will make pulling smoother. Position personnel at conveyor key points to help avoid hang-ups or belt damage.

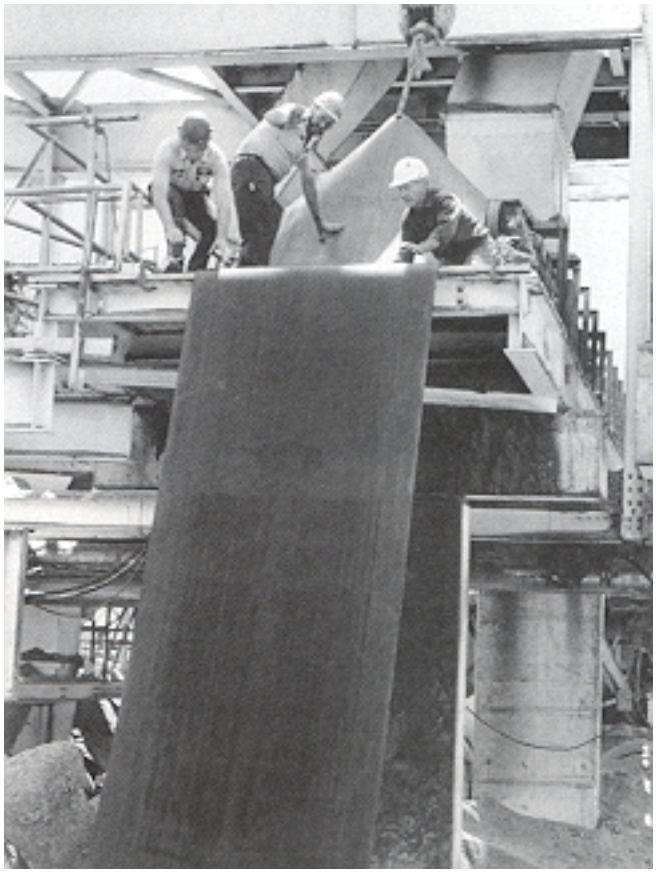


Figure 3 Threading a new belt onto a conveyor system.

Slowly pull the new belt into position. Overlap belt ends to required splicing length. Leave about 25 ft. of space between idlers (remove if necessary) to allow workspace for belt splicing.

Care and Maintenance

Belt Splicing

This section of the guide covers the essentials of mechanical and vulcanized splicing.

More:

Care and Maintenance

Setting Up The Splicing Area

It is easier to splice on a horizontal portion of the conveyor than it is on an incline. If it must be done on an incline, work at the lower end where the operation will be easier to perform.

Some shelter should be provided to keep the work area dry. A permanent structure or a temporary enclosure is the usual form of protection.

After removing 25 to 30 feet of conveyor idlers, set up a table at the splicing site with access to the work from both sides. If necessary, erect platforms to make the work accessible. Where the conveyor is too high to set up a splicing table, and more than one splice is required, a splicing table can be set up on the ground, in line with the conveyor. As each splice is completed the belt can be run onto this conveyor. Of course, the final splice will have to be made somewhere on the conveyor itself.

If logistics call for installing several belts at one point and splicing them at another, sections can be joined with mechanical splices and pulled through. When the splice reaches the splicing table, the mechanical fasteners are removed and the splice vulcanized.

Care and Maintenance

Clamping

Overlapping belt ends should be tightly clamped so that belt ends will remain firmly in place. Although clamps can be made out of wood, plate steel clamps are much more effective.

To make this type of clamp, cut large rectangular pieces of steel to length. Bond pieces of rubber pulley lagging to the side that will contact the belt.

Place one clamp 3 to 4 ft. from end of the belt. Place the other clamp 10 to 12 ft. from the other end. Secure one clamp to the conveyor frame, then draw the other one to it with chain blocks to tighten the belt. Pull to remove the sag between the return idlers with the takeup pulley in its proper position.

Preparing for the Splice

These instructions apply to both mechanical and vulcanized splices.

- Be sure belt ends are in sound condition. If they are weak or oil-soaked, cut back until you find a strong, uncontaminated area.
- Draw proper centerlines. They are essential for a good splice.
- The takeup pulley should be set to allow for the full amount of expected movement - elongation, pulley travel in start and stop, and storage of spare belting.

The subject of takeups and takeup travel is covered elsewhere in this manual, but here is a helpful tip. If takeup movement cannot be maximized when several vulcanized splices are to be made, use of a mechanical fastener in the final splice will allow the belt to operate until it has stretched enough for a vulcanized splice to be made.

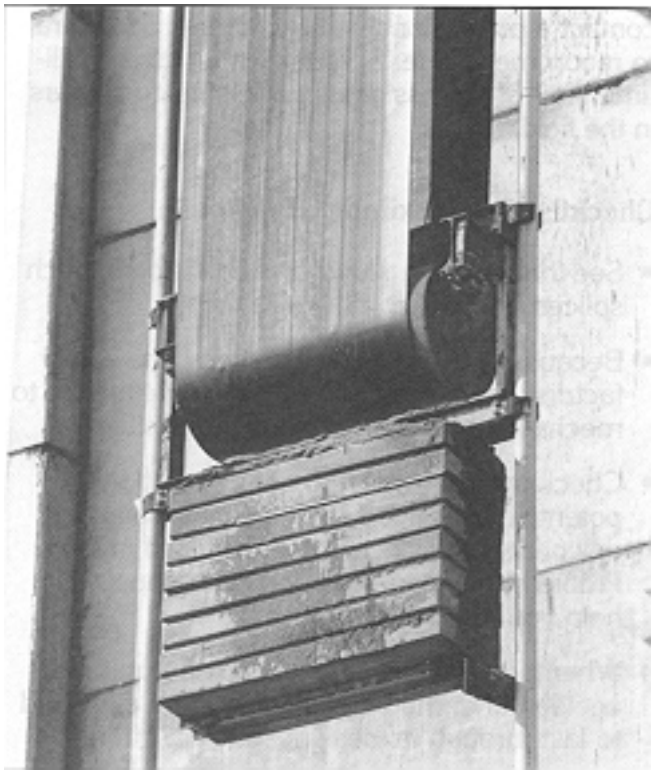


Figure 4 The takeup pulley.

Care and Maintenance

Mechanical Splices

Mechanical splices are most often used where takeup travel is limited, or where time does not permit vulcanization.

More:

Selecting the Right Fastener

Installing Fasteners

Maximizing Fastener Efficiency

Mechanical Fastener Precautions

Care and Maintenance

Selecting the Right Fastener

Choosing the right fastener calls for a study of various factors: Pulley diameter, belt thickness, belt tension, loads, materials carried, startup voltage condition, frequency of starting and stopping. Also, different types of fasteners are used for different types of belts. Hook type fasteners are fine for lightweight carcasses, but bolt and rivet-type fasteners are needed for heavier carcasses. In high tension applications, plate fasteners often work best. And in underground mining, interchangeable hinge fasteners are preferred.

Index Page

Care and Maintenance

Installing Fasteners

For well-balanced bolt-type splices, start torquing bolts at the center of the splice and work out. To obtain maximum splice efficiencies and to avoid damaging carcass fabrics, know and set torquing limits in advance.

When installation is complete, taper each corner of belt ends to prevent bulging that occurs at the edge of the splice.

Index Page

Care and Maintenance

Maximizing Fastener Efficiency

Where either belt cover is greater than 3/16", the cover can be cut away for countersinking fasteners. Stresses on the cover and the fasteners are reduced. When either belt cover is greater than 3/16", the fasteners should be countersunk to allow the fastener teeth deeper penetration into the carcass. Countersinking reduces wear of the fasteners and noise on return idlers.

Index Page

Care and Maintenance

Mechanical Fastener Precautions

Check mechanical fasteners often for wear or breakage. Where fasteners are missing, the strain on the remaining fasteners may be too great to hold the splice together.

Although a variety of fasteners may seem appropriate for your needs, be sure to check all alternatives before making your selection. Consult fastener manufacturer's recommendations for the correct fastener for your application.

Care and Maintenance

Vulcanized Splices

Although making a vulcanized splice requires more time, skill and expense, it is far superior to a mechanical splice in many regards. Compared to a mechanical splice, a vulcanized splice:

- Is up to twice as efficient, and often lasts longer than mechanical splices.
- Travels more smoothly and quietly over pulleys and idlers, with far less abrasion, damage, and noise.
- Has better resistance to localized strain.
- Has better resistance to abrasion.
- Resists harmful moisture and chemicals better.
- Resists direct heat better, inasmuch as metal fasteners conduct heat to the carcass – to weaken fabric.

Figure 5 Use only the best grade of splicing compounds such as Scandabond adhesive.

More:

Vulcanized Splicing Procedure

Index Page

Care and Maintenance

Vulcanized Splicing Procedure

Craftsmanship and care are the most important elements in a vulcanized splice. In cutting the steps, for example, the fabric should not be cut below each step.

Splice step lengths should never be shortened. And the fill-in fabric beneath the cover should likewise never be short-cut. Either type of short-cutting will seriously reduce splice life and strength.

Use only the best grades of splicing compounds, compatible with the grades of splicing materials for the belt you are splicing. Do not use outdated materials. And do not skimp on material. A proper buildup is essential for an effective cure.

Proper tools and equipment are also vital for well executed splices. A prodder is the only type of tool that should be used for separating plies. Never use a screwdriver or a knife. Make sure you have properly cooled your splice to 160°F before opening the press. This will minimize the possibility of cover or ply separation and blisters. The splice should be allowed to cool completely before being put under tension.

Figure 6 Carpenter's claw-type pincers are used for pulling away sections of belt cover and fabric plies.

This procedure pertains to rubber belting. The procedure for splicing a Scandura PVC belt incorporates a finger method and requires different kits. Contact Scandura customer service for information on procedure and materials.

Care and Maintenance

Scandura Field Splicing Services

If you do not have your own tools and equipment, contact a professional splicer. Or ask Scandura to recommend one. Scandura maintains a fulltime staff of professionals to help its customers in the field.

Care and Maintenance

Checklist For Maximum Splice Life

- See that skirting, plows and belt wipers touch splices lightly, if at all.
- Because of their higher efficiency and safety factors, use vulcanized splices in preference to mechanical fasteners wherever possible.
- Check splices regularly. Early detection of potential failure can save costly repairs and downtime later on. Conditions listed in the Problem Solving section of this manual will help you to spot incipient trouble.
- When properly executed, and without accidental damage, a splice can be expected to last through its design life.
- To minimize the number of splices, order the longest possible roll lengths. This will keep splices and their problems to a minimum.
- If you have persistent trouble with splices, contact a reputable splicing firm, your Scandura distributor, or your Scandura representative.

Index Page

Care and Maintenance

Belt Training

Following the splice, the belt should be properly trained.

Training is the process of adjusting idlers, pulleys, and load conditions to ensure that the belt does not run off center. Belts most always try to steer to the side of the idler it touches first.

When a belt trains poorly, edges can be damaged and materials can spill – with possible damage to belts, idlers, and pulleys.

More:

Before You Start Training:
Your Pre-Training Checklist:
Belt Training Procedure:
The Break-In Run
Training Devices
Belt Training Problems and Solutions

Care and Maintenance

Before You Start Training:

Square up and level the conveyor system. Be sure pulleys and idlers are square to the belt path. You may have to move some idlers forward or backward in their mountings. If idlers are being mounted for the first time, lightly tighten bolts for the training for easy adjustment. Tighten when training is complete.

Care and Maintenance

Your Pre-Training Checklist:

Be sure to make these checks before belt startup:

- Has all splicing equipment been removed?
- Are pulley shafts parallel to each other?
- Were belt structure bolts checked for tightness?
- Are belt idlers horizontal, in-line and square with conveyor centerline?
- Have self-training idlers been installed properly?
- Were belt idlers greased properly?
- Is the reducer oil at the proper level?
- Was the belt chain guard oiled?
- Does the motor have proper rotation?
- Were all tools, installation gear and foreign objects removed from area?
- Was belt gravity takeup blocking removed?
- Have belt wipers and skirting been properly adjusted?
- Are pulleys and idlers free of material buildup?
- Is the takeup carriage in good working order?
- Will head and tail pulleys be watched for possible belt runoff?
- ARE BELT EMERGENCY STOP CORDS INSTALLED?

Care and Maintenance

Belt Training Procedure:

- Always train a belt empty.
- Shift only one idler at a time.
- Pulleys should be kept square to belt travel.
- Jog belt for several revolutions while checking at head, drive, takeup, tail, and along carry and return runs for smooth passage.
- If everything is running smoothly, allow belt to run empty while continuing training steps-

1. Start at head pulley and work toward tail on the return run.

2. Begin training 4 to 6 idlers before point of maximum runout.

3. Follow directions of belt travel while making corrective shifts.

4. Each idler shift should be very slight.

When return run training is completed, begin training on the troughing side. Again, proceed in the direction of belt travel and move idlers only slightly while making adjustments.

