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BULK MATERIAL HANDLING

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BELT CONVEYOR INSTALLATION AND MAINTENANCE

Bulletin 400.IOM

CAUTION!! Do not operate the conveyor without safety guards in place and properly adjusted. WARNING!! LOCK OUT EQUIPMENT POWER PRIOR TO ANY MAINTENANCE!

A. STORAGE, HANDLING, AND INSTALLATION

New conveyor belt should be stored upright in the factory package until used. For hoisting, a bar is passed through the hole in the center of the roll. Chains or cables looped around the bar ends should be provided with a spreader above the roll to avoid damage to the belt edges. Mount the roll on a suitable shaft for unrolling and threading onto the conveyor. Conveyor belting is normally rolled with the carrying side out. Consequently, the belt must lead off the top of the roll if it is being pulled onto the troughing idlers but off the bottom of the roll if it is being pulled onto the return idlers.

B. TRAINING THE BELT

Training the belt is a process of adjusting idlers, pulleys and loading conditions in a manner which will correct any tendency of the belt to run other than centrally.

When all portions of a belt run off through a part of the conveyor length the cause is probably in the alignment or leveling of the conveyor structures, idlers or pulleys in that area.

If one or more portions of the belt run off at all points along the conveyor the cause is more likely in the belt itself, in the splices or in the loading of the belt. When the belt is loaded off-center the center of gravity of the load tends to find the center of the troughing idlers, thus leading the belt off on its lightly loaded edge.

These are the basic rules for diagnosis of belt running ills. The usual cases when a pattern does not emerge are those of erratic running that may be found on an unloaded belt that does not trough well or a loaded belt that is not receiving its load uniformly centered.

C. FACTORS AFFECTING THE TRAINING OF A BELT

1. Pulleys and Snubs. Relatively little steering effect is obtained from the crown of conveyor pulleys. All pulleys should be level and with their axis at 90 deg. to the frame. They should be kept that way and not shifted as a means of training with the exception that snub pulleys may have their axis shifted when other means of training have provided insufficient correction. When pulleys are not level the belt tends to run to the low side.
2. Carrying Idlers. Training the belt with the troughing idlers is accomplished in two ways. Shifting the idler axis with respect to the path of the belt, commonly known as “knocking idlers”, is effective where the entire belt runs to one side along some portion of the conveyor. Center the belt by “knocking” ahead (in the direction of their travel) the end of the idler to which the belt runs. Shifting idlers in this way should be

spread over some length of the conveyor preceding the regions of the trouble. All idlers should initially be squared with the path of the belt and only the minimum shifting of idlers used as a training means Tilting the troughing idler forward not over two degrees in the direction of belt travel produces a self-aligning effect. The idlers may be tilted in this manner by shimming the rear leg of the idler stand.

This method has an advantage over "knocking idlers" in that it will correct for movement of the belt to either side of the idler, hence is useful for training erratic belts.

3. Return idlers. Return idlers, being flat, provide no self-aligning influence as in the case of tilted troughing idlers. However, by shifting their axis (knocking), with respect to the path of the belt, the return roll can be used to provide a constant corrective effect in one direction. As in the case of troughing rolls, the end of the roll toward which the belt is shifting should be moved longitudinally in the direction of return belt travel to provide correction. Self-aligning return rolls should also be used. These are pivoted about a central pin. Pivoting of the roll about this pin results from an off-center belt and the idler roll axis becomes shifted with respect to the path of the belt in a self-correcting action.

4. Side Guide Rollers. Guides of this type are not recommended for use in making belts run straight.

D. SEQUENCE OF TRAINING OPERATIONS

Initial installation of conveyor equipment should ensure good alignment of all pulleys, troughing and return idlers, i.e., they should be place at right angles to the direction of belt travel, leveled and centered on a straight line. First movement of the belt should be slow and intermittent so that any tendency of the belt to run off many be observed and the belt stopped before damage occurs.

Initial movement of the belt will provide indication of where corrections of the types described are required. The first corrections must be those at points where the belt is in danger of being damaged.

