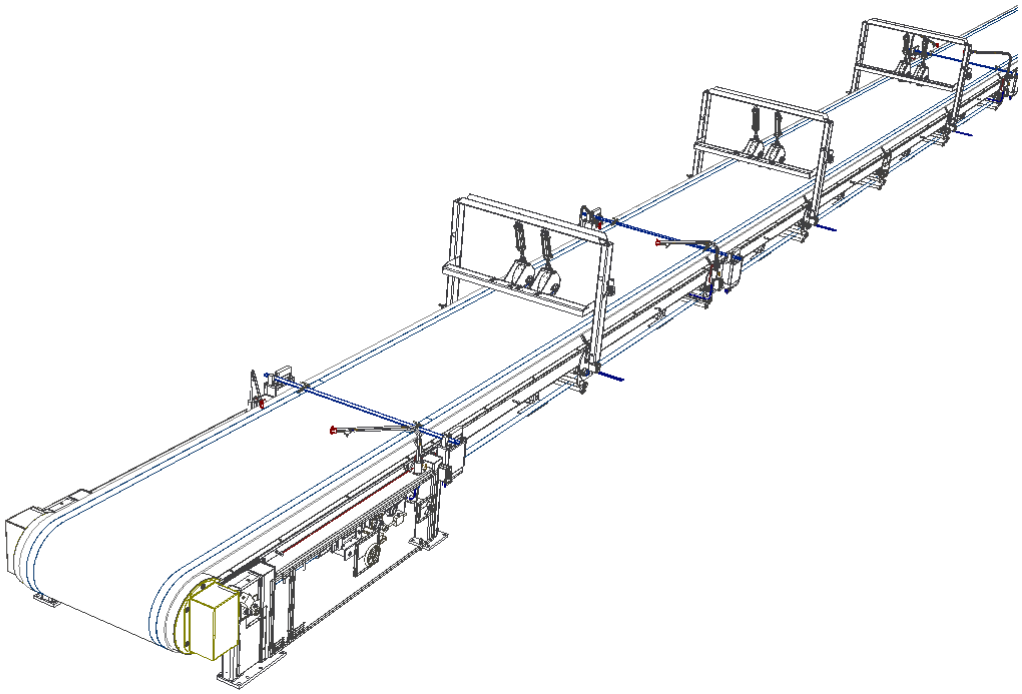
Boardline Belt Conveyor

Maintenance Manual



Gyptech

Proven Technology Worldwide

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Introduction

This manual is written to provide detailed technical information to assist in the maintenance of the boardline. For information regarding normal operation please refer to the Area Operator's Manual. Maintenance should only be performed by qualified, trained personnel.

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1 Safety Overview

Never put yourself at risk.

Many pieces of equipment have the potential to cause serious injury or even death. Be sure to understand the safety concerns related to a piece of equipment before undertaking or performing any maintenance or clean out procedure. Work with your supervisors to address any safety concerns prior to undertaking work.

The following safety items are particular to the Boardline. These items are as follows:

- Boardline Disconnects
- Emergency Stops and Pullcords
- Pinch Points

1.1 Boardline Disconnects

Each boardline belt conveyor will have an associated drive panel with a lockable disconnect switch to isolate all drives in that panel. Some areas may also have a field mounted disconnect, which removes power to a motor or series of motors.

There is also a local air and water service panel that supplies all the air and water for the boardline equipment. Activating the lockable pneumatic dump valve will exhaust air from the boardline equipment and close the air supply line. A shut-off valve for the water supply is also located on the same panel.

1.2 Emergency Stops and Pullcords

The entire boardline equipment is protected by an interconnected emergency stop system. The emergency stop system can be activated by safety pull cords arranged along each side of the entire length of the board line. In addition, emergency stop buttons are located at the drive panel for each section of the board line and can be used to activate the emergency stop system. Pushing any one of these buttons or pulling one of the safety pull cords will stop the entire board line.

CAUTION: Allow time for the boardline to come to a complete stop.

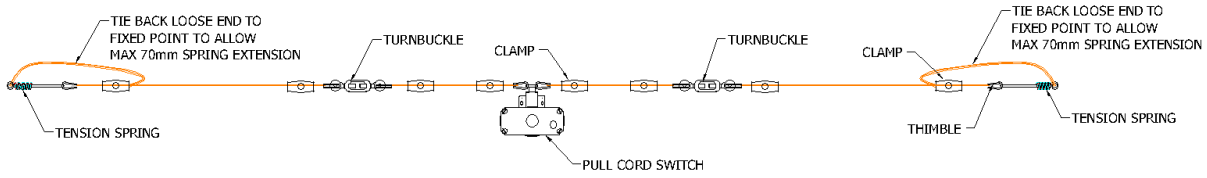

Figure 1: Example Emergency Stop Pull Cord

1.3 Pinch Points

The main pinch points associated with the boardline conveyor are between the pulleys, rollers and belt. Some maintenance functions may be performed with power and air supplied to the machine while guards are removed. In these cases, special care must be taken to understand where the potential pinch points are in the area.

Pinch point locations of note include the belt entry over the drive pulley, belt entry under the tail pulley, belt wraps at the take-up pulleys, and all snub pulleys. These rollers with significant belt wrap around the pulley will pose a greater safety concern with regards to pulling in objects, loose clothing or limbs.

Other pinch points are located where pneumatic cylinders operate the walker wheels, edge bars and belt washers. Air should be dumped and locked out for any maintenance purposes.

2 Equipment Overview

A typical boardline will consist of a series of belt conveyors to carry the continuously formed board from the mixer area to the wet transfer area. The first boardline belt conveyor will generally consist of edge bars, edge sprays and back sprays to aid in the control of the board forming process. Other typical components include walker wheels, belt washers, taper belt guide and taper belt tensioner.