NOTE: It is especially important that the belt be set to pass under the load point on-center, under all operating conditions. Belt will not train if it is loaded off-center.

Care and Maintenance

The Break-In Run

1. Begin by loading lightly, and increasing gradually to full capacity.

2. If necessary re-align idlers (see installation steps).

3. Be sure belt chutes are loading belt on center.

4. Check to see that belt is still centered on tail pulley.

NOTE: Where materials are loaded off-center, the belt can be forced out of alignment. Belt edges and conveyor parts can suffer severe damage if the condition continues.

Care and Maintenance

Training Devices

Most damage to belt edges occurs because the belt does not train properly. Reversible belts are hard to train. Short-centered wide belts run at slow speeds are hard to train, as are belts that operate completely on flat-profile idlers. Training problems also arise with off-center loading or conveyor system misalignment. Even under normal operating conditions, training devices must sometimes be installed to keep a belt running true.

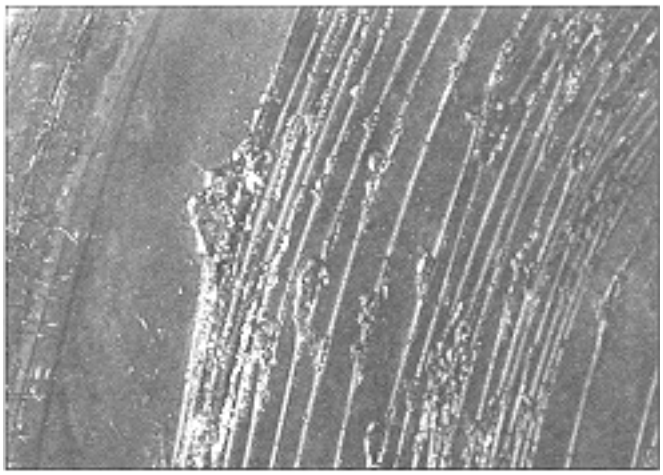


Figure 7 Belt edge damage due to poor training.

The types of devices discussed here are intended only to nudge the belt back on track if it wanders. If any of these devices are under constant stress from belt edges, the conveyor system should be examined for possible misalignment of one or more elements. Without this precaution, you will experience rapid wearout of the training device and excessive wear at the belt edge.

More:

Self-Aligning Idlers
Vertical Edge Guides
Forward-tilt Idlers
"V"-Type Return Idlers
Crowned Pulleys

Care and Maintenance

Self-Aligning Idlers

Self-aligning idlers (training idlers) are designed to move the belt back to the center when it moves to one side or the other. Most of them work best in dry conditions. In wet conditions, where lower belt/idler friction can cause a belt to wander, self-aligning idlers with actuating rollers are highly effective.

Location of self-aligning idlers is determined by belt width, speed and tension. At head and tail pulleys, they are especially helpful in keeping the belt on center. As a rule of thumb, self-aligning idlers should not be installed any closer to a terminal pulley than the belt width in inches changed to feet. For example, if belt width is 36 inches, do not install these idlers closer than 36 feet from terminal pulley. On long-center conveyors they are often specified at 200-foot intervals. Self-aligning idlers are not ordinarily recommended for convex or concave curves. As stated earlier, self-aligning idlers are not intended to contact belt edges continuously. If such a condition occurs, a more permanent solution should be found.

Care and Maintenance

Vertical Edge Guides

Vertical edge guides are free-rolling cylinders placed in fixed brackets near the belt edge. Their function is to contain the belt and prevent edge damage from contact with the conveyor structure.

Vertical edge guides are most often used on the return side of the belt, where the belt responds more easily to lateral pressure. In this application, guides are placed next to, and slightly ahead of return idlers, as well as along 50' to 100' centers. They are especially effective for training assistance where disc-type return idlers are used.

Although also designed for use on the troughing side, vertical edge guides in this position exert less sideways pressure on the belt and are therefore minimally effective. And there is a risk of snagging, if some part of the load comes in contact with the guide.

As with self-aligning idlers, vertical edge guides should make only occasional contact with belt edges. If permanent misalignment, as indicated by continuous guide/belt contact, is a problem, check the trouble-shooting chart in this guide. Early detection (and correction) of this condition is essential for obtaining maximum service from training devices as well as from your belting. Downtime, repairs and replacement costs will be minimized.

Care and Maintenance

Forward-tilt Idlers

Placed under a belt, forward-tilt idlers help to prevent lateral belt movement. Some types are pre-cast with a forward tilt, but most have to be tilted by shimming. If shimming is required, the shim is placed under the rear foot of the idler support, to tilt the idler in the direction of belt travel. The top part of this roller should not move more than 1/8" to 3/8" forward. The forward tilt will amount to about 2°. Greater tilt will result in excessive wear on the belt cover.

Care and Maintenance

Crowned Pulleys

A crowned pulley has a larger diameter at the center than at the ends. The crown should be approximately 1/8" in diameter per foot of pulley width to a maximum total of 3/8". The effect of this design is to direct the belt to the center of the pulley.

Over the years, changes in conveyor systems and belting designs have rendered crowned pulleys less desirable for training control. The added stress at the center can cause belt distortion and excessive strain.

Where crowned pulleys may help are in low-tension applications with long, unsupported spans. In these applications they may provide the only solution to training problems. Never use crowned pulleys when operating steel cord belting.

Care and Maintenance

Belt Training Problems and Solutions

Although many specific problems are addressed in the Problem Solving Chart in this manual, here are a few detailed ways to correct major problems.

One quick clue to whether the problem is in the system or in the belt is this:

If the belt is running off only at one part of the structure, alignment can be suspected; if the belt runs off all along the structure, the belt or splices can be at fault.

Here are some specific problems and their solutions.

More:

Belt Curl
Takeup Training Problems
Return Side Training
Training New Or Used Belts

Care and Maintenance

Belt Curl

Once a belt begins to curl or cup, training becomes a real problem, especially on the return side of the conveyor. If the curl is caused by excessive oil or grease, the damaged section should be replaced.

Another short-term solution is to turn the belt over, but in the process you lose the protective characteristics of the top cover. You also have the problem of increased material spillage and possible damage to vital conveyor parts.

Because curl primarily affects training on the return side, here are two improvements:

1. Reeve the belt under every third or fourth return idler.

2. Lower belt tension.

The effect of these remedies is to provide better belt/idler contact, which leads to improved training.

As indicated above, turning the belt over will also provide some relief.

Care and Maintenance

Takeup Training Problems

Most belt training problems in the takeup area can be traced to the counterweight pulley. Unless it is kept aligned and stable at all times, the belt will not train properly and can be severely damaged.

The solution: Yoking. Both horizontal and vertical counterweight pulleys should be yoked to create a harness effect. And the carriage should move freely along the guides to avoid the freezing or stalling action that can cause belt slippage.

On horizontal takeups the carriage can sometimes be derailed by accumulated debris or a sudden surge of power. Where these conditions are expected, restraining rails can be fitted above the flanged carriage wheels.

If your takeup structure is exposed to wind, it is not practical to store long lengths of belting without some sort of protection. A wind shielding device will help prevent blowing of the belt against the conveyor.

In takeup areas where long, unsupported lengths of belting can cause training problems, the use of crowned counterweight pulleys should be considered.

Care and Maintenance

Return Side Training

In some underground mining operations, training on the return side has been improved by:

1. Placing a 12" sleeve, 1/8" thick over the center area of the return idler.

2. Alternately advancing and raising each return roll.

Care and Maintenance

Training New Or Used Belts

Sometimes a new belt will take a little while to settle in. The same is true of a used belt that has been installed on a different conveyor. With the aid of mechanical training devices most belts perform satisfactorily.

Training problems are likely to remain stubborn in reversibles; belts on flat-profile idlers; and wide, short-centered belts that are running at low speeds. Because of the inherent instability of these applications, training remedies may have to be improvised.

Care and Maintenance

Introduction

The major threats to long belt life are: material buildup on idlers and pulleys; material spillage; loading impact; and training problems. The latter problem has already been dealt with. What follows is a discussion of how to minimize belt damage from the other conditions.

More:

Pulley and Idler Maintenance
Removing Spilled Material
Combating Material Carryback
Protecting Against Trapped Materials
Minimizing Idler Junction Fatigue

Care and Maintenance

Pulley and Idler Maintenance

Material buildup on pulleys and idlers can create serious training and damage problems. Pulley and idler surfaces should be cleaned as soon as buildup occurs. Here's why:

On the pulley and idler faces, material buildup can force the belt off-center, making it ride off the side of the pulley. When this happens, belt edges can be damaged by the conveyor structure. On high-tension or snubbed pulleys, buildup can weaken the belt in the area over the buildup, over a period of time.

Material buildup is usually removed from pulleys and idlers by scraping. Care must be taken not to damage pulley or idler surfaces.

Material buildup on pulleys can be controlled with scraper bars mounted near, but not touching the pulley.

Buildup on return idlers can be minimized by using disc-type return idlers, rubber-coated rolls, or solid-faced return rolls covered with rubber sleeves.

IMPORTANT: Be sure conveyor is shut down when cleaning pulleys and idlers.

Care and Maintenance

Removing Spilled Material

Spilled material can be a hazard for both idlers and belts. As it piles up it abrades idlers to the point where the shell surface becomes rough enough to damage the belt. Spilled materials can also jam idlers and pulleys, which will increase drag.

Figure 8 Hosing away spilled material.

Most spilled material can be shoveled or hosed away. If a shovel is used, care should be taken not to damage the belt or conveyor parts. Spilled material should not be allowed to fall on the return side of the belt. Since this material will then go through the tail pulley and be entrapped. This causes localized tensions in the belt carcass which may lead to damage and shortened belt life.

Care and Maintenance

Combating Material Carryback

When material that clings to the top cover of the belt is carried to the return side, it builds up on idler rolls which leads to belt and idler damage. A number of cleaning systems are available to minimize material carryback.

More:

Belt Wipers
Water Spray and Wiper Systems
Rubber Pulley Lagging
Other Belt Cleaning Aids
The Belt Turnover System
Air/Liquid Systems

Care and Maintenance

Belt Wipers

The most common method of removing built up material is some form of a belt wiper. Located past the discharge pulley, the belt wiper removes the material and allows it to fall where it can be moved away from the conveyor.

A typical setup is a strip of rubber mounted on a frame, positioned to make light contact with the belt. The wiper should not touch the pulley and the mounting bracket should be kept clear of the belt.

Scandura offers two kinds of belt wipers: the Uscothane Bead Bar Scraper and the Uscothane 4281 Resistwear Scraper. Both are highly-efficient, long-wearing alternatives to rubber wipers. The Uscothane Bead Bar Scraper uses thousands of ultra-hard slippery beads imbedded in the scraper edge of the bar.

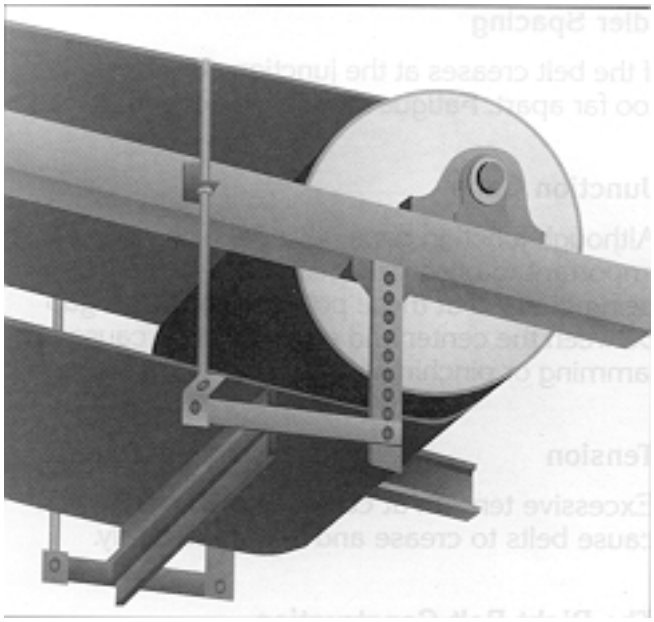


Figure 9 Conveyor belt scraper bar.

For especially sticky material, wiping is done with metal blades mounted on springs or pivoted on weighted arms to maintain pressure. Check blade pressure often to protect cover from excessive abrasion. These should be used only if other types of wipers do not work.

Care and Maintenance

Water Spray and Wiper Systems

Where wipers alone are not totally effective in removing materials, a water spray system can be added. Typically a wiper/spray system includes spray nozzles, a regulating valve, a water control valve, drainage and a wiper blade.

Care and Maintenance

Rubber Pulley Lagging

Sheets of soft rubber applied to pulleys help to remove built up material as the belt passes over the pulley.

