

**CAMFLEX CONVEYOR
INSTALLATION,
OPERATIONS
AND MAINTENANCE
MANUAL**

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To our valued customers:

We at Cambelt International Corp. (CIC) are pleased that you have selected the CamFlex Conveyor to fill your bulk materials handling need. This manual has been prepared to assist you in making the best possible use of our equipment, and in fully understanding its operation. We have attempted to cover most of the pertinent areas, and hope that our efforts have been successful. If, however, you have any questions concerning the installation, operation, or maintenance of our equipment, which are not covered in this Manual, please feel free to contact CIC or the Cambelt Representative in your area.

Read these instructions carefully and pass them on to any others who will be directly responsible for the installation, operation, and maintenance of the CamFlex Conveyor. It is very important that competent and capable people be responsible for the safe and professional installation and maintenance of the CamFlex Conveyor since, while the equipment is quite simple, it nonetheless requires regular inspections and adjustments (if necessary) to keep the conveyor in top working condition. Remember, the operation of the CamFlex Conveyor depends on how well these instructions are followed.

This manual covers the standard CamFlex Conveyor. It does not cover all design details, modifications, or options.

I M P O R T A N T ! !

Immediately upon receiving the conveyor(s), inspect for damage or indication of rough handling. Make sure all shafts rotate freely and examine the housing for obstructions or sharp edges in the path of the belt. Check for shortages by referring to packing list or Bill of Materials for a record of items shipped. Report any damage or shortage claims immediately to the carrier, keeping a record of your report; then notify your Cambelt Conveyor representative or CIC. CIC is not obligated to replace, free of charge, items which show as being shipped on the Packing List. CIC must be notified within 10 days after receipt of equipment of any shortages and/or damage. This will not relieve the carrier of its responsibility, but will provide CIC with information we would need if you happen to need our assistance in processing your claim with the carrier. Failure to notify CIC as specified will be understood to be notice that the equipment was received, complete, and in good condition.

IMPORTANT!!

In the event that problems are encountered in the assembly, installation or erection of your CamFlex Conveyor that would be considered to be beyond normal and expected problems, it is necessary that your Cambelt engineer be notified prior to the affectation of a cure, if any claim is to be made against Cambelt as a result of the problem.

CAMBELT WILL NOT APPROVE OR ACCEPT BACK CHARGES FOR LABOR, MATERIALS OR OTHER COSTS INCURRED BY PURCHASER OR OTHERS IN MODIFICATION, ADJUSTMENT, SERVICE OR REPAIR OF CAMBELT-FURNISHED MATERIALS UNLESS SUCH BACK CHARGE HAS BEEN APPROVED IN ADVANCE OF THE WORK BY AN AUTHORIZED CAMBELT PRODUCT MANAGER, BY CAMBELT PURCHASE ORDER OR WORK REQUISITION SIGNED BY CAMBELT.

SERVICE AVAILABLE

The CamFlex Conveyor is designed to be installed and serviced by your plant personnel. However, if factory service is desired, please contact your local Cambelt representative or CIC. A schedule of current field service rates will be forwarded to you, upon request. Normally, advance notice of your need for field service is required, so plan ahead. An order for field service should be placed with your Cambelt representative at least one week in advance of the date on which you would like service to commence.

INSTALLATION OF THE CAMFLEX CONVEYOR

Normally, the conveyors are fabricated, assembled, and shipped in pre-assembled component modules; i.e., head section, tail section, turn section(s), etc.. Refer to your conveyor general arrangement drawing(s), and locate the connection flange designations. Connect the modules according to the corresponding match markings on the conveyor modules and the flange designations on the general arrangement drawing. Conveyor modules must be erected in the order as shown on the general arrangement drawing in order to ensure proper conveyor alignment.

Be sure that the conveyor is installed plumb and level, and is not crooked, twisted, or skewed. Care must be taken to install the conveyor properly, so as to avoid belt alignment problems which are almost certain if the conveyor is not aligned.

If the conveyor support structures are supplied by Cambelt, assemble them as indicated on the appropriate assembly drawings, and attach them to the conveyor structure as indicated on the general arrangement drawing(s).

CAUTION: If supports are to be welded to the conveyor structure, never weld on the conveyor structure after the belt has been installed, unless special precautions are taken to prevent burning the belt.

If conveyor support structures are supplied by others, please consult with a Cambelt engineer to determine specific support requirements. Too much support can be wasteful, but too little support can be disastrous!