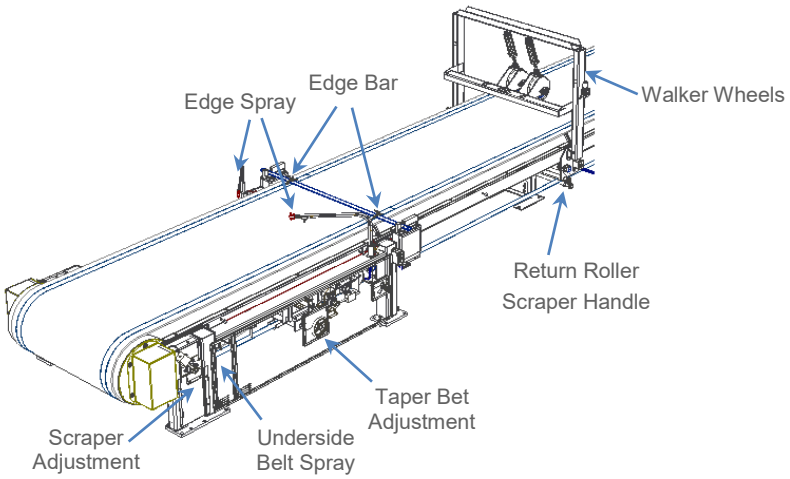

Figure 2: Typical Belt #1 Tail Section

2.1 Edge Bars

Several sets of edge bars are located along the length of the first boardline conveyor to help maintain the desired edge profile and surfaces during the initial stage of board formation. Two vertical pneumatic cylinders are equipped to raise and lower the edge bars.

2.2 Edge Sprays

Several sets of edge sprays are located along the length of the boardline conveyor and are used to wet the edges of the board where the face paper meets the back paper, allowing the paper to relax and expand. A manual valve at each air atomizing spray nozzle will allow the operator to set the desired level of misting spray. Solenoid valves are equipped to control the on/off operation of the edge sprays.

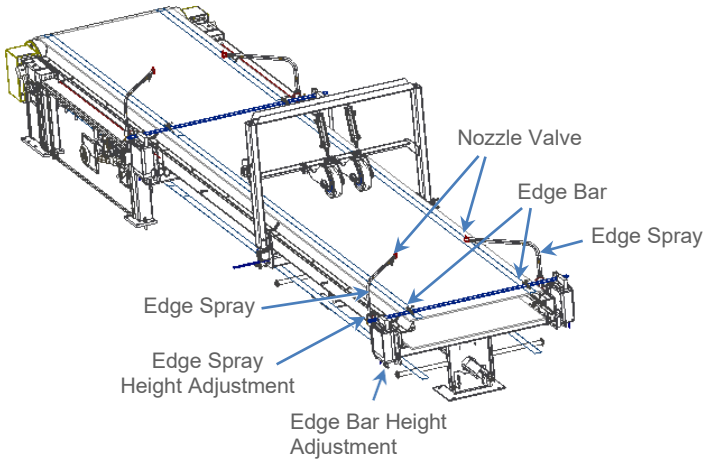

Figure 3: Edge Bar and Edge Spray

2.3 Back Sprays

One or more back sprays are positioned to wet the back of the board to relax the back paper and allow it to expand. A manual valve at each air atomizing spray nozzle will allow the operator to set the desired level of misting spray. Solenoid valves are equipped to control the on/off operation of the back sprays.

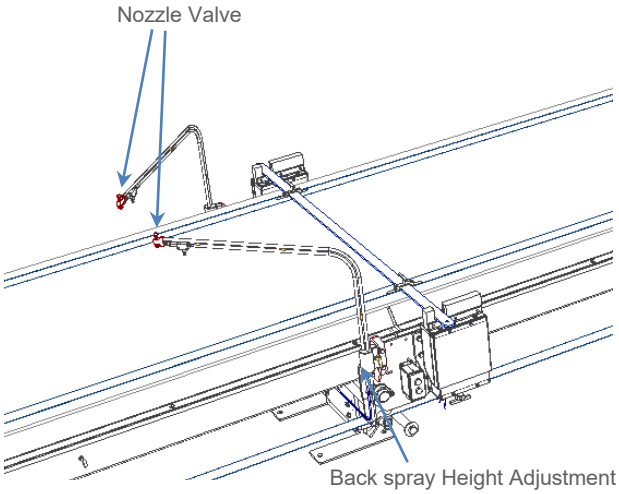

Figure 4: Back Spray

2.4 Walker Wheels

One or more walker wheels are positioned along the length of the boardline conveyor to aid in the start-up procedure. The wheels are lowered to apply adequate friction and traction between the paper and the belt to pull the paper through the mixing area during start-up. A pressure regulator can be used to adjust the amount of pressure applied by the walker wheel to the paper.

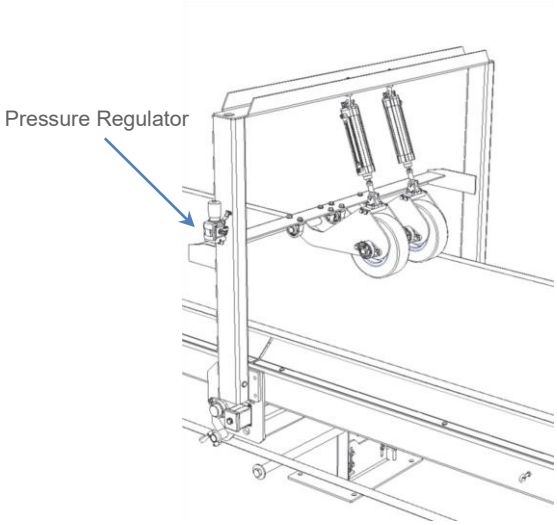

Figure 5: Walker Wheel

2.5 Belt Washers

Where equipped, a belt washer is located at the head end of the conveyor and is designed to clean slurry from the surface of the belt after process upset conditions and may also be used during start-up or normal shut-down to maintain belt cleanliness. The belt washer consists of a powered rotary brush, water spray and squeegee system that is automatically raised against the belt during a cleaning cycle.

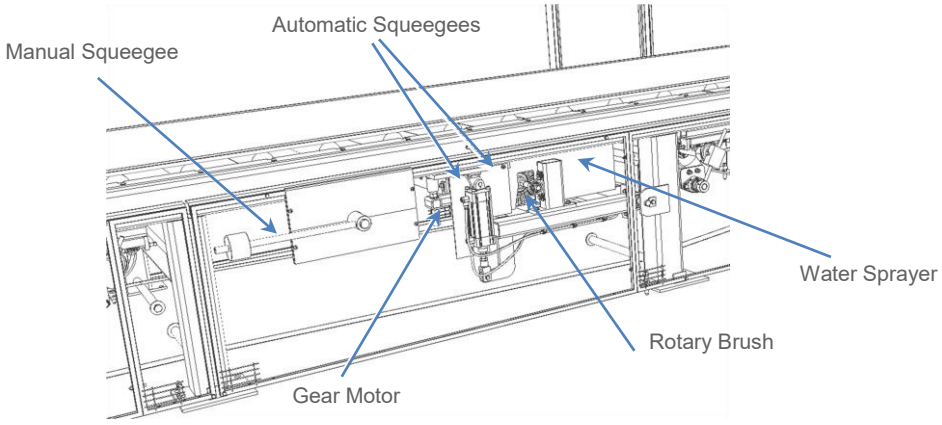

Figure 6: Belt Washer

2.6 Underside Belt Spray

An underside belt spray is located downstream of the tail pulley of the first boardline conveyor and is used to aid in cleaning the belt. The operation of the underside spray is generally used outside of normal production and is turned on/off using a manual valve.