Care and Maintenance

Other Belt Cleaning Aids

Power driven brushes and rubber spiral rolls have been offered as a solution to material buildup. However, clogging is a problem, in terms of maintenance and belt abrasion. Belts carrying dry materials can also be cleaned with compressed air.

Care and Maintenance

The Belt Turnover System

One of the most effective methods for dealing with the material carryback problems is to install a belt turnover system. As the belt makes its return run it is turned upside down, so that built up material does not contact return idlers. This type of system has more than repaid its extra cost in most applications especially on long overland installations.

Care and Maintenance

Air/Liquid Systems

Where sticky materials are handled, the belt is given a film of water applied through an air compressor. Release agents can also be applied in this manner.

Care and Maintenance

Protecting Against Trapped Materials

When lumps of hard materials are trapped between the belt and the pulley the stress is often great enough to rupture the fabric, and to damage the pulley.

Generally, material entrapment can be avoided by proper loading and by accurate belt training. Even so, spills do occur and lumps of material do get onto the return side of the belt. A number of devices are available to minimize the potential for damage from trapped materials.

More:

Plow Shaped Scrapers
Grated Decking
Vertical Screens
Winged Pulleys

Care and Maintenance

Plow Shaped Scrapers

Plow shaped scrapers are often used to deflect lumpy materials from the path of the belt to the pulley. They can be installed singularly or in pairs at a 45° angle, or they can be installed in a "V" pattern. They are positioned above the belt, over the return side. In a vertical takeup, a plow can also be used to deflect material away from the counterweight pulley.

Care and Maintenance

Grated Decking

Decking, placed between the carrying and return sides of the conveyor, catches all lumps that may be spilled. It is primarily used in loading areas, but is more effective if used along the conveyor line.

Care and Maintenance

Vertical Screens

Vertical screens in loading areas help to prevent material from spilling over onto the return side of the belt. They also shield personnel from being injured by the conveyor.

Care and Maintenance

Winged Pulleys

Where entrapment of material cannot be otherwise avoided, vaned or "winged" pulleys help to minimize belt damage. The slotted design permits large lumps to fall through the pulley without damage to the belt.

A major disadvantage is the adverse effect the vanes have on splices, mechanical ones in particular.

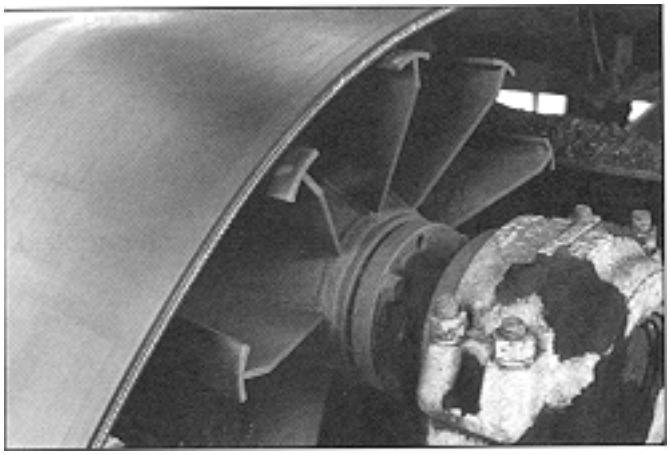


Figure 10 A winged pulley can help prevent material entrapment.

Care and Maintenance

Minimizing Idler Junction Fatigue

Idler junctions are points of major stress for a conveyor belt. And any of these junction problems can cause the belt breakdown problem known as idler junction fatigue: Wrong trough angle; insufficient transition distance; varying idler heights; sharp curve radii; and several others that will be covered here.

More:

Trough Angle
Transition Distance
Varying Troughing Idler Heights
Convex Curve Radii
Idler Spacing
Junction Gaps
Tension
The Right Belt Construction

Care and Maintenance

Trough Angle

The sharper the trough angle, the more belting is subject to longitudinal creasing and flexing. Minimize the trough angle whenever possible to avoid this cause of fatigue.

Care and Maintenance

Transition Distance

Idlers must be spaced far enough apart that the belt will not be excessively stressed in going from flat to troughed travel, or the reverse. The stresses set up by too short a transition distance can dramatically shorten belt life. For a transition distance recommendation on a specific application, contact the Scandura Application Engineering Department.

Care and Maintenance

Varying Troughing Idler Heights

When an idler at a transition point is higher than an adjacent idler or pulley, the belt will flex excessively at that point and fatigue the carcass.

Care and Maintenance

Convex Curve Radii

Too short a radius on a convex curve sets up fatigue potential that is similar to uneven troughing idler heights. The curve arc should be as smooth and gradual as possible.

Care and Maintenance

Idler Spacing

If the belt creases at the junction, idlers may be too far apart. Fatigue can quickly occur.

Care and Maintenance

Junction Gaps

Although junction gaps have been pre-set, it is important to observe whether or not the belt is being creased at these points. Too wide a gap between the center and edge rolls can cause belt jamming or pinching.

Care and Maintenance

Tension

Excessive tension at curves and transition can cause belts to crease and fail prematurely.

Care and Maintenance

The Right Belt Construction

If you are experiencing belt failure as a result of idler junction fatigue, the cause could also be in the type of belt you are using. Be sure that the belt is able to support intended loads at the idler junctions. A study of different belt specifications will provide you with the correct load-support information. Refer to Scandura catalogs for load support criteria.

Care and Maintenance

Loading Area Precautions

Abrasive action and load impact are greatest in the loading area. It is therefore important to minimize these effects for longer belt life.

First, the location of the loading area should be set up past the tail pulley, with enough belt area to be fully troughed before the load is accepted.

Second, in setting up the loading assembly, be sure that no part of it can ever come in contact with the belt (with the exception of the skirtboard rubber).

Be sure to account for heavy vibration at the loading point that may cause lateral belt movements.

Since almost all top cover abrasion occurs at the loading point, it is to your advantage to set up the load for minimum wear in this area.

Figure 11 A proper loading area showing a skirting system and a loading chute.

More:

Loading Angle

Speed of Loading

Full Loading vs. Partial Loading

Steps to Minimize Impact Damage at the Loading Point

Care and Maintenance

Loading Angle

Load on the flat conveyor angle whenever possible. Loading on an incline increases turbulence when material strikes the belt which results in premature belt wear.

If the belt must slope, a short flat loading area ahead of the slope should be considered. On a sharp slope, loading should take place on an incline of less than 9°, with a gradual curving of the belt to reach the desired angle. For minimum abrasion, loading in the direction the belt is traveling is much to be preferred to loading from the side. Loading at an angle can also push the belt to one side - damaging belt idlers and belt edges.

Care and Maintenance

Speed of Loading

Try to match your loading speed to the belt speed. When a slow-moving load hits a faster moving belt, cover abrasion is much more severe than when both speeds are approximately equal.

A belt run at a relatively low speed is less susceptible to abrasion damage when it crosses over idlers.

Care and Maintenance

Full Loading vs. Partial Loading

A slow-moving belt, fully loaded, can carry as many tons per hour as a faster-moving belt, partially loaded. And it is a lot easier on the belt. Very little more of the surface is exposed to abrasion, and the potential for abrasion at the idlers is less.

In opting for a higher loading at lower speeds, be sure not to exceed the operating tension on the belt. Operate only at or near the rated capacity of the belt.

Care and Maintenance

Steps to Minimize Impact Damage at the Loading Point

As with excessive abrasion, impact damage occurs most frequently in the loading area. The steps that can reduce impact damage in this area are given below.

Figure 12 Belt damage due to impact.

More:

Height and Angle of Drop
Special Idlers
Other Low Impact Feeders
Steel Baffles
Load-Directing Skirt-Boarding
Determining Skirt-Board Length and Height
Skirt-Board Installation Tips
Shapers
Skirting Rubber
Installing Skirting Rubber

Care and Maintenance

Height and Angle of Drop

The lower the drop and loading angle, the less danger of impact damage.

A chute with a low angle helps to lower the impact of lumps. Too low an angle, however, can cause material to clog. Straight steel chutes are usually more effective than curved chutes. Openings should be about 2/3 the width of the belt.

To further reduce the risk of lump damage, cut a rounded notch at the mouth of the chute. Finer particles will drop on the belt first and cushion the shock of large particles and lumps. Pre-cushioning the load against big-lump impact can also be accomplished with screens and grates inserted in the chute ahead of the loading point.

Care and Maintenance

Special Idlers

Loads should not be discharged onto steel idlers or pulleys because the continued impact can soon damage a belt and the idlers. If heavy loads must be dropped onto idlers:

1. Replace metal idlers with rubber-cushioned impact idlers, or

2. Replace metal idlers with zero pressure rubber tires.

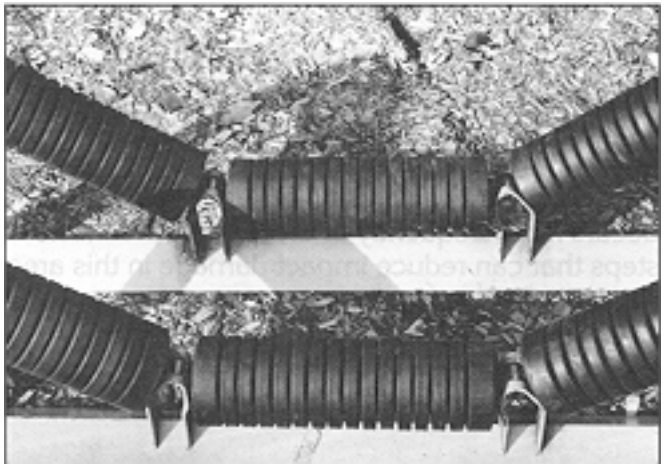


Figure 13 Rubber-cushioned impact idlers.

Care and Maintenance

Other Low Impact Feeders

The effect of high impact loading can also be softened by feeder belts and mechanical feeders. A feeder belt is higher in strength, and travels only a short distance. Although it is used sacrificially, it is easier and cheaper to replace than the main belt.

The use of feeder belts for extremely punishing loading conditions is recommended. This concept employs a short length, extremely thick, belt located between the loading chute and the main belt designed to withstand more damage and is easier and less costly to replace than the main belt.

Depending on the material handled, mechanical feeders can take the place of feeder belts. These mechanical feeders are variously these types: Screw, apron, Ross, reciprocating plate and vibrating.

Care and Maintenance

Steel Baffles

Baffles made of sheet iron or steel bars and hung inside the chute help to slow large lumps falling at great speed. Heavy chains are also suspended over chutes as a substitute for fixed baffles.

Care and Maintenance

Load-Directing Skirt-Boarding

As material is being loaded onto a conveyor belt it must be contained long enough for the load to settle. Also, material must be kept from spilling over the belt edge. Skirt-boards are designed to handle both of these problems. Made of lengths of wood or metal, skirt boards help to prevent spills and direct the load onto the belt.

Although extremely useful, skirt-boards should be installed with care. If material lodges under a board it can quickly wear a belt cover away. Also, if a fatigued belt begins to turn up at the edges it may contact the skirt-board and be damaged further.

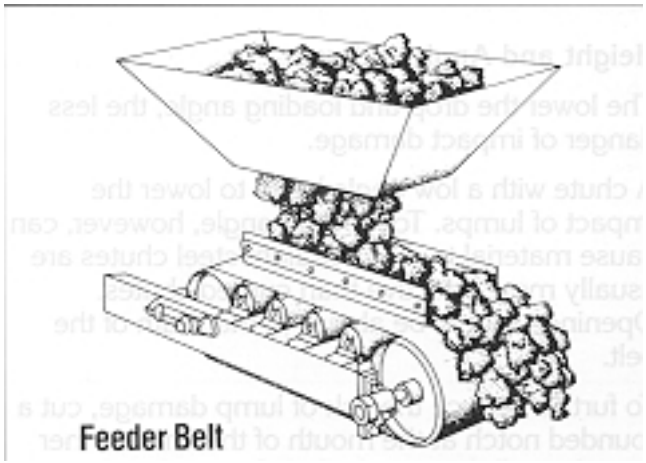


Figure 14 Load-directing skirt-board.

Care and Maintenance

Determining Skirt-Board Length and Height

In most applications, skirt-boards are required for only the distance it takes for a load to settle. In a horizontal loading, settling occurs about ten or fifteen feet past the loading point. The greater the incline the longer the load takes to settle. Simple observation will determine the length of skirt-board required. In extreme cases, skirt-board may be required along the entire lengths of the belt to prevent spillage.

One popular formula for determining the length of the skirt-board is to make it three or four times the width of the belt. Another formula is that boards should be two to three feet in length for every 100 FPM of belt speed. Experience will show which formula is best for your application.

The skirt-board should be high enough to contain the load at normal operating capacities. For belts, the height for 20° idlers is about 20% of the belt width. Height on conveyors with 35° and 45° idlers is about 1/3 of belt width. Loads that normally carry large quantities of large lumps may have to be higher.