The best procedure to use in starting the training sequence is probably to start with the return run and work toward the tail pulley. This assures early centering of the belt on the tail pulley so that it can be centrally loaded.

If the empty belt troughs readily, the training should be completed. Should the belt tend toward stiffness and erratic running, placing some load onto the belt as soon as the return run has been straightened up and the belt centered on the tail pulley will help hold the top run.

Normally, the belt can be trained properly onto the tail pulley by manipulation of return idlers and with the assistance of self-aligning return rolls. Seldom is any adjustment of snub or tail pulley necessary but the snub can be used as a supplementary training means.

Training of the top run, with the belt empty, is usually no problem if the belt troughs readily. It should not be necessary to use the head pulley for training purposes if it has been aligned properly.

With the empty belt trained satisfactorily, good operation with load is usually assured. Disturbances that appear with load are usually due to off-center loading or to accumulation of material on snub pulleys and return idlers.

When equipment is apparently properly aligned, training action should be taken slowly and in small steps because the belt requires some time to respond to corrective measures. It should begin at some point preceding that where run-off occurs and then gradually proceed forward, in the direction of belt travel, until the run-off condition has been corrected.

E. LUBRICATION

The troughing and return idlers normally supplied on SINCLAIR belt conveyors are fitted with thru-lubrication fittings so that complete lubrication of all idler bearings can be accomplished from either side of the conveyor. The system connecting the idler bearings provides a metered amount of grease to each bearing when the lubricant is introduced from either end. Relief holes are provided in each bearing seal assembly to purge air, foreign material and contaminated grease from each bearing.

CAUTION!! Best results will be obtained if the idlers are re-greased with the conveyor running. Personnel should wear suitable clothing and exercise EXTREME CARE when wiping fittings and attaching grease hose to the fittings.

SINCLAIR-furnished idlers come factory greased with lithium soap multipurpose industrial grease, especially compounded to resist corrosion and provide oxidation resistance. Any lubricant that meets the basic description below is acceptable for re-lubrication:

NGLI NO. 1

STRUCTURE: Smooth
SOAP TYPE: Non-lead lithium, 12 hydroxystearate
COLOR: Brown
DROP POINT: 340 degrees F. (min.)
MINERAL OIL: 89%
VISCOSITY: 75 Sus @ 210 degrees F.
EXAMPLE: Mobil Corp. Mobilux-EP1

F. PROBLEMS AND THEIR SOLUTIONS

1. Idlers or pulleys out of square with center line of belt: readjust idlers in affected area.
2. Conveyor frame or structure crooked: Straighten in affected area.
3. Idler stands not centered on belt: readjust idlers in affected area.
4. Sticking idlers: Free idlers and improve maintenance and lubrication.
5. Buildup of material on idlers: remove accumulation; improve maintenance, install scrapers or other cleaning devices.
6. Belt not joined squarely: remove affected splice and re-splice.
7. Bowed belt: for new belt this condition should disappear during break-in; in rare instances belt must be straightened or replaced; check storage and handling of belt rolls.
8. Off-center loading or poor loading: adjust chute to place load on center of belt; discharge material in direction of belt travel at or near belt speed.
9. Slipping or drive pulley: increase tension thru screw take-up or add counter weight; lag drive pulley; increase arc of contact.
10. Material spillage and buildup: improve loading and transfer conditions; install cleaning device; improve maintenance.
11. Bolts heads protruding above lagging: tighten bolts; replace lagging; use vulcanized lagging.
12. Tension too high: increase speed, same tonnage; reduce tonnage, same speed; reduce friction with better maintenance and replacement of damaged idlers; decrease tension by increasing are of contact to lagged pulley; reduce counterweight to minimum amount.
13. Skirt boards improperly adjusted or of wrong material: adjust skirt board supports to minimum 1” between metal and belt with gap increasing in direction of belt travel; use-skirt board rubber (not old belt).
14. Belt spanking down under load impact: install cushion idlers.
15. Material hanging up in or under chute: improve loading to reduce spillage; install baffles; widen chute.
16. Impact of material on belt: reduce impact by improving chute design; install impact idlers.
17. Material trapped between belt and pulley: install plows or scrapers on return run ahead of tail pulley.
18. Belt edges folding up on structure: same corrections as for 1,2,3; install limit switches; provide more clearance.
19. Dirty, stuck, or misaligned return rolls: remove accumulations; install cleaning devices; use self-cleaning return rolls; improve maintenance and lubrication.
20. Cover quality too low: replace with belt of heavier cover gauge or higher quality rubber.
21. Spilled oil or grease, over-lubrication of idlers: improve housekeeping; reduce quantity of grease used; check grease seals.
22. Wrong type of fastener, fasteners too tight or too loose: use proper fasteners and splice technique; set up schedule for regular fastener inspection.
23. Heat or chemical damage: use belt designed for specific concern.
24. Fastener plates too long for pulley size: replace with smaller fasteners; increase pulley size.