2.7 Taper Belts

The taper belts run down each side of the boardline and are used to shape the edges of the board until it hardens enough to maintain the tapered edge. A taper belt guide is used to set the position of the taper belt for the desired board width when required and is adjusted manually with hand wheels located on each side of the equipment. Taper belt tensioners are equipped to take-up excess slack in the taper belts and adjusted manually with handles.

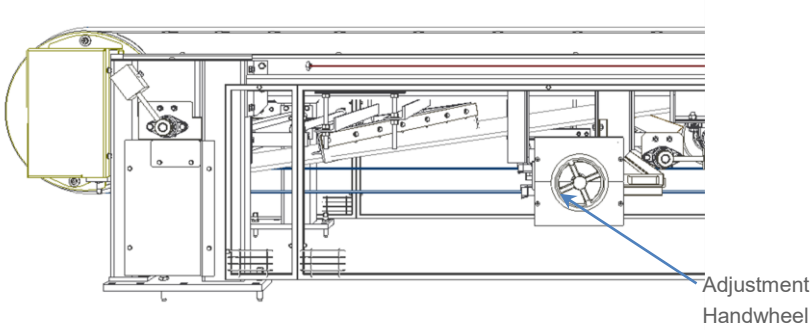

Figure 7: Taper Belt Guides

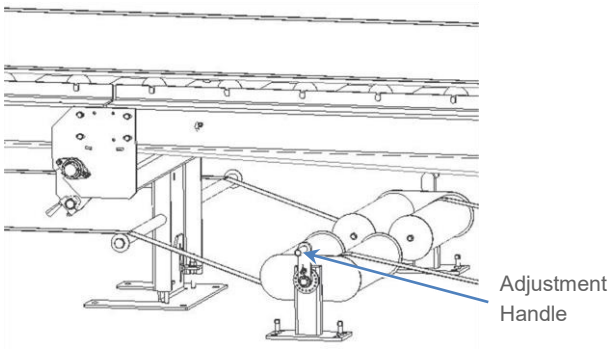

Figure 8: Taper Belt Tensioners

2.8 Technical Data

i. Pneumatics

The walker wheel air pressure regulator to the cylinder is set to a nominal 40 psig (2.4 bar) and the tire air pressure is set to a nominal 20 psig (1.4 bar). These values may be adjusted as required based on paper tension, board or paper slickness, etc.

3 Maintenance Procedures

3.1 Lockout Procedures

As equipment may start automatically, always lock out any source of motive power (electric, hydraulic, steam, compressed air, etc.) before performing maintenance or cleaning functions. Note that potential energy may also be stored in some equipment such as those held in a raised position by hydraulic or air pressure and that such equipment may move or fall suddenly if pressure is removed.

Depending on the equipment layout, electrical lock out may be performed at the electrical panel or locally with a safety switch or disconnect. Air pressure is removed and locked out at the manual air disconnect switch. As a further safeguard, you must confirm that any equipment in the system being worked on is not operational after being locked out. Test for this by using the normal means of starting, i.e. the operator controls on the HMI station or the manual HOA switch.

The above procedure is a general recommendation. Operating and maintenance staff must follow lockout procedures and operate in compliance with their company policy and local regulations.

3.2 Belt Tracking

Proper belt tracking is essential to board quality during the forming process. Training rollers on the return side are for self-correcting but they will not be able to correct all alignment issues.

When the need for belt tracking arises there are several items that need to be confirmed before making adjustments:

- It cannot be overstated that **ALL pulleys** and **roller** surfaces **must be clean** and free from any stucco build-up. If this is not done tracking conditions will change as the surface conditions change.
- Head pulley, tail pulley, take-up pulleys and snub pulleys are all parallel and level. **The major pulleys are not to be adjusted to track the belt.** See the red rollers in Figure 9. 95% of tracking a board belt is controlled by the carrier rollers and the return rollers mounted on the pedestals.

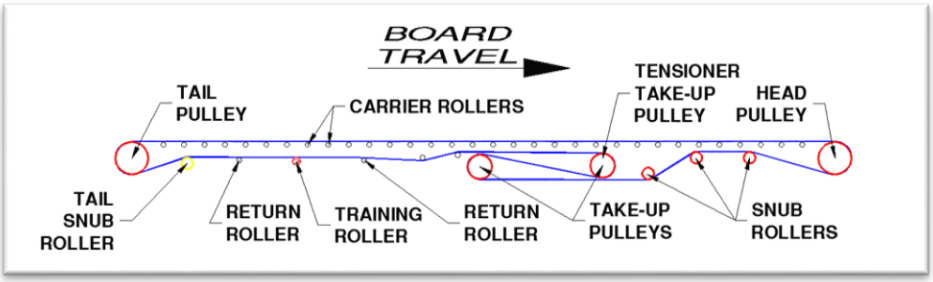

Figure 9: The major pulleys are not to be adjusted to track the belt

If there are concerns about major pulley alignment and level it is advisable to arrange to have a capable optical equipment alignment technician to correct any issues.

- It is also important that the complete boardline is centered on the boardline center line. The boardline conveyor should have been installed in this condition and it is important to maintain this. If tail pulley and head pulley are not on the same centerline this will affect belt tracking. If equipment has been accidently bumped by heavy mobile equipment this can be a cause for tracking concerns and again should be correct using the services of a capable optical equipment alignment technician
- Although it looks like adjusting the tension roller unequally is an easy way to track the belt this is not recommended as it creates unequal tension in the belt from side to side and will make the belt unstable.
- In the case of a new belt installation it is important to have all the rollers level and square to the board belt centerline. Once it is established that all rollers are square and level some type of marking is recommended so that all major pulleys can be maintained in this position.
- Rubber board belt tension measured by belt sag between return rollers at 10ft (3m) centres should be approximately 1 ½" (40mm) or according to belt supplier recommendation. At times increased tension can improve belt tracking stability. PVC belts need to be tensioned as per belt suppliers recommendations, they are generally under more tension than a rubber belt but monitoring belt sag between return rollers can give an indication of belt stretch or reduced tension.
- The training rollers should track the belt to a consistent position close to centerline. Excessive tilt or lean towards one side may indicate poor belt tracking ahead of the training roller. Also training rollers need to be properly installed if tracking issues arise shortly after installation of the tracking roller please confirm installation is correct. Training rollers that do not have enough belt weight on them will also not have optimal performance. Training rollers need to have 10ft (3M) of unsupported belt before and after the roller. Also never lower a training roller from its original installed height as this will reduce the belt weight on the roller. Over greasing a training roller can affect its performance. If grease is visible around the internal seals then we can assume the cavity around the bearing is full restricting the free movement of the wobble roller. See figure 10 for the internal construction of the training roller.