Care and Maintenance

Skirt-Board Installation Tips

Skirt-boards should be installed high enough above the belt that they cannot possibly touch the cover. They should taper up slightly so that material will not wedge under boards as the load moves along. Once you have determined the minimum height at which the board cannot touch the belt under all operating conditions, taper the board upward.

When fine material is being carried, a taper of 1/4" per foot of length is suggested. With partially lumped material a taper of 1/2" is recommended.

Begin the skirt-board installation at the loading chute with the ends set at about 2/3 of the belt width. Fan them out so that the other ends widen to the belt edges.

Care and Maintenance

Shapers

Wood or metal wedges can be attached to the belt side of the skirt-board to direct large lumps onto the belt. Their service can be prolonged by the use of rubber covers. Shapers should not be installed directly opposite each other. It may be necessary to make several adjustments before the most effective placement can be determined.

Care and Maintenance

Skirting Rubber

Skirting rubber is used to close the gap between the skirt-board and the conveyor belt. Its functions are to help keep material from jamming under the board and to minimize spillage of fines.

Although old pieces of belting have been used as skirting, the practice is not recommended. As fines accumulate in the belt fabric an abrasive action is set up that is very harmful to the belt covers.

A better method is to use solid rubber slabs that do not retain abrasive materials.

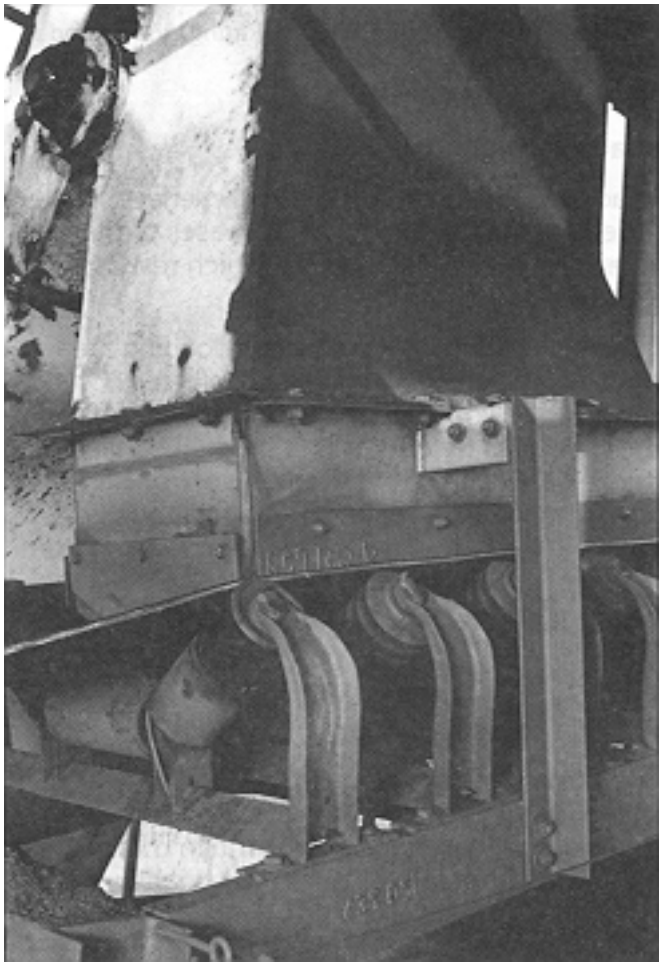


Figure 15 Skirting rubber.

Care and Maintenance

Installing Skirting Rubber

Drill or punch elongated bolt holes in the rubber, so that the rubber slab can be adjusted downward as it wears against the belt.

The following chart shows the thickness of the rubber skirting recommended for various applications.

Type of Material	Estimated Thickness of Rubber Skirting (in inches)
Non-abrasive materials such as wood chips, flue dust, loose cement or very fine coal.	3/16 - 1/4
Mildly abrasive materials such as sand, earth or bituminous coal. Rock or coal under 3 in. size.	1/4 - 3/8
Abrasive materials such as anthracite coal, coke or sinter. Overburden or coal up to 10 in. size. Iron and copper ores or limestone under 9" in size.	1/2 - 5/8
Heavy, sharp abrasive materials such as iron, copper, zinc, lead ores, and limestone trap rock, quartz, glass cullet, etc. Any hard, heavy, sharp ore over 9 in. size.	5/8 - 3/4

Care and Maintenance

Location and Operation of Takeups

Takeups perform a number of vital functions:

- They apply tension on the slack side of the drive pulley to help prevent drive slip.
- They maintain tension under changing load and speed conditions.
- They minimize belt sag between troughing idlers which reduces belt wear and power requirements.
- They compensate for changes in tension as the belt stretches or shrinks in operation.

The takeup area itself serves as a storage area for spare belting, convenient for emergencies.

Ideally, the takeup is installed adjacent to the drive pulley. This is not always possible, as is the case with tail-end drives. In these instances, select the most accessible location for takeup service.

More:

Manual and Automatic Takeups
Tensioning the Takeup
Do Not Overtension!
Allowable Takeup Movement

Care and Maintenance

Manual and Automatic Takeups

There are two type of takeups – manually-adjusted and automatic. Manual takeups are screwed or winched into a fixed position with static tension adjustments made as required by hand. This type of takeup does not adapt as readily to changes in tension as an automatic one. However, they are often used on conveyors with short centers and in areas where space is limited, as in underground mining.

Automatic takeups are designed to equalize tension automatically as changes in tension occur. They can be of the horizontal or vertical type, with tension adjustments made by counter-weights or hydraulic devices.

Care and Maintenance

Tensioning the Takeup

The amount of takeup tension that will be required is determined by the location of the takeup assembly. The counterweight must apply the maximum static tension to prevent drive slips and belt sag under all operating conditions. For most installations, the counterweight need only equal the combined tension of the carrying and return sides of the belt.

Where takeup travel is restricted, a double-reeved counterweight system can be installed.

Although it saves space it must now offset maximum belt tension in four belt positions and it doubles counterweight requirements.

Care and Maintenance

Do Not Overtension!

In any takeup assembly, be careful not to overtension the belt. Overtension can fatigue belts in marginal curves, pulleys and transitional locations: reduce belt/idler contact and create training and edge damage problems on the return side of the belt.

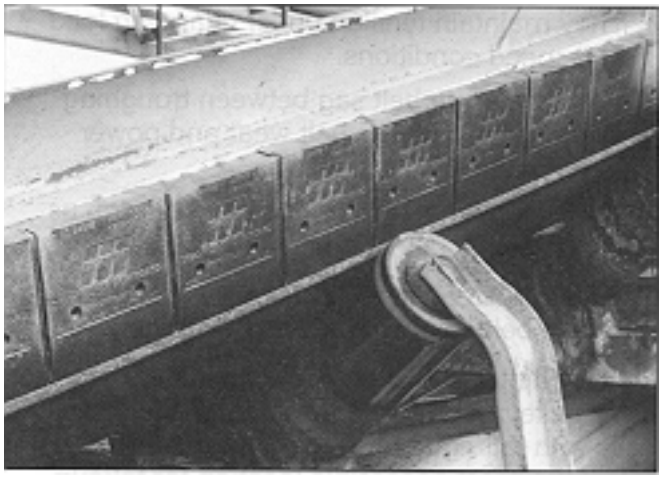
Care and Maintenance

Allowable Takeup Movement

The takeup pulley should move so that it does not strike its stops in any phase of belt operation - loading, unloading, acceleration or deceleration. It should also be set to adjust to anticipated elongation and shrinkage of the belt under typical operating conditions. Consult your Scandura representative for takeup position for a specific application.

Care and Maintenance

Idlers



More:

Standard Troughing Idlers

Offset Idlers

Deep Trough Idlers

Catenary Idlers

Return Idlers

Idler Spacing

Graduated Idler Spacing

Idler Spacing on Convex Curves

Spacing on Concave Curves

Idlers at Transition Points

Idler Care and Maintenance

Care and Maintenance

Standard Troughing Idlers

Standard troughing idlers have three rolls of equal length and diameter. They are usually mounted at 20°, 35° or 45° angles and roll on anti-friction bearings. Roll diameters vary from 4" to 7". Diameters below 5" are generally used where lighter duty is evident or where clearances are close. Larger diameters are usually required for heavier-duty applications.

The carrying capacity of a system can often be altered by changing the length of the center roll to widen or narrow the trough. Rolls of unequal length may also be specified, but only after the effects of this type of idler on material flow and belt performance have been studied.

Care and Maintenance

Offset Idlers

In an offset idler, the center roll is positioned behind the concentrating rolls. The most common use is in installations with minimal clearances. Offset idlers offer more protection against idler junction fatigue than the inline type.

Figure 16 Offset idler.

Care and Maintenance

Deep Trough Idlers

Although 20° troughing idlers were once standard, angles of 35° and 45° are now more commonly in use. The benefits of deeper troughs, inline or offset, are:

- Greater cross section for more tons per hour.
- Less cover wear per ton of material carried.
- Use of a narrower belt is possible - for savings on belting and hardware.
- Reduced potential for material spills.
- With most materials, a deeper trough allows for more distance between idlers.

In choosing a deep-trough over a 20° trough, it must be kept in mind that deep-trough idlers require a larger curve radius and longer transition distances for optimum belt performance.

Care and Maintenance

Catenary Idlers

Catenary idlers are most often used in handling light-to-medium materials such as coal and grain, and are mounted at each edge of the conveyor. They offer less of a jolt to transversing loads than standard idlers.

Care and Maintenance

Return Idlers

Return idlers are generally flat, with the same roll diameters as the carrying idlers. They should be at least three inches longer than the width of the belt to allow for lateral movement. Use of longer idlers will further reduce the risk of belt edge damage.

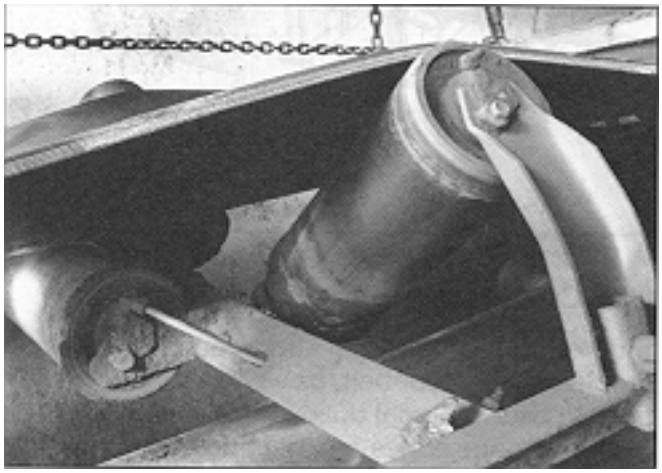


Figure 17 Return idlers.

Because the belt is especially prone to wandering on this return side, self-aligning return idlers are a good investment, especially where the belt crosses the tail pulley. In this area, it is critical that the belt enter on center.

Care and Maintenance

Idler Spacing

Excessive sag between idlers can cause load shifts that abrade belts, spill materials, and in the case of steeply sloped belts, create an avalanche. Belt sag can be kept to a maximum of 2% with idler spacing at four-foot intervals along the carrying side. By increasing the tension, the idler spacing can be increased and still maintain the 2% maximum sag.

Care and Maintenance

Graduated Idler Spacing

As shown by the accompanying sketch, sag can be controlled by spacing idlers closer together at the tail pulley and farther apart towards the head. This method saves on belt wear, power and the total number of idlers required.

The principle behind this concept is simple. Belt tension is lower at the tail end, so that sag is more of a problem. In addition to possible load shifts, material jamming and spillage can occur between loads and skirtboards. To counteract sagging in this area, idlers are spaced at, perhaps, five-foot intervals for half the flight, and at six-foot intervals for the remainder. In some instances, idlers must be placed 12 to 18 inches apart to prevent excessive spillage and belt vibration.

Although six feet is generally considered the maximum spacing between carrying idlers, a spacing of eight to ten feet can be used on very high tension or heavy-duty troughing applications.

On undulating or declining conveyors, tension should be calculated for all loading conditions as the conveyor accelerates or decelerates. Idlers should be spaced to minimize belt sag along these systems.

Care and Maintenance

Idler Spacing on Convex Curves

To avoid belt edge overstress or idler junction fatigue, the curve radius and idler spacing must be designed properly. In cases of space limitations a lower trough angle may have to be installed. The drawback to that solution is reduced conveyor capacity.

Troughing idlers through the convex curve should be positioned on the curve arc, not on structural chords, and may require shimming to fit the arc profile. Idler spacing should be no more than half the spacing distance on the remaining idlers on the conveyor.

