RAMSEY PRODUCTS CORPORATION

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Glass Conveyor System Installation and Maintenance Guidelines

For maximum productivity and efficiency it is very important that the key elements in a glass conveying system be properly installed and maintained. In this discussion, the key elements are those components that influence glass transport in most hot end and cold end conveying systems, including: the conveyor chain, sprockets, idler sprockets or rolls, wear or dead plates, and guides. **All applicable safety procedures should be followed whenever performing chain maintenance and installation. Do not attempt to service a chain while it is operating.** Figure 1 shows a typical glassware conveying system.

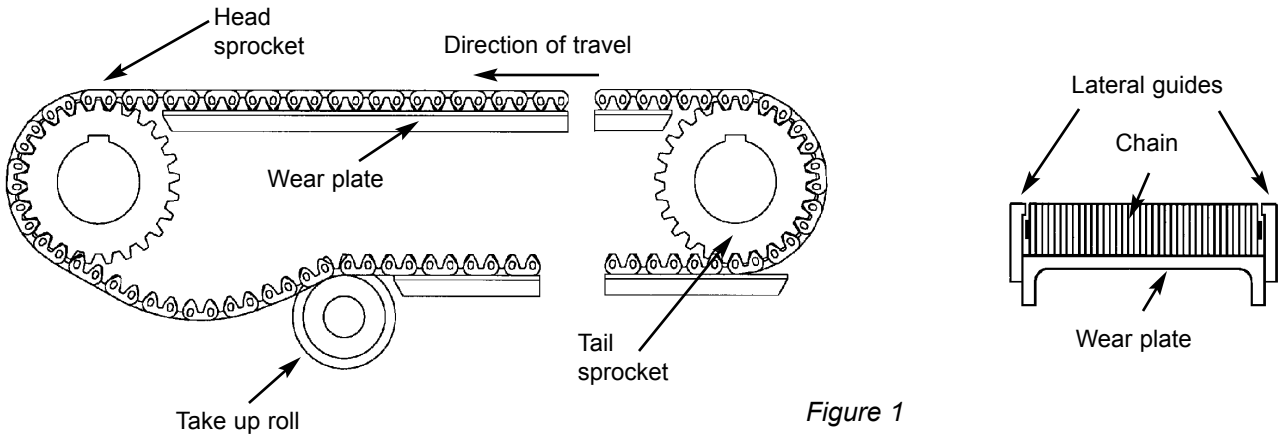

Figure 1

New Installations

Leveling and Alignment

All components should be level and properly aligned for optimum results. Sprockets and idlers should be aligned so that their shafts are parallel and there is minimal lateral offset between the sprockets (figure 2).

In general, the more exact the alignment and parallelism, the more trouble free the chain operation and the longer the chain life.

Where shaft center distances are small, a steel rule is often adequate for aligning sprockets laterally. However, the long center distances common in glass conveying systems may require a medium accuracy laser alignment tool (min accuracy +/_ 1/4” in 50 feet). A simple way to check sprocket alignment is to place a cylindrical laser alignment tool in the guide grove of one sprocket and direct the beam toward the sprocket to be checked; the beam should fall in or near the second sprocket's guide groove (Figure 3). For side guide type sprockets, the laser can be placed against a sprocket face, in place of the steel rule shown in Figure 2.