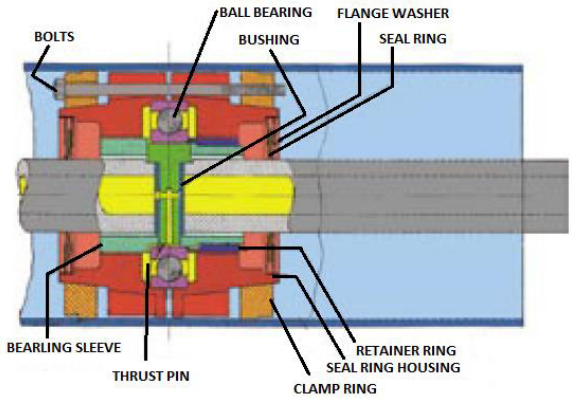

Figure 10 – Internals of the Training Roller

Figure 11 – Picture of a Training Roller Installed on the Board line

Belt Tracking

Note: During belt tracking, station a person at the head and tail pulleys to monitor belt position and ensure the belt does not run off. Test tracking switches to ensure that in the event of a belt running off that the boardline will automatically stop.

- It is strongly recommended to make marks or record exact adjustments made while tracking the belt so that if it becomes necessary, they can be reversed later in the tracking process.
- At times it can be beneficial to have the board belt running at reduced speeds while tracking, After each adjustment, observe at least one full revolution of the belt to allow the changes to take full effect. It will take several revolutions of the belt to establish it has stabilized into a new position. After the belt is centralized, run at full speed and observe.
- If a belt is running straight but not centered then no tracking adjustment should be made in the area the belt is running straight. The required adjustment will need to be done where we see a change

in direction happening. We do not recommend adjustments unless you see a trend in change of more than 3/16” (5mm)

- The illustration see in figure 12 demonstrates the basic principle used to track board belts. Lay a pen or pencil on table top on and angle in relation to the book placed on top of it. Then push the end of the book and see the resulting movement of the book

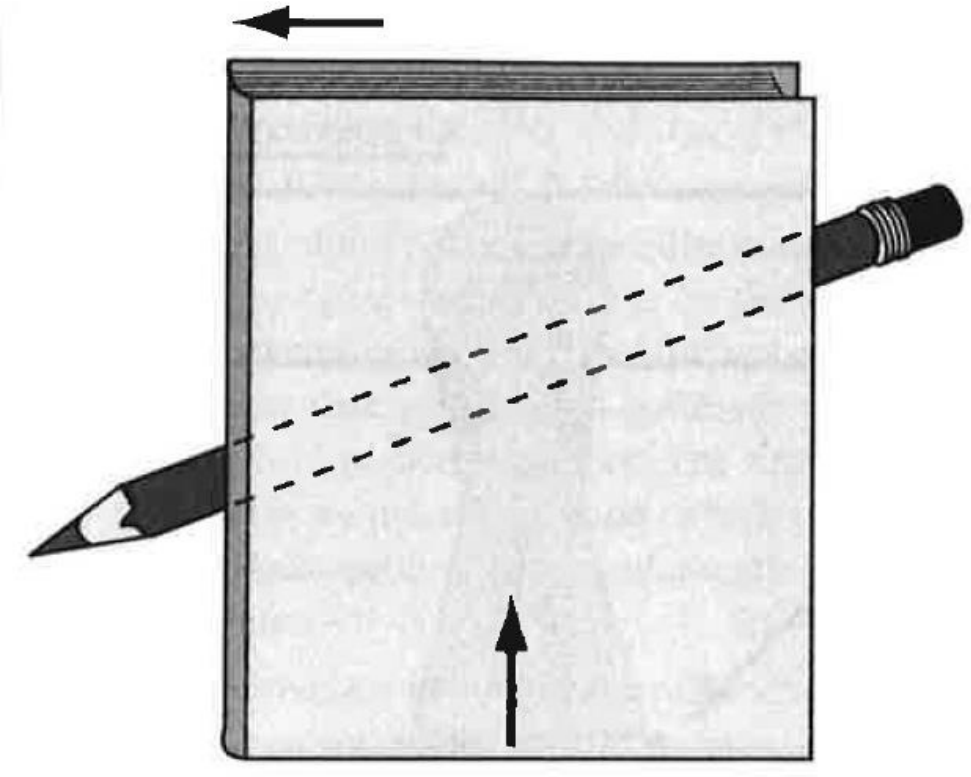

Figure 12 – Tacking Demonstration

Tracking Methodology:

- Before any tracking is done, please ensure the rolls and drums are clean or at least in a normal state – i.e. no large buildups on the return rollers or major pulleys
- Tracking adjustments should be made when the belt changes direction more than 3/16” (5mm.)
- After a tracking change is made, please observe at least one if not several revolutions of the belt around entire boardline to see the full change take effect.
- Initial changes can be done on an unloaded belt, but tracking can only be taken so far without product on the belt.
- Changes should be recorded or noted so that they can be undone if necessary

Tracking order should be as follows:

1. Track belt along return rollers to center of tail drum
2. Ensure training roller is spinning concentrically and without excessive wobble
3. Review return belt path and adjust if needed
4. Track belt along carrier rollers to center of head drum
5. Repeat these steps as necessary

Belt Tracking – Return Belt

- The first goal of belt tracking is to get the belt coming up centered on the tail pulley. Please note that under extreme conditions some adjustment will need to be done to top carrier rollers at the same time as tracking the return belt but final tracking cannot be achieved until belt is running consistently centered on the tail pulley. Adjusting carrier rollers at this time is just to achieve making the belt run straight not necessarily centered.

- Measuring between the inside of the pedestal vertical stringer mounting plates and the edge of the belt can determine if the belt is centered on a return roller. See red arrow in figure 13 below.