Care and Maintenance

Spacing on Concave Curves

On concave curves, radii should be large enough to prevent bending of belt edges. Idlers should be spaced to keep sag to a minimum when the belt is fully loaded. As with a convex curve, idlers should be placed on the arc of the curve - not on the structural chords. Shim idlers, if necessary.

Care and Maintenance

Idlers at Transition Points

As a belt moves from a flat to a troughed configuration, the stress of the change can be eased through the use of idlers with adjustable concentrating angles. These idlers minimize junction strain through a gradual curving of the belt to a troughed contour.

To be sure that your transition distances are compatible for your belt, contact your Scandura representative.

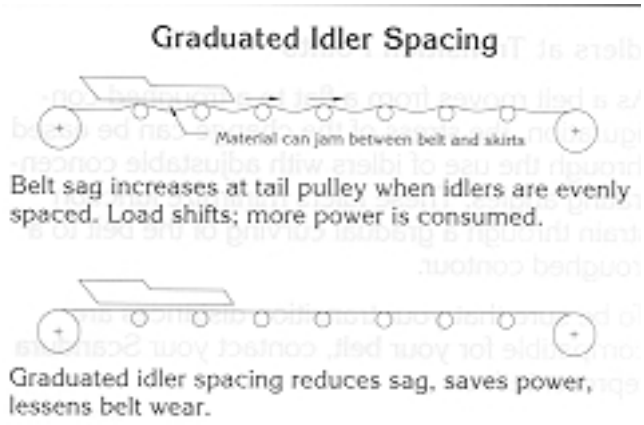


Figure 18 Idlers At Transition Points

Care and Maintenance

Idler Care and Maintenance

Dirty or under-lubricated idlers can cause serious problems with your belt, as well as with your power costs. Material buildup can move belts off line to damage edges and bearings can jam or freeze from material buildup. Jammed rollers drain system power and if the shells are scored badly enough, damage the belt cover. Regular inspection and maintenance are essential.

Although you may maintain a schedule of lubricating idler bearings on a regular basis, it helps to check them periodically. Certain materials or environmental conditions may indicate that selected idlers may require more frequent attention. Even self-lubricating idlers should be inspected regularly.

Idlers should not be over-lubricated. If oil or grease fall on a belt that is not oil-resistant, the rubber will deteriorate and eventually not be able to protect the carcass.

Where bearing seals are overgreased, dirt can mix with the grease and wear away the seal to damage bearings.

Care and Maintenance

Pulley Lagging

Lagging is used for a variety of reasons. It increases friction between the belt and the drive pulley to permit lower belt tensions, helps to prevent drive slip in wet operating conditions, and a soft type of lagging helps to wipe away material buildup at drive snubs and takeup bend pulleys. Lagging also reduces wear on pulley surfaces, whether from normal use or from occasional fabric creep. Lagging also helps to reduce noise to levels required by law.

More:

Types of Pulley Lagging:

Care and Maintenance

Types of Pulley Lagging:

Vulcanized

Replaceable Lagging

Sheet Lagging

Strip Lagging

Magnetic Pulleys

Grooved Lagging

Care and Maintenance

Vulcanized

Vulcanized lagging is chemically bonded to the pulley surface by the pulley manufacturer or by a rubber fabricator. It is widely used in high-tension applications, and is the most common form of lagging.

Care and Maintenance

Replaceable Lagging

Known as Slide-lag, this method of lagging involves metal panels bonded to rubber that fit into metal channels welded onto the circumference of the pulley. As the lagging wears out individual panels can be easily replaced - without removing the pulley.

Because of economies of time and cost, use of replaceable Slide-lag is rapidly becoming more widespread.

Care and Maintenance

Sheet Lagging

Sheet lagging is supplied in a wide variety of widths, gauges and compounds. It is normally bolted onto the pulley in the field.

On open-end steel or cast-iron pulleys, lagging is fastened with flat-head elevator bolts. For welded steel pulleys, flat-head screws are recommended. Recessed or countersunk washers should be used under the heads of flat-head screws.

Care and Maintenance

Strip Lagging

Strip lagging is typically furnished in 2 1/2" rubber strips with a fabric-reinforced back. It is cemented and bolted to the pulley, using the same types of fasteners that are used in sheet lagging.

Care and Maintenance

Magnetic Pulleys

Special care must be taken in applying lagging to magnetic pulleys. There is a danger of drilling into electrical windings or the insulation. A drawing of the pulley will show where it is safe to drill. To lag crowned magnetic pulleys, it is safe to drill at the edges and at the middle. Then apply two half- width lagging slabs. On a flat-faced pulley a full-width sheet can be used. Lagging is usually reinforced with a fabric.

Care and Maintenance

Grooved Lagging

Putting grooves in lagging improves the coefficient of friction of pulleys operating under extremely wet conditions. This added friction is especially important on long, sloping conveyors, where drive slip must be minimized.

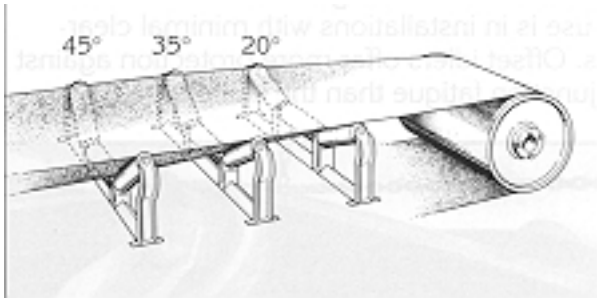


Figure 19 Grooved Lagging

Pulleys can be ordered with the grooved lagging already installed, or smooth lagging can be installed and grooved in the field using a tire re-grooving tool. Cut grooves 1/8" deep and 1/4" wide on 1/2" centers.

Grooves can be cut directly across the lagging surface, or they can be cut in a herringbone "V" pattern. The point of the "V" should face in the direction of pulley rotation. V-grooves can also be cut in both directions.

Care and Maintenance

Environmental Effects on Conveyor Belting

Moisture, sunlight, ozone, chemicals, heat, cold and petroleum products all have an influence on belt performance and life.

More:

Care and Maintenance

Moisture

Moisture has long been an enemy of conveyor belting, especially those made with cotton and rayon carcasses. When attacked by moisture they rot, weaken and lose adhesion. Early detection and repair of cover damage will help prevent these conditions.

Nylon and polyester carcasses are unaffected by moisture, but regular cover inspection and repairs are necessary to prevent abrasive particles from entering cuts and grinding on carcass fabrics.

Belts with steel cable reinforcement are also subject to deterioration from moisture if they are exposed due to cover damage. The cords may corrode which will lead to tensile strength loss and low adhesion.

Surface moisture can also be a problem. Material can cake on pulleys, idlers and belt surfaces to detrain the belt. Moisture can also cause slippage. Material caking can be removed by installing belt wipers near the drive pulley.

Care and Maintenance

Effects of Sunlight

The effects of sunlight are especially severe in hot, dry climates and at high altitudes. Rubber, especially under tension, will dry out and crack. Because cracking can be expected under these conditions, any sort of protection will be beneficial. Leave belts in their protective packages while in storage. Scandura rubber covers are compounded to minimize the degradation that results from sunlight exposure.

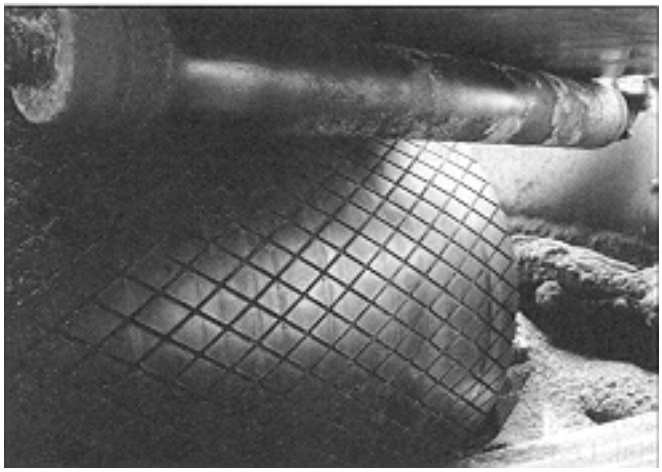


Figure 20 Excessive sunlight can cause rubber belting to dry out and crack.

Care and Maintenance

Effects of Ozone

Regular exposure to ozone will cause rubber to crack and lose its tensile properties. Ozone is produced by ultra-violet rays from the sun, electric arc welders, and electrical generating equipment. Although there may be no protection from sun-produced ozone, covering belts that are near electrical ozone-producers will minimize industrial ozone effects. Scandura uses ozone inhibitors in rubber compounds for above-ground applications. Contact Scandura Application Engineering for best cover recommendation.

Care and Maintenance

Effects of Heat

Storage of belts at temperatures over 90°F for long periods of time can dry out and weaken covers. In carrying hot materials, the effect is the same. If a hot load is carried in a closed area, the effects are more severe than in an open one. Where heat is a problem, Scandura offers you a variety of heat resistant carcasses and compounds.

Care and Maintenance

Effects of Cold

Although low temperatures rarely have a harmful effect on rubber compounds, the stiffening of the belt may cause training problems until it warms up. This is especially true of belts containing neoprene compounds. Before these belts will train properly, they must be warmed to a temperature above freezing.

Frost, snow, and ice can also affect belt performance:

- On an incline surface a layer of frost can cause load slippage.
- Ice can build up on conveyor hardware and cause more damage than material buildup.
- Ice can form on the troughed side of the belt and plug chutes.

The preferred method for removing cold-weather glazing is ethylene glycol. Calcium chloride solutions are also sometimes used, but they can corrode conveyor parts.

Ice buildup should be removed before the conveyor is started. If the system must be kept ice-free at all times, the gallery should be covered and heated if possible.

The general effects of cold on conveyor systems are increased power demands during startup, freezing up of rotating mechanical parts, and causing drive motors to stall.

Care and Maintenance

Effects of Oil

When rubber is attacked by oil or grease it swells and loses tensile strength, abrasion resistance, and adhesion. Belts will wear rapidly or curl in reverse.

Scandura offers a complete line of oil-service conveyor belts, compounded to specific oil-resistance needs.

Care and Maintenance

Effects of Chemicals

Certain chemicals can affect PVC and rubber compounds. The attack on the compound can cause blistering, cracking, and total deterioration. Scandura manufactures a wide variety of chemical resistant belt styles. Please consult with a Scandura representative for a proper recommendation.

Care and Maintenance

Conveyor Slope Limitations

Conveyor slopes can pose difficulties. If the pitch is too great, or the belt is running too fast, or it is only partially loaded, part or all of the load will slip and will sometimes avalanche. For these reasons, slopes should be made as gradual as possible. The following table provides the maximum angle at which various materials can be carried with minimum risk of slippage.

Table 1 Maximum Angles for Conveyor Slope

Material	Max. Angle (degrees)
Cement, loose Portland	23
Coal, anthracite, run of mine	16
Coal, bituminous, run of mine	18
Coal, bituminous, sized	16
Coal, bituminous, slack	22
Coke, screened	18
Coke, breeze	20
Concrete, 6 in. slump 4 in. slump 2 in . slump	12 20 26
Earth, loose	20
Glass batch	21
Grains, whole	15
Gravel, bank run	20
Gravel, sized, washed	12
Gravel, sized, unwashed	15
Gypsum, powdered	23
Lime, powdered	23
Logs, debarked	10
Ore, finely crushed	20
Ore, mixed lumps and fines	18
Ore, sized	16
Packages, paper wrapped and flat on bar duck or smooth, rubber-coated belting	16
Rock, finely crushed	20

Rock, mixed lumps and fines	18
Rock, sized	16
Salt	20
Sand, bank run	20
Sand, dry	16
Sand, tempered	24
Sulfur, powdered	21
Wood chips	27

Full-loads and slow speeds help to maintain load stability on steeper slopes. On a long slope, belt construction should reflect the higher tensions involved.

On declining conveyors, maximum slope angle can be increased by one or two degrees when loading is nearly horizontal, and belt is fully loaded.

For wet, sloppy material, decrease maximum slope angle to minimize slippage.

The maximum slope angle of materials can be increased by using an impression top or cleated conveyor belt. The impressions support the load and prevent the material from sliding down the belt toward the loading area. In PVC, Scandura offers 5 different impression-top patterns and 3 custom cleated designs. In Rubber, Scandura makes 4 rib-top impression patterns. The same tension ratings and compounds offered with our standard belting are also available on incline belt styles.

Care and Maintenance

Conveyor System Safety Practices and Devices

Care and Maintenance

Personal Safety

Working around a conveyor belt can be dangerous. There is a danger from spills, of being caught in the machinery, or of falling on the conveyor. Here are a few precautions you can take.

Whenever there is maintenance work to be done, it is safest to shut the belt down first. The main switch should be pulled and locked out.

Common sense also dictates the use of safety shoes on wet or slippery surfaces, and particular caution on catwalks and ladders.