25. Improper transition between troughed belt and terminal pulleys; adjust transition in accordance with SINCLAIR Engineering recommendations.
26. Severe convex (hump) vertical curve: decrease idler spacing in curve; increase curve radius; consult Sinclair for assistance.
27. Excessive forward tilt of trough rolls: reduce forward tilt of idlers to no more than 2 deg. from vertical.
28. Excess gap between idler rolls: replace idlers; replace with heavier belt.
29. Insufficient transverse stiffness: replace with the proper belt.
30. Pulleys too small: use larger diameter pulleys.
31. Counterweight too light: add counterweight or increase screw take-up tension to value determined from calculations. Consult Sinclair.
32. Counterweight too heavy: lighten counterweight to value required by calculations. Consult Sinclair.
33. Pulley lagging worn: replace pulley lagging
34. Insufficient traction between belt and pulley: lag drive pulley; increase belt wrap; install belt-cleaning devices.
35. System under-belted: recalculate belt tensions and select proper belt.
36. Excessive sag between idlers causing load to work and shuffle on belt as it passes over idlers: increase tension if unnecessarily low; reduce idler spacing.
37. Improper storage or handling: See proper storage and handling instructions, above.
38. Belt improperly spliced: replace using proper method as recommended by Sinclair.
39. Belt running off-center around the tail pulley and through the loading area; install training idlers on the return run prior to tail pulley.
40. Belt hitting structure: install training idlers on carrying and return run.
41. Improper belt installation causing apparent excessive belt stretch: pull belt through counterweight with a tension equal to at least empty running tension; run belt in with mechanical fasteners.
42. Improper initial positioning of counterweight in its carriage causing apparent excessive belt stretch; consult Sinclair Engineering for recommended initial position.
43. Insufficient counterweight travel: consult Sinclair for recommended minimum distances.
44. Structure not level: level structure in affected area.
45. Cover cuts or very small cover punctures allow fines to work under cover and cut cover away from carcass: make spot repair with self-curing repair material.
46. Excessive cover gauge ratio: use a belt with a lower gauge ratio and/or a thicker carcass.

F. GRAVITY TAKE-UP MECHANISM

Your conveyor may have been designed to employ an automatic counterweighted gravity take-up assembly to tension the belt. This assembly normally consists of a weight box, guide rails, and other accessories. The weight box is an empty vessel with removable lid. It is designed to accept a quantity of dense material (i.e., concrete, steel scrap, steel plates, etc.) that serves as the mass required to tension the chain or belt. BWSI normally does not ship weight in the weight box. It must be added at the job site.

The amount of weight to add to the weight box is difficult to calculate. In some instances, the weight of the empty box, shafts, pulleys, and belt or chain is sufficient to tension the conveyor. In some instances, additional weight must be added.

We suggest that you begin by adding some weight to the box, simultaneously observing the conveyor to check for sufficient operating tension. If you cannot determine if the belt is properly tensioned, please call SINCLAIR @ 940-766-2556 for additional engineering assistance.

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