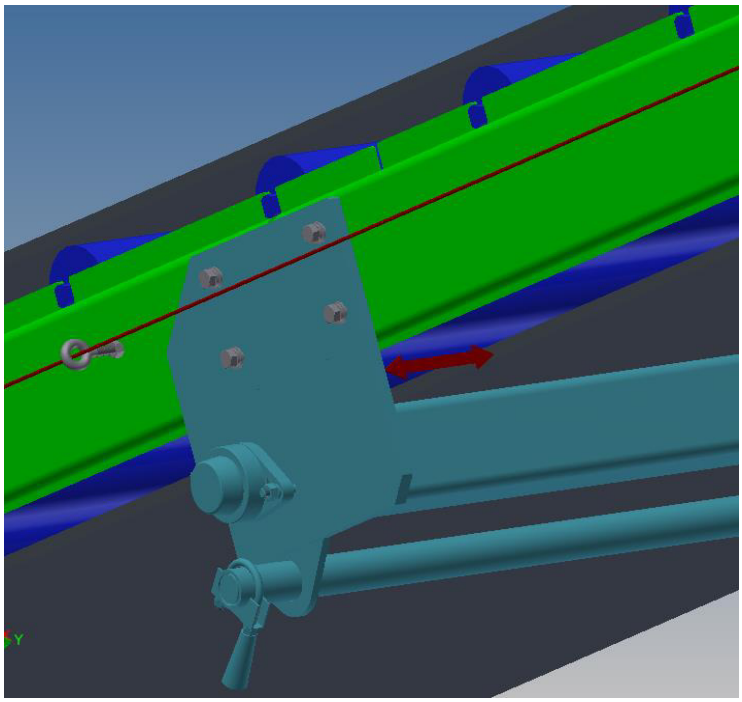

Figure 13 – Red Arrow Shows Good Measuring Point of Return Belt

A general guide line is that a shift of 3/16” (5mm) or more from one pedestal to the next in direction of belt travel should be addressed but only if the belt continues to travel away from center at the next pedestal.

- Return rollers are mounted in horizontal slots see figure 14. The bearing is removed to show the slots in the pedestal side plate.

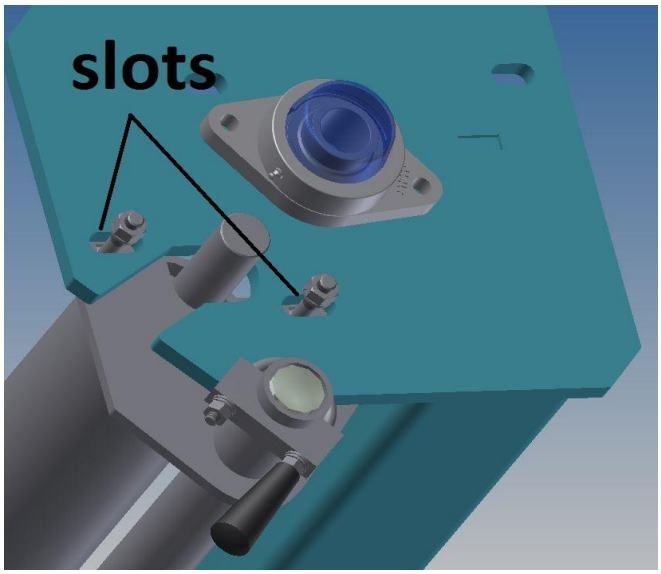

Figure 14 – Adjusting Slots for Return Roller.

Adjusting a return roller bearing in the slots will steer the belt. Moving a return roller bearing ahead in the direction of return belt travel will move the belt away from the side that is adjusted. See figure 15.

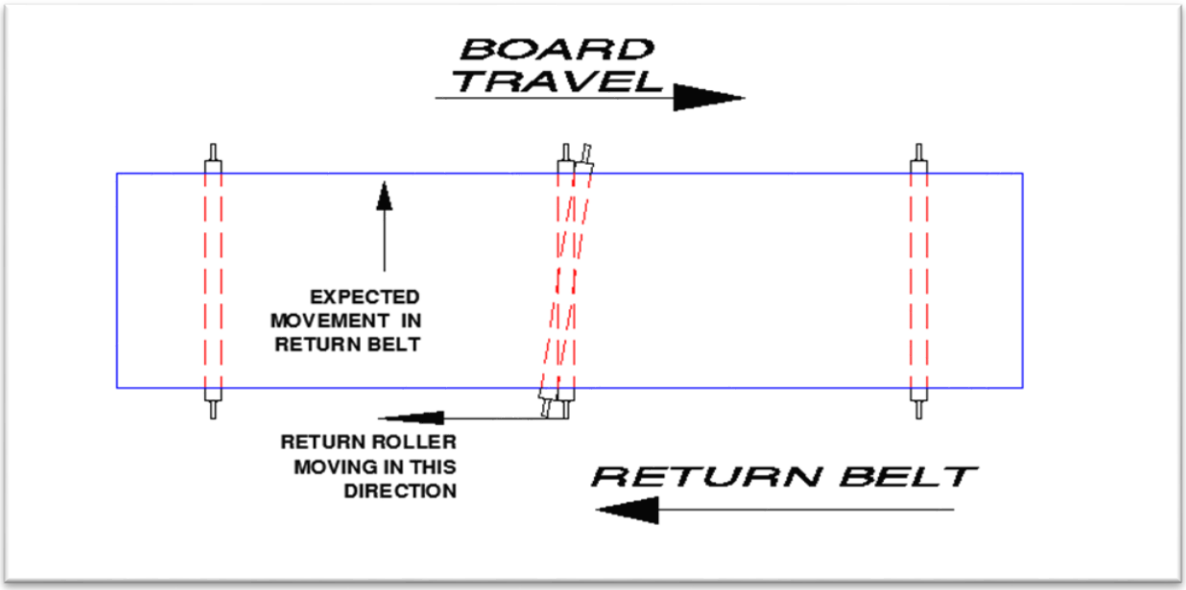

Figure 15 – Expected Tracking Results in Return Belt.

Some trial and error is required to establish the exact amount of movement related to the amount of correction. Moving a pedestal return roller bearing ¼ inch (6mm) is a good adjustment increment.