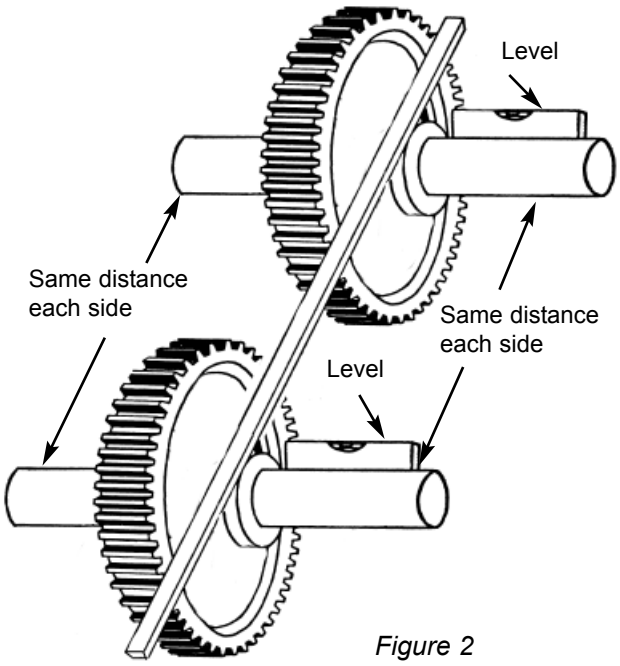

Figure 2

Note: Mis-alignment increases the likelihood of excessive lateral guide wear, chain wear, increased maintenance, and shortened chain life. The importance of good alignment can not be overstated.

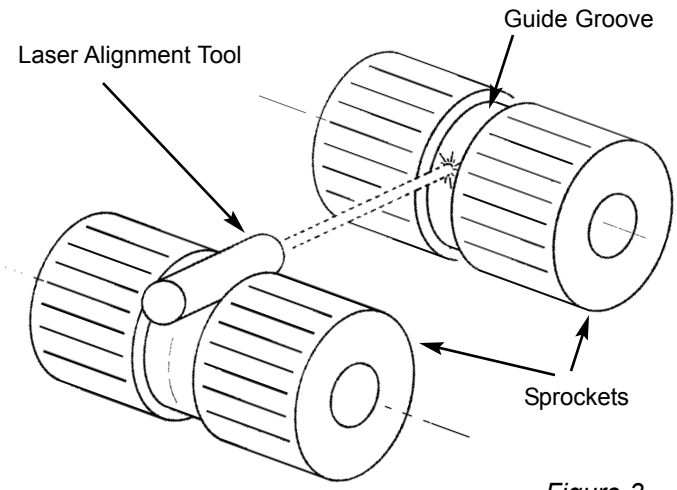

Figure 3

Shaft parallelism can be verified by using a tape measure to measuring the distance between sprockets at two different points along the sprocket teeth. The more exact the parallelism, the more trouble free the chain operation and the longer the chain life. When sprockets are not parallel, chain may not run straight and may interfere with lateral guides.

How closely do sprockets have to be aligned and brought into parallel? This depends to a large extent on the design and placement of lateral guides. The closer the guides are to the sprockets and the smaller the space between guides, the more important alignment and parallelism becomes.

Wear plates should be flat, with no exposed sharp edges upon which the chain will hang-up when crossing adjoining plates. Lateral guides typically have profiles that make contact with chain side plates and do not interfere with chain movement. (figure 4).

Common Lateral Guide Profiles

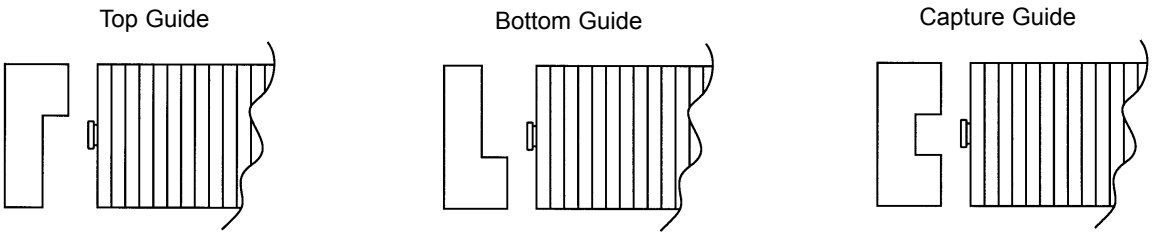

Figure 4

The guides should be straight and installed in a line that runs parallel to a line extended between the sprockets (figure 5).