Care and Maintenance

System Safety Devices

A variety of safety devices are available to protect the conveyor belt from severe damage. The shutdown cord is one of the most important. But where operators cannot see all areas of the operation, auxiliary safety devices are available.

Care and Maintenance

Lateral Movement Controls

Where a belt is in danger of being damaged by wide lateral movements, vertical levers are mounted between the belt path and the conveyor frame. If the belt trips the lever, the system shuts down automatically, or an alarm is sounded to alert the operator.

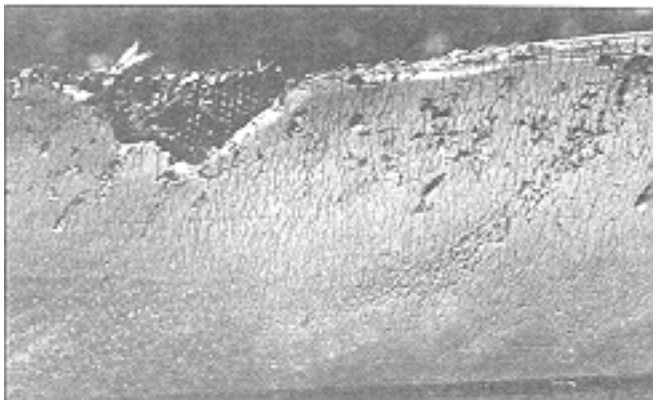


Figure 21 A proper shutdown cord is one of the most important safety devices.

Care and Maintenance

Plugged Chute Shutoffs

When a chute gets clogged, material builds up in the hopper. If the hopper overloads and spills, the belt behind it can be severely damaged. The usual protection against such an event is an electric eye or a contact relay switch that works in conjunction with a paddle or baffle. As the hopper fills, the material pushes a swinging baffle that stops the conveyor before belt damage can occur.

Care and Maintenance

Speed Control Devices

A belt running too fast or too slow can severely damage an adjacent belt. Both extremes indicate a malfunction in the system, both serious enough to indicate a shutdown.

Care and Maintenance

Slowdown Protection

Centrifugal switches, located along belt paths or at idlers, are activated when a belt slips or stalls. When the belt speed decreases, the switch automatically stops the system to prevent overloading or belt damage.

Care and Maintenance

Sequence Protection

When a belt on a conveyor with several flights stops, belts behind it should also stop. Sequence switches are set to react so that normal loading can resume when the stopped belt is at its optimum loading speed.

Care and Maintenance

Overspeed Controls

On steep declining slopes, conveyors can lose power, or belts can slip – resulting in a runaway of the load. To control an overspeeding belt, switches can be installed to open the motor control circuit or activate a brake or some other type of holdback device. Located under the belt, a switch of this type will react to overspeed from any cause. If it is located on the motor or drive pulley it will not detect overspeed due to belt slip.

Care and Maintenance

Holdback Systems

When power is accidentally shut off or a belt begins to slip on an inclining slope, a loaded belt will start to roll backward. A holdback system senses the change in direction of the belt through the belt, an idler or a pulley and activates a braking mechanism that stops the belt.

Care and Maintenance

Other Belt Protection Methods

Where high temperatures can damage a belt, water sprays can be used to cool it.

Activity at any point along the system can be monitored by television. Cameras transmit images to a central control point where immediate action can be taken if a malfunction occurs.

Care and Maintenance

Magnetic Protective Devices

Magnetic separators are used most often to remove unwanted metallic objects (e.g., tramp iron) from the load. Magnets can also separate magnetic and non-magnetic metals and sort materials with different degrees of magnetic attraction. Generally, magnetic separators are either built into the conveyor system as magnetic pulleys or suspended over the conveyor on a hoist.

More:

Magnetic Head Pulley

Suspended Magnets

Magnetic Field Detectors

Care and Maintenance

Magnetic Head Pulley

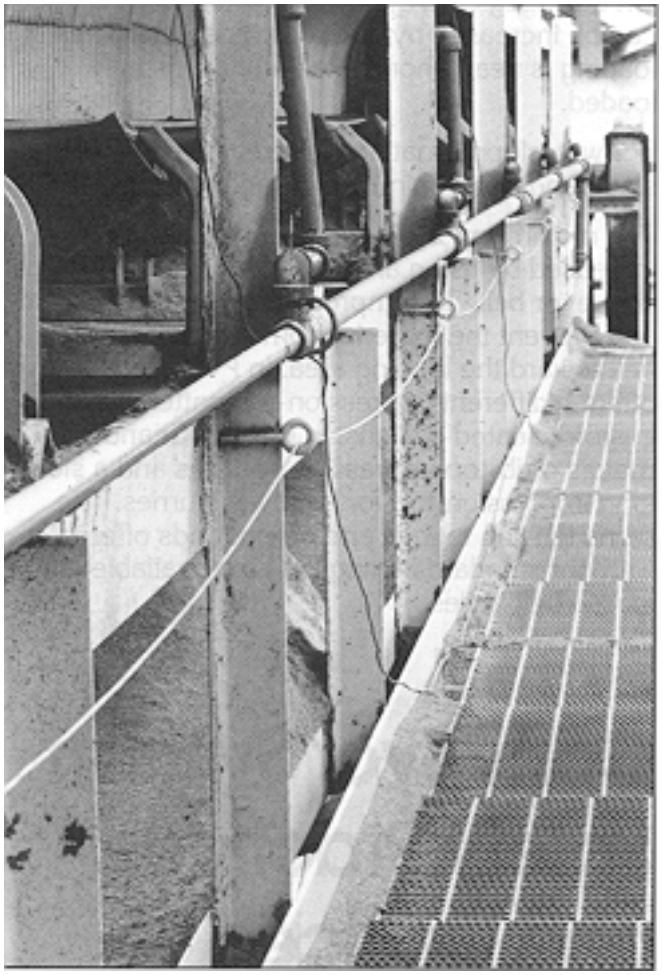
Tramp iron can be easily removed from the load by a magnetized pulley. One very common application is to use a short feeder belt with a magnetized head pulley to protect a longer, more expensive belt from damage by sharp metal objects.

When the load travels over a magnetized pulley, magnetic particles cling to the belt cover. Non-magnetic particles drop off as soon as the belt starts down through the arc.

The magnetic particles eventually drop off the belt on the return side when they pass out of the magnetic field. But by then they are effectively separated from the non-magnetic part of the load. For the most effective separation, spread the load out evenly at the most shallow depth practical when it passes over the magnetized pulley. You will get the most efficient service if you use the thinnest possible belt construction. If you have to use a thicker belt for greater impact resistance, you will need a greater magnetic force in the pulley. You will probably have to install a larger head pulley to accommodate the extra wiring needed to provide that greater attraction.

Care and Maintenance

Suspended Magnets

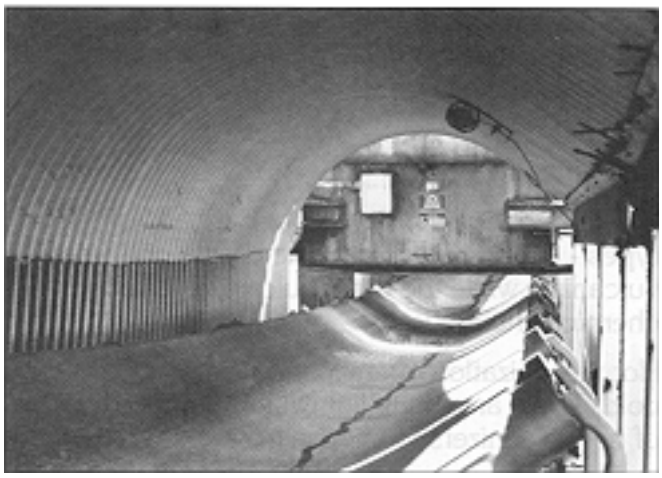


Sometimes a magnet is suspended directly over the belt to pull out tramp iron. It can be either a permanent magnet or electromagnet. Whichever type it is, it has to be suspended in such a way that it can swing aside to periodically release its load.

One way to accomplish this is to mount the magnet on a monorail, so it can simply slide to one side to release its load. Another common arrangement is to fix the magnet in a single position and move a flat belt with cleats across it at a right angle to the path of the main belt. When metal is attracted by the magnet, it strikes the cleated belt first and is thrown clear of the conveyor.

Care and Maintenance

Magnetic Field Detectors



When tramp metal in the load is rare, it may be more practical to install a magnetic field detector rather than a magnetized pulley or suspended magnet. With this device, a search coil is mounted on the conveyor near the loading point. The search coil sends out a magnetic field that surrounds the belt and the load. When a piece of metal passes through the field, it interrupts the lines of magnetic force and activates a relay which can in turn either shut the belt down or sound an alarm. The unit can also be arranged to blow chalk dust or lime on the load as a marker. This helps the operator find the metal more easily and remove it.

Care and Maintenance

Introduction

There are many situations within a conveyor operation that can damage the belt or shorten its life. They may be major problems initially or minor ones that develop and worsen. The situations include splice and edge wear problems plus carcass and cover damage.

Conveyor belts are only indicators of system characteristics.

Although some accidents to belts occur with little advance warning, most conditions in this manual can be detected and corrected before more serious damage occurs. Except where an accident is obviously destroying a belt and shutdown is essential, you will have some judgment calls to make.

Study the Problem-Solving Guide carefully to determine what response must be made to specific problems.

Care and Maintenance

Make Repairs as Soon as Possible

Overlooking or ignoring belt damage can only cost you more later on in terms of replacement or repair costs, and in downtime. Minor damage to a belt can only get worse, so make repairs as soon as it is detected. And when you make temporary repairs, be prepared to take more permanent measures as soon as time permits.

If you encounter problems not covered in this Guide, or need more help solving the ones you can identify, contact your Scandura distributor or Scandura Sales Representative for engineering assistance. They will be happy to provide a cost- saving solution.

Care and Maintenance

Repairing Conveyor Belts

Any cut or tear in a conveyor belt can be seen as a promise of further trouble to come. Transverse cuts or tears will inevitably get longer and reduce belt strength. Cuts in the cover will allow gritty materials to enter the belt and abrade the carcass. Stress on damaged edges can cause curl or ply separation. It is important to repair all damage as soon as possible.

Care and Maintenance

Temporary Repairs

While major damage is difficult or impossible to repair in the field, there are several temporary repairs that can be made on small injuries. Bear in mind, however, that these repairs will be highly stressed and that permanent repairs will soon be required.

Small cuts in the cover can be patched with rubber cement or an air-cured material until a better repair can be made.

Large cuts in the cover or carcass can be repaired with mechanical fasteners that will hold for a short time or can be repaired with vulcanized patches. Where you have a choice, a vulcanized repair is preferable to one made with metal fasteners.

To understand why some repairs are only temporary consider this:

- Metal fasteners or repair plates can damage pulleys and idlers. Also they can pull out under sustained stress which will extend the area of damage.
- A vulcanized repair to the carcass requires a fabric insert. Because this insert does not have the same stretch characteristics as the original fabric, a hinge-point can develop and further weaken the belt in this area. The decision to patch a belt or make more permanent repairs depends on the location of the damage and the stress on the injury.

For example, transverse tears or cuts in the carcass significantly reduce belt strength. A permanent repair should be made as soon as possible. The following table shows just how devastating transverse carcass damage can be.

Table 2Effects of Transverse Edge Damage on Overall Belt Strength

Length of cut or tear (% of belt width)	Reduction in belt strength
5	30%
10	45%
15	52%
20	60%
25	62%

A continued stress in this area can only lead to a complete break in the belt. Transverse

breaks at the edge can be temporarily repaired with metal fasteners, but a more permanent vulcanized splice should be made.

Care and Maintenance

Vulcanized Repairs

Vulcanized repair systems are basically of two types - "hot" and "cold." One uses a hot-press vulcanizer while the other vulcanizes through chemical interaction.

Hot vulcanization offers longer lasting results than cold. There are many lightweight, mobile models of hot vulcanizers to choose from on the market.

Cold vulcanizing however has major advantages: It is fast, low in cost, and easy to use. It sometimes eliminates the need for a vulcanizer. Caution: Chemical vulcanization is not recommended for hot-material applications, or for belts with steel cable or high tension fabric carcasses.

Care and Maintenance

Conveyor Belt Problem Solving Guide

Care and Maintenance

Vulcanized Splices

Condition	Cause	Recommendation
Extensive separation along splice interface.	Improper pressure and/ or temperature during vulcanization.	Check platens of vulcanizer for temperature and uneven surface. Use pad between belt and vulcanizer when necessary.
	Improper or aged cements and tie gums.	Use proper cements and tie gums.
Breaks in the top or bottom ply over a butt joint in the ply immediately beneath.	Excessive flexing. Improper workmanship during splicing.	Use care in fitting steps and avoid buffing along step lines. Check pulley diameter inadequacies. Re-evaluate splice techniques and procedure.
Step lines show as an impression in belt covers.	Improper fitting of steps. Excessive tension.	Use care in matching step lines. Reduce tension.
Separation at edges along steps.	Improper pressure. Edges not confined during cure.	Use edge irons during splicing to confine edges. Seal edges with cement as a temporary repair.
Carcass breaks at the steps only at the edges.	Improper transitions, pulleys and/or curves.	Reduce excessive edge stress. Improve transitions, etc.