- To correct a tracking situation you need to adjust the roller ahead of the situation you are trying to correct in the sense of belt travel. Not the roller where you see the tracking variation. See figure 16

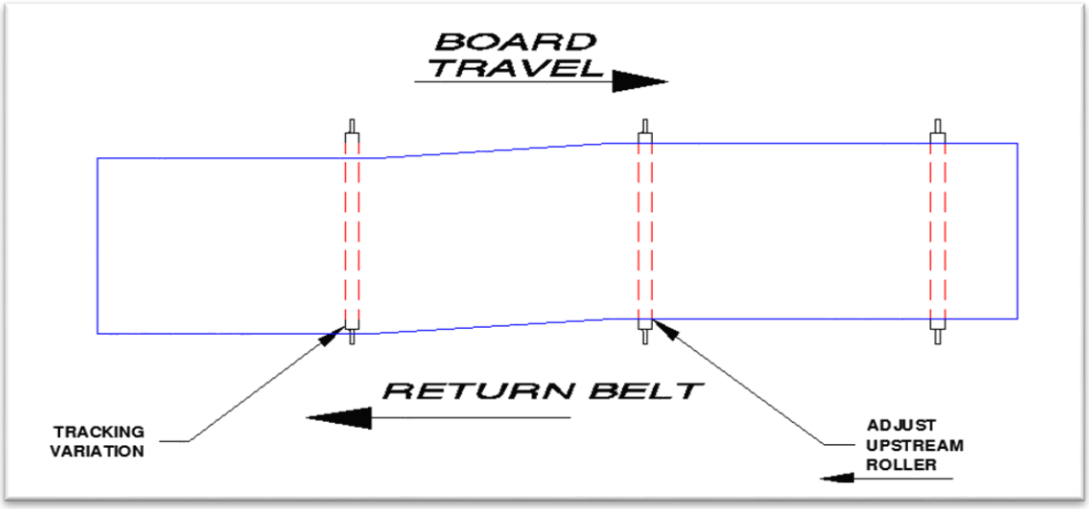

Figure 16 – Identifying Proper Roller to Adjust

The goal is to have the return belt as centered as possible feeding into the training rollers and into the tail pulley snub roller. The snub roller feeding the tail pulley (see figure 17) is very effective in tracking the belt but it is important to have the complete belt as straight and centered as possible in order to have a stable belt. Using the tail pulley snub roller should be the last adjustment used to track a belt on the return side. It would be best to have the tail snub roller square and level like all the other major pulleys see figure 9.

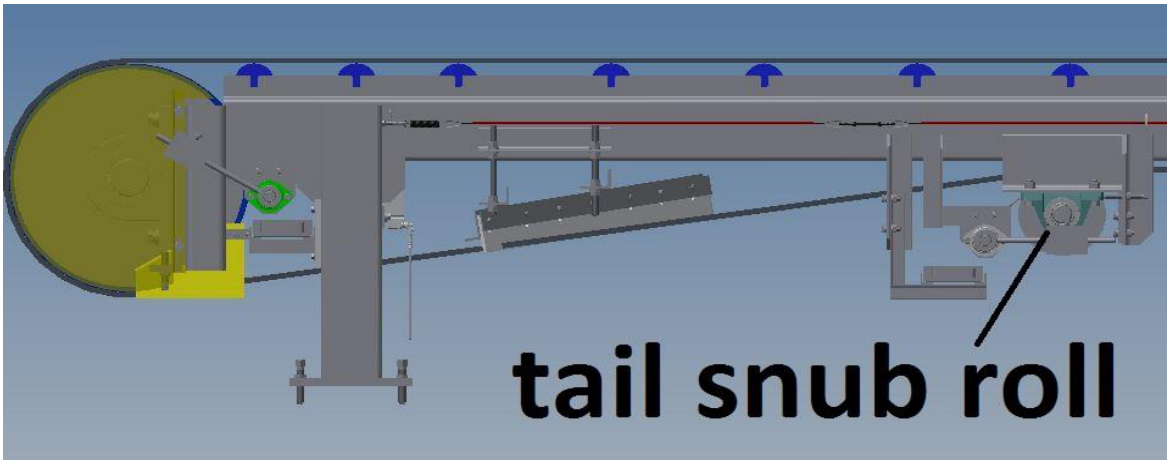

Figure 17 – Tail Pulley Snub Roller

- When belt is coming up centered on the tail pulley then work can be done to center the board belt on the carrier rollers.

Belt Tracking – Forming Belt on Carrier Rollers

Measuring from the vertical portion of the stringer to the edge of the belt can determine if the belt is centered. See Figure 18. Measuring at each pedestal gives a fixed measuring interval and a reasonable idea of belt tracking travel.

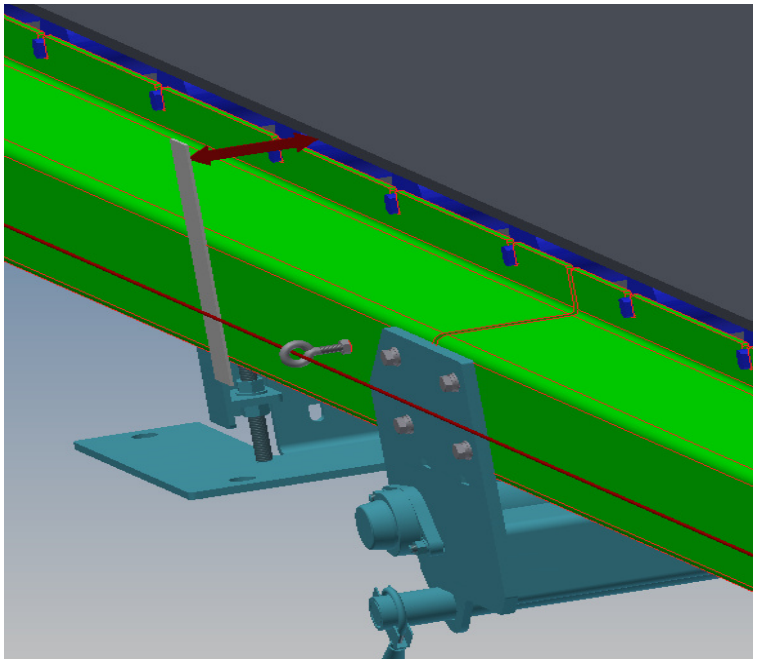

Figure 18 – Measuring Reference for Forming Belt on Carrier Rollers

A general guide line is that a shift of 3/16” (5mm) or more from one pedestal to the next in direction of belt travel should be addressed but only if the belt continues to travel away from center at the next pedestal.

- The carrier rollers are fixed in location in the stringer support channel. These channels are accurately laser cut during the fabrication process and there is no need to adjust individual carrier rollers. The stringers are mounted in horizontal slots to the pedestal mounting plates. The pedestal mounting plates also have accommodation to adjust the level of the stringers. Level adjustments should have been accurately completed at installation and should not be adjusted again unless absolutely necessary.