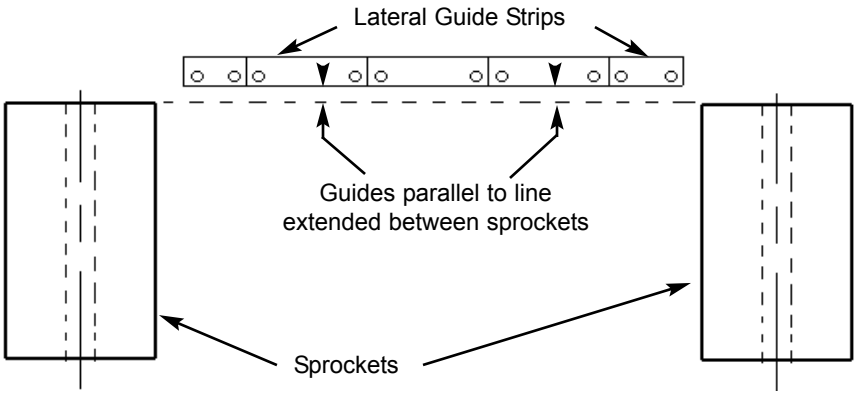

Figure 5

Chain Tensioning
New chains should be installed with just enough tension to provide satisfactory operation. Excess tension will accelerate chain and sprocket wear and shorten useful chain life. Begin installation by adjusting sprocket positions and tensioning devices, if present, to their initial, minimum center distance, positions. The chain should then be run the full length of the conveyor with the ends brought together, and clamped, on the wear plate. The chain should be pulled tight enough that it gently sags between the head sprocket and the first idler roll. The chain should then be shortened to remove any excess length, and connected, before removing the clamps.

Note, not all conveyor systems employ the idler roll configuration illustrated in Figure 1 . Also, some systems employ automatic tensioning devices that have not been described here. No matter which design is in place, chain tension should be kept as low as possible. Remember, over tensioning can be more harmful to a chain than under tensioning.

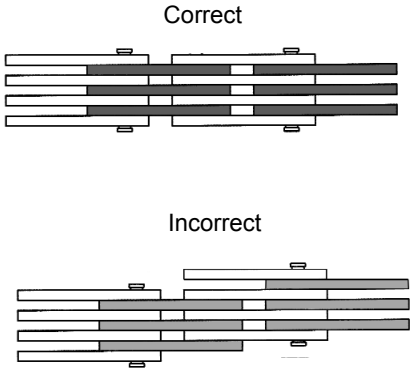

Figure 6

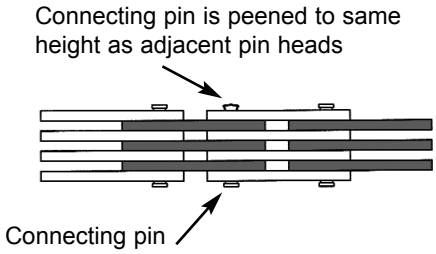

Figure 7

Chain Connection
It is very important that the chain be correctly laced at the connection (Figure 6) and that the connecting pin be sufficiently peened to retain the side link plate (Figure 7).

Running the Chain
New chain should be run for several complete cycles to verify proper installation. The chain should operate smoothly, running in a nearly straight line between the sprockets, with no noticeable jerking or surging.

Adjusting the Guides
Lateral guides should be adjusted after the chain has been cycled and smooth operation is obtained. The guides assure that the chain runs in a straight path and should be adjusted as needed, leaving a small gap between chain and guides. The guides should not squeeze or impede the free movement of the chain.

Lubrication
In hot end applications chain lubrication is generally not recommended.
If lubricants are used, it is important to choose a type that can withstand the operating temperature of the chain and will not leave thick residues that can block inter-link spaces and interfere with chain flexibility.
See maintenance section for reference to lubricating chains during machine shutdowns.

Maintenance

If a chain and sprockets have been properly installed, a minimal amount of maintenance should be required.

Shutting Down a Conveyor for Maintenance
When performing machine maintenance, it is important that un-lubricated chain not be stopped completely for more than a few hours at a time. During stoppage, rust and carbon build-up will cause the chain to stiffen; if the chain is left still for too long, it may lock up completely and become unusable. This condition can usually be prevented by cycling the chain every few hours or by spraying the chain with a light weight oil before shutting down. The oil can be burned off when the machine is restarted.
If a machine is going to be shut down for more than 24 hours it may be advisable to remove the chain and soak it in light penetrating oil. Here again, the oil can be burned off when the machine is restarted.

Re-tensioning
Over time, chain will elongate due to wear of joint components. Periodically chain tension should be checked visually, and the chain re-tensioned as necessary. It may be necessary to shorten the chain by removing a small section, after the limits of sprocket adjustment have been reached.
Eventually chain pitch will elongate to the point that problems are encountered either with chain not wrapping the sprocket or with controlling the speed of the conveyor. These are signs that a chain and possibly sprockets need to be replaced.