Care and Maintenance

Cover Damage

Condition	Cause	Recommendation
Lengthwise strip swelling of bottom cover.	Oil.	Avoid over lubrication and spilling of oil and grease. Use oil-resistant belt if necessary.
Top cover gouged or grooved.	Load jams in chute.	Redesign chute for proper angle and width.
	Material trapped under skirts.	Prevent jamming by providing an increasing gap under skirt-boards in direction of belt travel. Increase belt tension or space loading point idlers more closely.
	Sharp edges of material or tramp-iron.	Use jingle bars, impact idlers, magnetic removal equipment.
Bottom cover wear.	Drive pulley slippage.	Increase belt tension if belt rating permits. Lag drive pulley (groove lagging if wet). Increase belt wrap with snub pulley or tandem drive.
	Corroded troughing idler rolls.	Replace or cover the troughing idler rolls.
	Troughing rollers sticking.	Lubricate properly and replace idlers as required. Free idlers from material buildup.
	Excessive troughing idler tilt.	Correct to not more than 2° from upright.
	Bolt heads protruding above lagging.	Replace worn lagging. Vulcanize lagging onto pulley.
Belt edges worn, gouged.	Belt rubbing on some obstructions.	Realign or retrain belt if necessary. Remove all obstructions.
	Off-center loading. Build-up on idlers or pulleys. Misalignment of conveyor. Defective self-aligning idlers.	Restructure loading area to control loading. Use scrapers to prevent buildup on pulleys, idlers. Lag snub or bend pulleys to reduce buildup. Realign conveyor. Repair or replace faulty idlers. Lag return idlers.
	Trippers not in good alignment.	Inspect trippers frequently. Readjust to correct even slight misalignment of trippers.
Excessive top cover wear.	Incorrect cover quality.	Replace with better quality rubber or use heavier cover.

	Abrasive skirt-boards.	Use rubber skirt material. Do not use old belting.
	Poor loading.	Feed material onto belt as near same direction and speed as possible.
	Excessive sag between idlers where skirting is used.	Check tension. Reduce idler spacing particularly at loading end.
	Slow-running, stuck or misaligned return rollers.	Service and realign return rollers. Use rubber-disk return idler if necessary.
Blisters in cover.	Fine materials working into cuts or punctures.	Make spot repair.

Care and Maintenance

Chemical, Organic Or Thermal Deterioration

Condition	Cause	Recommendation
Softening and swelling of top cover.	Oil, grease or solvents from material or from conveyor equipment.	Specify Scandura FORP, Oil Resistant Neoprene or Moderate Oil resistant belt for replacement. (Proper choice depends upon amount and type of oil present.) Use equal cover thicknesses so that belt can be turned over. When damage is due to oil and heat, specify Sahara Hot Oil Resistant (SHOR).
Softening and swelling of back cover along a line corresponding to the juncture of the troughing rollers. Some cover separation in serious cases.	Overgreasing of troughing rollers. Belt picks up grease that accumulates on the idlers.	Avoid this practice, warn maintenance personnel about the dangers of overgreasing.
Hardening, cracking and separating of top cover. Deterioration and loss of strength of carcass. Ply separation.	Handling of materials at high temperatures.	Specify Sahara & Super Sahara belt based on material temperature, size and abrasiveness. If temperatures are extremely high use a glass fabric belt, Scandura Hotshot.
Crosswise breaks across belt width.	Inadequate pulley diameter ... belt with too little elongation at break.	Increase pulley diameters; discuss low elongation with belt manufacturer.
Cuts or breaks in belt enlarge quickly. Splices weaken prematurely. Belt stretches excessively.	Too much belt tension. Starting tension may be excessive. Frequent starts under load.	Reduce load by increasing belt speed, keeping tonnage the same. Or reduce tonnage at same belt speed. Establish controlled loading of belt to produce even rate of feed. Decrease drag by lubricating idlers. Replace worn idlers. Remove spilled material obstructing idlers. Reduce takeup weight, applying only enough tension to prevent slipping and keep sag between idlers to a minimum. Increase wrap of belt around drive pulley by using snub pulley, or tandem or dual-motor drive and lag pulleys to permit lower takeup tension.

Care and Maintenance

Training Problems

Condition	Cause	Recommendation
Empty or lightly-loaded belt does not run straight on carrying idlers, but there is no definite pattern in way it runs off.	Belt is too stiff transversely to conform well to carrying idler.	Use a belt construction with more transverse flexibility or install an extra number of aligning aids.
	Belt is new and therefore stiff.	Allow proper break-in time ... can be hastened by letting belt stand overnight while loaded.
	Belts increase in stiffness when exposed to cold weather. Effect on some belts is more extreme than others.	Allow belt to run overnight during extreme cold.
Belt runs crooked on certain days.	Wind blowing against belt forces it out of line. Sun on one side of steel framing causes uneven expansion in the steel.	Erect wind baffles or improve existing belt housing. Use appropriate training aids. Paint framing with aluminum paint to reflect heat.
Conveyor supports out of line. Proper belt alignment impossible.	Conveyor erected on a temporary or insecure foundation.	Make foundation more secure. Realign supports and other parts. Consider appropriate training aids.
Belt runs true when empty, crooked when loaded.	Off-center loading.	Adjust chute and other loading devices so load is delivered to center of belt and in line with direction of belt travel.
	Variations in nature and formation of load.	Use notched chute to keep load peak in exact center of belt.
	Belt not making good contact with all idlers.	Adjust height so all idlers contact the belt.
Belt runs off as it approaches terminal.	Material buildup on snub pulley or idlers.	Keep surfaces of pulleys and idlers clean. Consider use of scrapers.
	Pulley or approaching idlers not square.	Align properly.
Belt climbs sidewise on some idlers.	Loose idler.	Return idler to proper position. Fasten securely.
	Idler sticks or jams and cannot rotate.	Clean and lubricate properly. Replace any sticking idlers having worn spots.

	Idlers or pulleys out of alignment.	Realign idlers while belt is unloaded. Start with second or third idler back of point of run-off and work in direction of belt travel. Make small adjustments initially and, to check the effect, wait for one or two revolutions. Make correction with more than one idler.
Part of belt running off idlers is in vicinity of splice.	Improper splice: ends not cut squarely for a mechanical splice, or steps not properly matched for a vulcanized splice.	Re-splice. Make sure ends are square for mechanical-type splice. For vulcanized spice, match ends properly. Draw proper center lines for either type of splice.
Same section of belt repeatedly runs off idlers along entire conveyor.	Belts needs containment throughout the system.	Use of training idlers will contain belt within the conveyor structure.
Belt with worn edge becomes crooked.	Worn edge became stretched because of high friction pull, or shrank from moisture absorption.	Eliminate cause of wear. Repair damaged edge.

Care and Maintenance

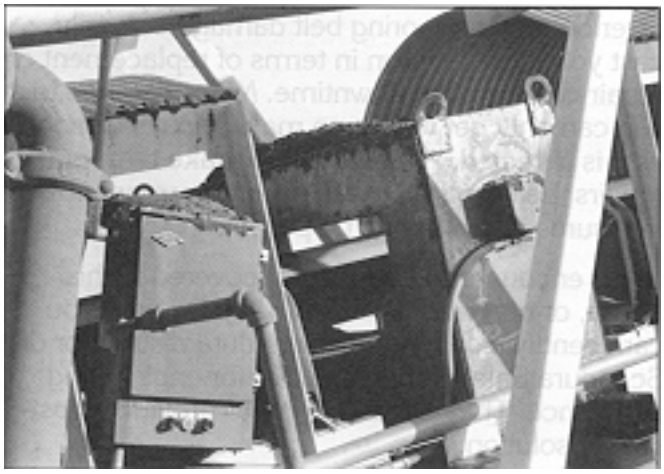
Mechanical Splices

Condition	Cause	Recommendation
Crosswise breaks back of fasteners.	Fastener plates too long, pulleys too small.	Use shorter fasteners or increase pulley size. Consider Wedlok splicing. Install fasteners at 45° angle across belt. Consider vulcanized splicing, or countersunk fasteners.
Fastener pull-out.	Improper fasteners or fastener not properly tightened.	Check for proper fastener selection and proper application. With bolt-type fasteners, some users retighten after one day of operation and again after one week.
	Excessive tension.	Reduce tension. Consider reducing stresses during startup.

Care and Maintenance

Introduction

Elevator belting is nothing more than conveyor belting with buckets bolted on and used to carry material vertically or at a near-vertical slope. A rubber or PVC elevator system is preferable to a chain system in most applications: It operates more smoothly and quietly; it is higher in abrasion resistance; and it is not subject to corrosion.



Because elevator belting is almost identical to conveyor belting, most of the care and maintenance principles given earlier apply here. Only the conditions that are unique to elevator operation will be covered in this section.

Care and Maintenance

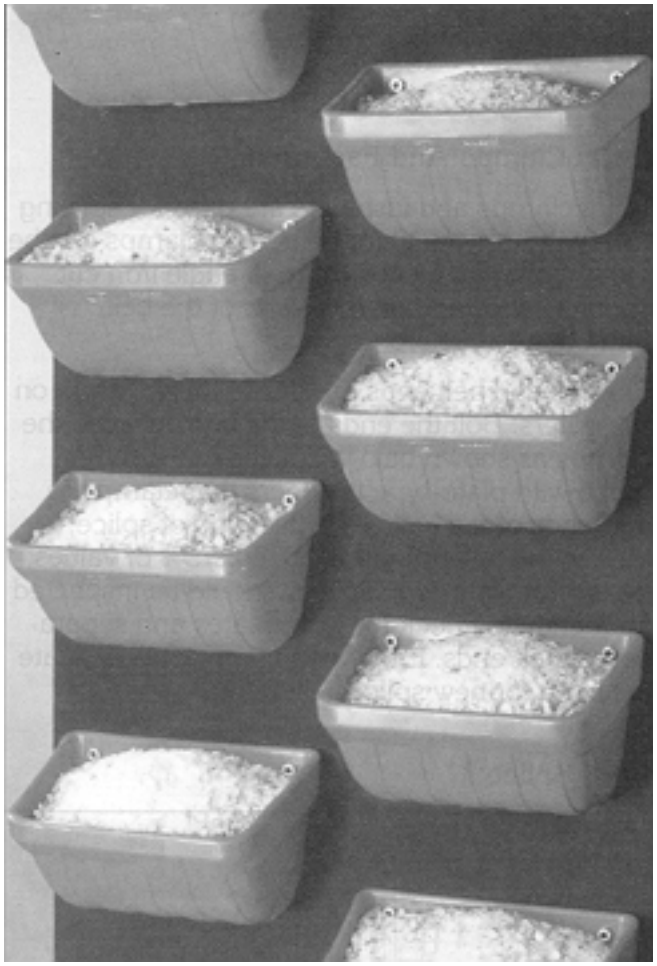
Installation

Care and Maintenance

Bucket Bolt Specifications

Norway-type flathead bucket bolts are the ones most commonly used for elevator belting. Standard diameters are 1/4", 5/16", and 3/8". Standard lengths are 3/4", 7/8", 1", 1 1/2", 1 3/4", 2", 2 1/4 ", 2 1/2", 2 3/4", and 3". Sometimes the Excelsior bolt with a round head is used for heavy buckets and belting.

Carefully consider the bucket bolt dimensions to be sure there's enough compression when the bolt is tightened. Bolt dimension "C" should be 1/16" less than the belt thickness.



Care and Maintenance

Rigging And Punching

When preparing to make the bolt holes in a belt, first pass a heavy piece of pipe through the center of the roll. Rest it on a pair of horses high enough to keep the roll from touching the floor.

Draw the belt out over a strong temporary bench or table. Then mark off the bucket positions with a steel square and pencil. Outline the bolt holes either with a template or by aligning a bucket in position and marking through its bolt holes. (A template can be made from a sheet of plywood ... nail a strip to it so it can be easily squared with the edge of the belt.)

Make the bolt holes with a sharp belt punch. Punch size should be between the same diameter and 1/32" larger than the bolts.

Care and Maintenance

Specifications For Pre-Punched Belting

Scandura distributors can pre-punch holes for you, provided you give them accurate specifications. By providing the information shown below, you can be sure the bolt holes will be correctly sized and spaced when the belt is delivered.