- Tracking of the belt on the carrier rollers is achieved by moving a complete stringer in the slots in the pedestal mounting plates. (see figure 19) Moving a stringer 1/8” inch (3mm) is a good adjustment increment. A reminder that it is strongly recommended to make marks or record exact adjustments made while tracking the belt so that if it becomes necessary, they can be reversed later in the tracking process.

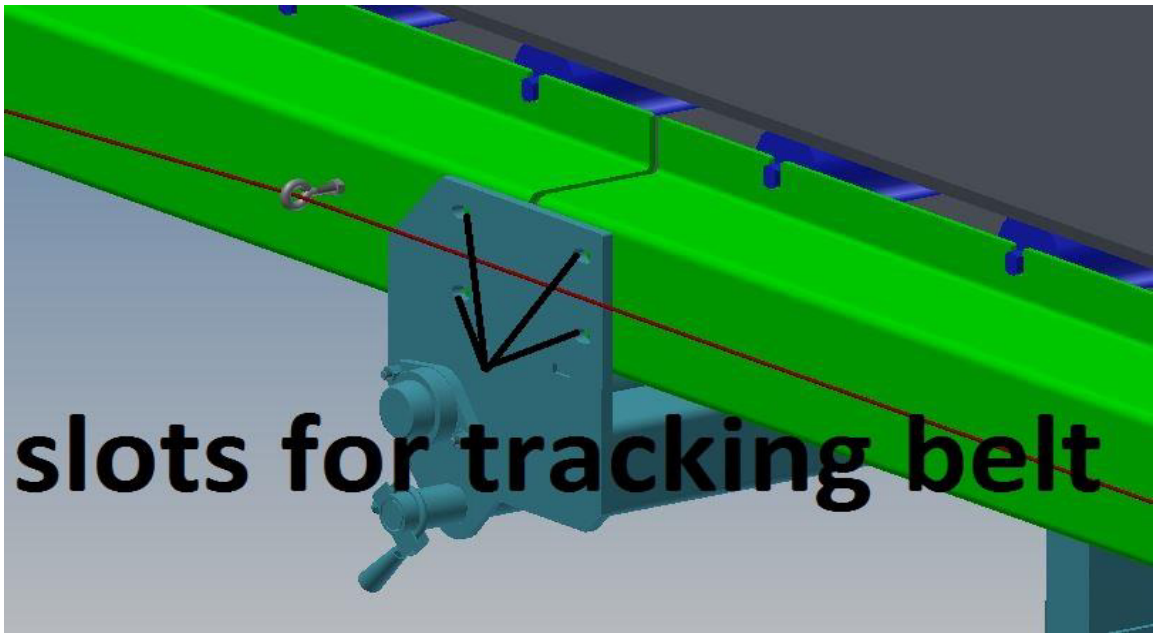

Figure 19 – Showing Slots in Pedestals to Allowing Stringer Movement for Tracking – (Bolts removed for clarity)

The carrier rollers in the head sections are supported by formed angles that have slotted holes to allow for adjustments, see figure 20.

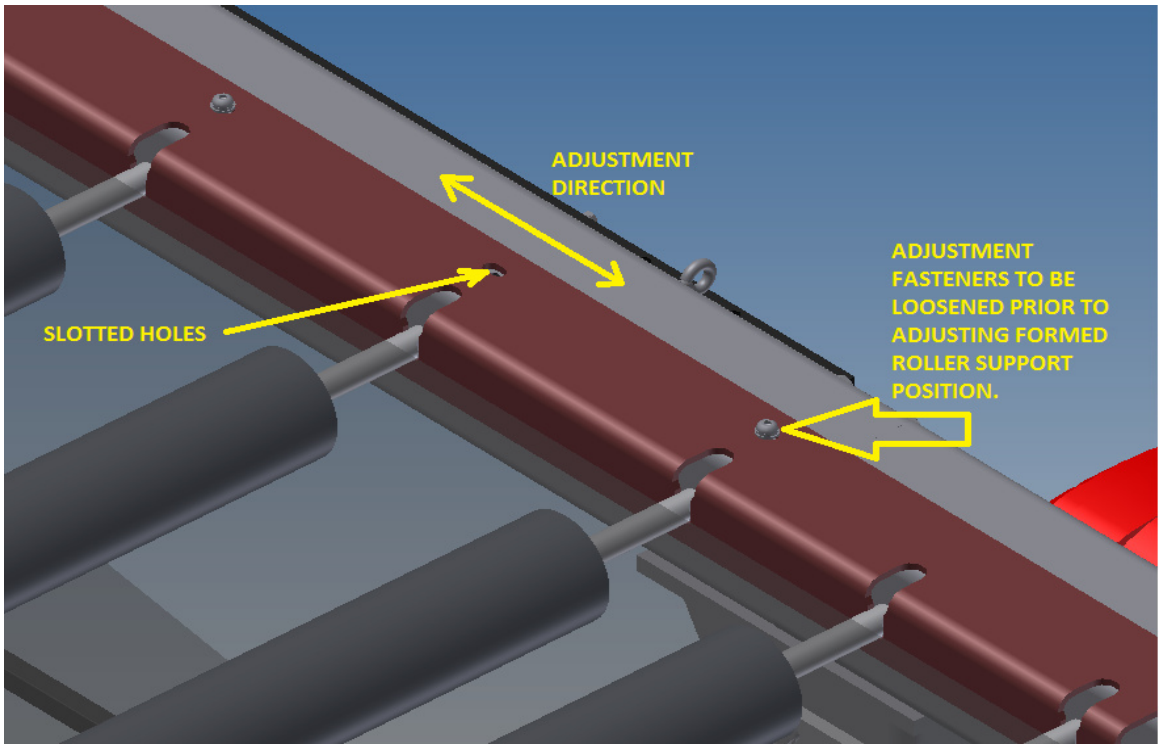

Figure 20 – Adjusting Slots in Head Sections

- It is important to only adjust the stringer in which the change in belt tracking is occurring. Moving a stringer in the same direction as the belt travel will result in the belt travelling away from that side.
- Figure 21 indicates this principle. The reverse obviously is true.