Visual Inspection for wear
Chain should also be inspected for evidence of wear on the pin heads and the link tips. Normal wear of the link tips reduces the height of the chain over time and may cause the pin heads to rub or impact lateral guides. Wear on the bottom surface of a pin head is a common indicator of lateral guide interference. Broken or cracked pin heads are evidence of the chain impacting some part of the equipment and their cause should be diagnosed and corrected as quickly as possible.
In some cases, extended operation in highly abrasive environments can result in the wearing thin of individual link plates. As this occurs, the pin heads may project excessively from the side of the chain. This is an indication that the chain should be replaced since it usually results in pins impacting lateral guides and chain failure.

Sprocket Inspection
Sprockets should be inspected for accumulation of debris in between the teeth or in the guide groove. Such deposits can affect chain speed and should be removed.
Sprockets should be replaced if the teeth are worn thin, if a newly installed chain does not fully wrap the circumference, or if a new chain skips sprocket teeth during operation.

Chain Replacement
When replacing a chain that has delivered satisfactory performance, it is normally not necessary to re-verify sprocket alignment. However, chain width may vary and it may be necessary to re-adjust lateral guides. Also, wear plates should be inspected for warpage or severe grooving, and any debris accumulation should be removed from between sprocket teeth. Once the new chain is installed it should be cycled to confirm smooth operation.

Troubleshooting

Symptom: Chain elongates or "stretches" too quickly
Action: Check for excessive chain tension or insufficient lateral guide clearance. Both of these conditions can produce chain overloads, leading to rapid elongation and short life.

Symptom: Pin heads are cracked, chipped, or worn excessively
Action: These problems are usually the result of chain impacting the lateral guides. Check that guides are straight and properly aligned with no corners or edges that the heads impact. If chain link tips are worn and the bottoms of the heads are rubbing the guides, then it is probably necessary to replace the chain. Also, inspect wear plates for unusual wear or grooves that cause the chain to run lower relative to the guides. If pin heads project excessively from the side of the chain then replacement may be required.

Symptom: Chain appears to be splitting
Action: Check for damaged pin heads. Damaged or missing pin heads can result in links coming out of the chain. When this occurs, links in the center of the chain migrate outward, creating a gap or split in the center of the chain. A chain that has been damaged in this manner should be replaced.

Symptom: Chain jerks or surges
Action: Check for guides or other machine parts that interfere with the free movement of the chain. Check pin heads for signs of impact. Check that the connecting pins used to join each section have been properly peened over and that chain lacing is correct. Inspect sprockets for debris accumulation between the teeth.

Symptom: Chain speed varies or is not consistent
Action: This can be caused by connecting used sections of chain with unused sections, a practice that we discourage. Also, if the lower strand of the conveyor chain is suspended, without support, oscillations may develop which cause the speed of the chain to vary. Inspect for debris accumulation between sprocket teeth.

Symptom: Chain does not run straight
Action: Check to see that sprocket shafts are parallel, sprocket faces are aligned, and wear strips are level..

Symptom: Chain runs faster than desired
Action: If chain speed is faster than desired and the speed cannot be adequately reduced with motor adjustment, the chain may have elongated so much that replacement is necessary. Check to see if chain runs on the outer edges of sprocket teeth to verify excess elongation. Also check for accumulation of debris between sprocket teeth.

Symptom: Excessive wear on chain guide links
Action: Inspect sprocket alignment. Also, make sure lateral guides do not force the chain to one side of the sprockets.

Symptom: Excessive wear on driving links
Action: Inspect wear plates for warpage, deep grooves, bending or other types of damage. These conditions can affect chain tracking and should be corrected as soon as possible.

Symptom: Using excessive chain tension to force a chain to run smoothly.
Action: Check to see if chain runs only on the outer tips of sprocket teeth: a sign of excess chain elongation or sprocket wear.
If alignment problems exist, excessive chain tension can temporarily straighten out the path of a chain, remove interference with lateral guides and possibly result in smoother chain operation. However, the excess tension will greatly accelerate chain wear and reduce chain life. It is advisable to correct any misalignment and return the chain to a normal tension level.