1. Belt width.
2. Belt length.
3. Spacing of buckets center to center of holes.
4. Distance to start first row of holes from end of belt.
5. Diameter of holes.
6. Center to center of holes. Start at center line of belt.
7. Distance between rows to be shown on double rows.
8. Rows with most holes to be on top of double rows.
9. Specify if belt is to be punched entire length.
10. Show number of rows to be punched.
11. When staggered buckets used, show spacing.

Care and Maintenance

Stringing The Belt

For new installations, follow the same general precautions you would use when installing a conveyor belt on a new system. If a belt is being replaced, cut the old belt and attach the lead end of the new belt to it. Then as you pull the old belt off, the new one will follow it into place.

Care and Maintenance

Preparing for the Splice

If it is at all possible, hang the belt over the head pulley for at least 24 hours before splicing with the buckets installed. When the splice is being made, pull the belt up as tightly as possible. Both of these recommendations are designed to take out some of the initial stretch in a new belt.

Position the takeup so it can travel fully when the new belt is first installed. Takeup travel will be limited by the boot pulley arrangement.

After the belt is initially installed, retighten the bolts and fasteners at least once after the first day of operation. Inspect the splices to be sure they are holding firmly.

Care and Maintenance

Elevator Belt Splicing

Care and Maintenance

Metal Clamps And Fasteners

Metal clamps and fasteners are used for splicing thin, light-duty elevator belts. The clamps can be made from two pieces of small angle iron cut about 1" shorter than the width of the belt. Smooth away sharp corners.

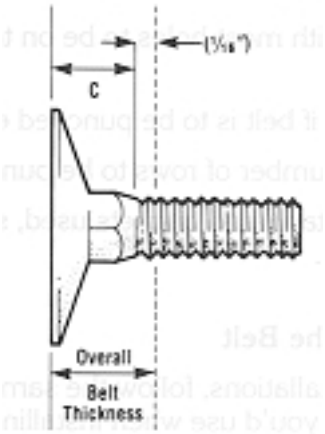
Clamps and belt ends are drilled for 1/2" bolts on 2" centers. Bolt the ends of the belt between the clamps as shown below. Splices can also be made with plate-type fasteners that clamp the butt ends of the belt. With this type of splice, reduce the belt ratings to 50% or 75% of values. Belts with plate-type splices should be inspected frequently to check for worn plates and separation of belt ends. Either condition would indicate the need for new splices.

More:

Dura Splice

Care and Maintenance

Dura Splice



Scandura offers the Dura Splice™ Elevator Belt fastening system for the following advantages:

- One size fits all Elevator Belt styles and all pulleys
- Holds belts in a vice-like grip between three heavy duty grooved plates designed to *remain secure.*
- The joint *never* touches the pulleys. There is no problem of metal-to-metal contact.
- Puts an end to the double belt thickness common to other joining systems. Stops the costly waste of extra belting necessary in lap and butt riderstrap joints.
- Offers extra safety and increased load capacity because belts are not weakened with excess bolt holes.
- Can be *used over and over again* for years of dependable service.
- Each splice set joins 2 inches of belt width. *Recommended* by grain elevator operators world wide.
- Note: DURA SPLICE AND SIMILAR BAR TYPE SPLICES ARE NOT RECOMMENDED WHERE A WING TYPE BOOT PULLEY IS USED AS SUCH PULLEYS MAKE IMPROPER AND ABNORMAL CONTACT WITH THESE SPLICES AND THE CONSTANT ENCOUNTER TENDS TO ABRADE THE PULLEY SIDE OF ANY BELT PREMATURELY AND EXCESSIVELY AT THE SPLICE AREA.

Care and Maintenance

Lap Joint

This splice is also commonly used in thin elevator belts. The lap area can extend under two to four buckets. Use the two-bucket lap only on elevators with low operating tension. The three or four-bucket lap should be used if the belt is operating near its rated tension.

Buckets are bolted through both the belt strands. If only the top row of bolts passes through both of the belt strands, some of the shearing stresses will be relieved as the buckets pass around the terminal pulleys. The end of the inside belt strand can be stepped back or tapered for smoother operation over the pulleys.

Care and Maintenance

Butt Joint

This is recommended for splicing heavy elevator belts. Cut the belt to the proper length and square both ends. Butt the ends together and fasten them with a strap cut from an extra piece of belting. Use bucket bolts, rivets, or button fasteners to fasten the belt to the strap. Use the same type of belting for the strap as you are using for the main belt.

The strap should be long enough to pass under at least two buckets. Use only one row of bolts in each bucket to pass through both of the belt strands.

The total number of fasteners used (including bucket bolts that pass through both belt strands) should be about 1 to 1 1/2 times the belt width in inches.

Care and Maintenance

Nylon Butt Strap Joint

This is a very serviceable splicing method for thick, high-strength elevator belting. Three variations of this joint have been developed to provide a dependable splice, regardless of the bucket arrangement.

1. Use this splice and layout when no buckets are mounted over the pad.
2. Use this when buckets are placed over the splice pad (single row of buckets). The splice pad length is determined by the bucket size and spacing. The pad need only be long enough to pass under one bucket on each side of the belt butt joint. It should extend far enough beyond to accommodate one row of Flexco plates.
3. This type of butt strap joint works best with buckets over the pad (multiple rows of buckets). The splice pad length is determined by bucket size and spacing.

Care and Maintenance

Vulcanized Splice

Where space, time and takeup permit, vulcanized splices are sometimes considered for elevator belting. However, they are not nearly as popular in elevator service as they are for conveyor belts. It is simply not always convenient to provide the space and the additional belting that vulcanized splicing requires.

Care and Maintenance

Elevator Belt Preventive Maintenance

The surest way to keep an elevator belt operating is to inspect it regularly. It is best to get in the habit of completely checking the belt and system at least once a week. Tighten loose bolts, replace worn washers and faulty buckets when needed. Check all clearances and examine each of the joints carefully.

More:

Bolt Tightness
Bucket Washers And Pads
Feeding
Lump Control At The Boot Pulley
Pulley Lagging
Belt Alignment
Belt Tension

Care and Maintenance

Bolt Tightness

When material wedges between the bucket and the belt, bolts will loosen, which can lead to problems. Even though this is one of the most common elevator belting problems, no washer or pad will totally prevent this occurrence. The best remedy is to check the bolts periodically and tighten, if necessary.

Care and Maintenance

Bucket Washers And Pads

Rubber or leather washers relieve the strain on the bolts and allow the belt to conform to the pulley contour. In addition to absorbing the shock when the belt passes over a pulley, washers provide space between the bucket and the belt to prevent material buildup. They also help seal the bolt holes against moisture, which can damage some belt carcasses.

Use pads whenever wear will be especially severe. They increase the belt life and also act as an insulator for hot materials. Pads can be made by cutting up an old piece of belting to the approximate size and shape.

Care and Maintenance

Feeding

There are two commonly-used methods of feeding or loading the elevator buckets. One is the scoop feed, where material is delivered into the boot and scooped up by the buckets as they pass through it. The second is the fly feed, where a spout delivers the material well above the boot pulley directly into the buckets. With the fly feed, there should always be two empty buckets below the spout to catch any spilled material.

Most wear on an elevator belt is caused by abrasion from material that gets between the boot pulley and the belt. So it is very important to arrange your feeding system so as little material as possible falls back into the boot area.

You can also have problems when too much material piles up in the boot. When the belt starts up, the heavy load on the buckets can strain the belt enough to slacken the tension. This allows the belt to sway ... buckets can scrape against the housing. The friction can build up enough to create a danger from heat or sparks. To protect yourself from bucket damage and any potential dangers from the heat of friction, be sure to watch the amount of load material in the boot closely.

Care and Maintenance

Lump Control At The Boot Pulley

Lumps that spill between the belt and the boot pulley can jam and severely stress or even tear the belt. (A similar problem exists with the pulley at the bottom of a vertical gravity takeup.) A deflector shaped like an inverted V or a simple plow can prevent lump damage when erected over the boot pulley. The deflector can be made of either sheet metal or planking and covered with a strip of old belting. When using such a device, be sure to inspect it frequently and adjust it as needed. If you do not, material can build up on it in time and come in contact with the belt.

"Wing" type pulleys have been very successful in preventing material from becoming trapped in elevator service.

Care and Maintenance

Pulley Lagging

Pulley traction can be improved with standard pulley lagging. Either bolt or vulcanize the lagging to the pulley face. The lagging will prevent slipping at the head pulley and also cushion the wear between the belt and the pulley surface. In wet conditions, grooved lagging works best.

Care and Maintenance

Belt Alignment

An elevator belt that trains poorly can scrape the buckets into the housing. This can damage the buckets, the elevator frame, and the belt itself by putting a greater strain on the bolts and boltholes. It can also create a danger from sparks and heat, a particular concern in grain elevator service.

A common cause of misalignment is a fly feed that delivers material at an angle. This loads the buckets off center. Material tends to accumulate on one side of the boot. The buildup in turn drives the belt toward the opposite side. Crowned head and boot pulleys will usually correct this tendency and keep the belt aligned.

Care and Maintenance

Belt Tension

Maintain proper tension in an elevator belt to prevent slipping and excessive pulley cover wear. This also eliminates belt sag along the return side, which is important to keep the belt from flapping and scraping the buckets on the housing or bins. Use your takeup to control the tension properly.

An approved type of takeup moves both ends of the boot pulley shaft equally so the belt is uniformly tightened. If there are separate takeup adjustments for each side, it is important to tighten them equally. Otherwise, the belt could become distorted and training problems could emerge.

Care and Maintenance

Elevator Belt Problem Solving Guide

Condition	Cause	Recommendation
Wear of belt cover on the bucket side.	Buckets abrade against belt cover when passing around terminal pulleys.	Rubber washers between buckets and belt help cushion buckets.
	Fine abrasive materials between belt cover and bucket.	Space between bucket and belt when washers are used permits fine material to pass through.
	If washers are used and material is still held between bucket and belt causing abrasive wear.	Rubber pad is occasionally used between bucket and belt. Material between bucket and pad wears only the pad. Material between pad and the belt does not cause as serious abrasive wear because it is between two rubber surfaces.
	Abrasive wear caused by excess material in the boot.	If feed of material to the boot can be controlled, jamming and turbulence can be reduced.
	Cover gauge on bucket side may be too light or quality too low.	On future belts, bucket-side cover gauge may be increased or higher quality used or both.
Wear of belt cover and pulley side.	Abrasive material between belt and boot pulley.	Some type of slotted or self-cleaning boot pulley may be used. A conventional smooth-faced boot pulley can be lagged with soft rubber lagging. Improve design of discharge point, increase belt speed and do not overload buckets so that amount of material falling down through casing into the boot is minimized.

	Belt slips at drive pulley.	If drive pulley is bare, lagging this pulley usually sufficiently reduced belt slip. For moist operating conditions, lagging may be grooved to reduce slippage. In rare cases, even with lagged drive pulley, additional tension may have to be applied to the belt. In this case, permissible belt operating tension should not be exceeded.
	Cover gauge on pulley side may be too light or quality too low.	On future belts, pulley-side cover gauge may be increased or higher quality or both.
Rubber cover separates from belt.	Generally severe service with large-size lumps of heavy, abrasive material being handled.	Use higher grade conveyor belt.
	Slip at drive can start pulley-side cover separation.	Increase drive efficiency by lagging bare drive pulley. If belt will not be overstressed, additional tension for driving may be applied.
Belt ply separation	One of the terminal pulleys may be too small.	Pulley diameters should be increased. But casing design often limits this possibility.
	Severe flexing service.	Higher quality belt carcass should be used in the future. This should include ample rubber skim coat between plies.
Breaks in belt carcass.	Lumps of material carried between belt and pulley	Deflectors over boot pulley have helped in some cases. Some types of slotted or self-cleaning boot pulley may be used.
	Operating tension too high for existing belt.	Check tension and elevator capacity. Belt with stronger carcass required for correct design in the future.

Buckets pull loose from belt or belt is torn at bolt hole.	Belt construction inadequate for proper bolt holding.	Besides withstanding necessary operating tension, proper belt recommendations should have considered bolt holding.
	Buckets not bolted tightly.	Bucket bolts should be kept tight. If bucket bolts come loose, bucket may snag and be torn from the belt.
	Jammed boot.	Controlled feed should help eliminate jams and turbulence in the boot.
	Improper clearance or obstruction in casing.	Redesign if at all possible. Be certain that terminal pulleys are aligned properly for straight running belt.
	Pulleys are too small so that the bolts are strained as belt flexes.	Possible a larger drive pulley cannot be installed in existing design. Belt construction may be improved. Washers cushion the buckets so if not already used, they might be tried here.
	Operating conditions changed from time of original design. Size or weight of material changed. Large lumps jam or strain buckets in the loading boot.	Recheck bolts for proper torquing. Consider washers and pads. Use larger pulley diameter if necessary.