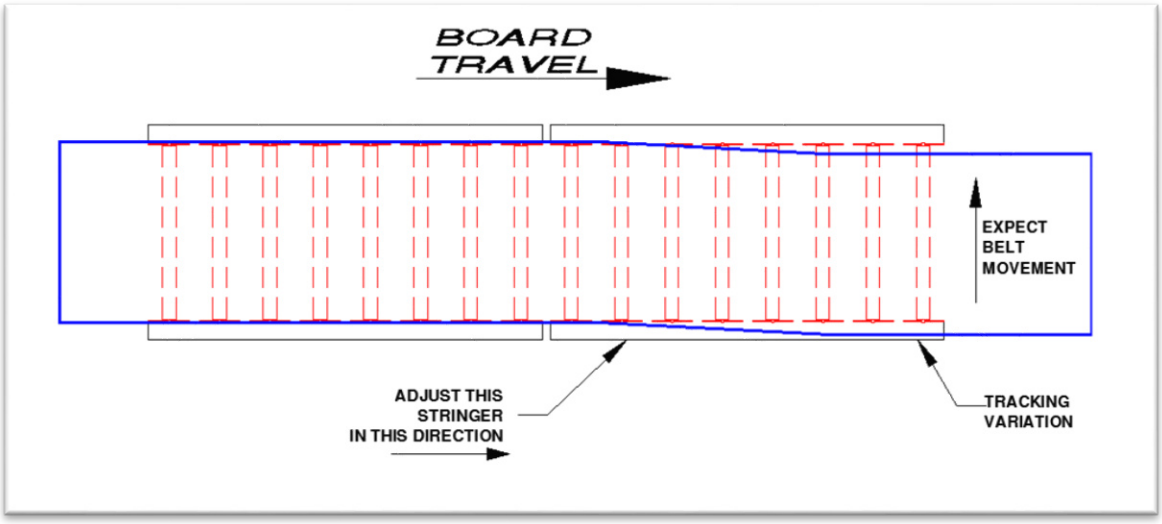

Figure 21 – Determining Which Stringer to Adjust and Expected Results

- Newer belt installations since (2013) have been installed with a reference straight edge due to the install jig used at installation. We recommend all adjustments be made from this same edge if possible. Older belt lines could have fabrication tolerances that mean the frame work could be up to a ¼" (6mm) off center and installation that were not accurate could also have the same results. This needs to be kept in mind while tracking your board belt.

- Long term monitoring is the only way to establish that the board belt is stable in its tracking position.

3.3 Pulley and Roller Maintenance

i. Bearing Lubrication

Top belt conveying rollers are constructed with internal, permanently sealed, lubed-for-life bearings. Periodic inspection to ensure all rollers are rotating should be made to prevent wear on the underside of the board belt. Replace rollers as necessary.

Return rollers and all pulleys use externally mounted bearings. Periodic inspection to ensure all rollers are rotating should be made to prevent frictional wear on the top side of the board belt. Grease or replace bearings as necessary.

ii. Surface Cleaning

Inspect all roller and pulley surfaces for pitting, galling, or other damage which may cause damage to the board belt surface. Repair or replace as necessary.

Top belt conveying rollers must be removed for surface cleaning.

Return rollers with scrapers can be cleaned during operation by pulling on the lever to apply the scraper against the roller while it is rotating.

Head pulleys, tail pulleys, take-up pulleys and snub pulleys are equipped with constant contact scrapers for automatic cleaning. Inspect surfaces to ensure that the scraper is making even contact across the face of the pulley or roller and adjust the applied force of the scrapers as necessary. Replace scraper blades as they wear down over time and the contact angle of the scraping force becomes ineffective or if the scraper is wearing unevenly.

3.4 Belt Tensioning

- Check that all jack bolts and bearing bolts for head pulleys, tail pulleys, take-up pulleys and snub pulleys are tight and secure.
- With the board belt stopped, adjust each side of the take-up pulley incrementally to a common parallel reference.
- With the board belt running, observe the sag in between return rollers at 10ft (3m) centres after a full revolution. For Rubber board belt tension, the sag should be measured at approximately 1 ½" (40mm) or according to belt supplier recommendation. At times increased tension can improve belt tracking stability. PVC belts need to be tensioned as per belt suppliers recommendations, they are generally under more tension than a rubber belt but monitoring belt sag between return rollers can give an indication of belt stretch or reduced tension.
- CAUTION: Guards may need to be removed to perform this procedure while the belt is running and expose pulley pinch points. Perform this maintenance only in compliance with Plant Safety Procedures and local regulations.

4 Maintenance Schedule

The following table summarizes the optimal maintenance intervals.

4.1 Daily Tasks

Task	Notes
Check belt tracking and belt surface condition	
Check training rollers are centered with the belt	Excessively tilted training rollers indicate belt tracking issues.

4.2 Weekly Tasks

Task	Notes
Check for debris build-up on V-plow at tail pulley	
Clean return rollers with built-in scrapers	
Check pulley scrapers for excessive noise or uneven wear. Adjust scrapers for even contact across the pulley.	Replace scraper blades as necessary.
Check pullcord switch operation and cable tension	See manufacturer's manual for details.
Clean all board break detection photo sensors	

4.3 Monthly Tasks

Task	Notes
Clean debris catch pans at all pulleys	
Clean water filter and inspect all water nozzles at edge sprays and back sprays	
Check belt tracking switches	

4.4 Annual Tasks

Task	Notes
Check all bolts for tightness	

5 TROUBLESHOOTING

5.1 General

Problem	Possible Cause(s)	Possible Solutions
Belt tracking	Occurs only when the belt washer is in operation.	Adjust the hard stops on both sides of the belt washer so that it makes even contact across the width of the belt
		Check for even water spray across the width, which may cause slippage on one side of the pulleys.
	Return roller misalignment	Check all return roller positions and fasteners for tightness.
	See Belt Tracking section.	
Belt bowed along the length of travel	Top conveying rollers misaligned	Check top rollers are square and parallel. A Gyptech laser alignment tool is available to verify. Adjust top roller sections or individual rollers.
	Uneven belt stretch or swelling across the width of the belt.	For cotton fiber reinforced belts with sealed edges: Check Belt Washer or other sprayers for uneven water distribution. Not common for synthetic or polyester fiber belts. Replace belt if necessary
	Poor belt splice.	Contact belt-splicer and re-splice if necessary.
Belt slippage	Belt tension too loose.	See Belt Tensioning section.
	Belt too wet.	Check Belt Washer operation and water shut-off solenoid.
		Apply manual squeegee to wipe off excess water from the underside of the board belt.
Paper cockles	Poor belt tracking	See Belt Tracking section.
	Belt misalignment from one belt section to another	Check head and tail pulley alignment for parallel and tighten all jack bolts.
	Poor paper expansion	Check Back Spray operation and clean as necessary.
	Belt speed difference from one belt section to another	See Operations Manual.

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