THREADING OF THE CONVEYOR BELT

Prior to threading the belt, all pulleys must be checked for possible shipping damage or misalignment. Pulleys are checked by rotating them in their bearings. Check to make sure there is free rotation and the pulley is centered in the middle of its housing. If not, the set screws on the bearing locking collar and the taperlock bushing must be securely tightened to prevent further side movement of the pulley on the shaft, or movement of the shaft itself.

If you are unsure of exactly what to do, please call your Cambelt engineer for assistance.

Most CamFlex Conveyor belts ride on a bed of rollers, called idlers. The idlers provide a low-friction support for the belt within the conveyor structure. However, the spaces between the idlers can present a challenge when threading the belt into the conveyor. Pre-threading a heavy rope or steel cable through the conveyor along the anticipated belt path will aid greatly in the actual threading of the belt. The end of the rope or cable can be attached to the leading end of the belt and then pulled through the conveyor, leading the belt along the correct path.

Many belts may be long enough and/or heavy enough that they may require mechanical assistance by means of a winch or similar device in order to withdraw the rope or cable from the conveyor, thus pulling the belt into place. At times, a pickup truck, forklift, or crane may be used to accomplish this, but only with extreme caution. The belt may be easily damaged if proper care is not taken.

We often recommend that a steel plate be bolted to the leading end of the belt to assist in drawing the belt through the conveyor. The steel plate should have a hole in it through which the rope or steel cable is threaded and attached. This plate will prevent the corners of the belt from curling downward, thus prohibiting the easy entry of the belt into the conveyor. Under any circumstances, make sure that the connection from

the rope or cable to the belt end is secure enough that there is no risk of the connection failing under stress, potentially causing injury.

The roll, pallet, or crate of belt, as received from Cambelt, should be lined up with the conveyor so as to allow for free and easy insertion of the belt into the conveyor. Misalignment will result in considerable difficulty in threading the belt into the conveyor.

Pulling the belt into the conveyor can be a stop and go process and care should be taken to watch carefully that the leading edge of the belt does not "catch" or "hang-up" while still pulling the rope.

A simple recommendation on how to thread a rope or cable through the conveyor is to attach the rope or cable to the end of a long, straight object such as a 2 x 4 or angle iron of a length of about 10 to 12 feet. The 2 x 4 or angle iron will span from one idler to another, and will not fall down between them, thus pulling the trailing rope or cable through the conveyor along its proper path. This method is most effective when the 2 x 4 or angle iron is introduced into the conveyor at the conveyor's highest point(s).

It is often easiest to thread the belt into the "return" side of the conveyor first; then up over the conveyor head pulley, and back down the "carrying" side of the conveyor.

Bring the two ends of the belt together at an easily accessed point, where the belt splice may be performed.

SPLICING OF THE CONVEYOR BELT

CamFlex Conveyor belting may be spliced using a "hot vulcanized" splice procedure; however, the most common and recommended method or type of splice utilizes mechanical fasteners. Cambelt normally supplies each conveyor with a splice kit complete with mechanical fasteners, bolts, nuts, hinge pin, sidewall splice plates, belt punch, template, wrench, and any other necessary hardware to perform a complete mechanical splice. The most commonly used splice fastener is a Flexco 550J; however, other styles of splice fasteners may be required and furnished for some extraordinary applications.

Specific splicing instructions will be inserted into the splice kit that is shipped with your conveyor. The splice kit will normally be located in the wooden shipping crate that also contains the conveyor drive motor, speed reducer, and other conveyor accessories.

Tools normally required to complete a mechanical splice:

- * Two pairs of belt clamps - one pair for each end of the belt;
- * One or two "come-a-longs" to pull the ends of the belt tightly together;
- * 1/2" drill motor;
- * Hammer;
- * Wrenches;
- * Carpenters' square;
- * Utility knife with extra sharp, new blades.

Great care must be taken to prepare the two ends of your belt with clean and square ends. Do not attempt to "eyeball" a straight (90°) cut. Use the carpenter's square and check the line you are about to cut from all angles. Make sure it is square with the belt - if it is not, difficulty in belt alignment/adjustment will be experienced. Do not "hack" at the belt with a pocket knife when making your cut(s). **Use a utility knife against a straightedge**, making long, smooth cutting strokes in order to provide a smooth, clean edge against which to place your splice fasteners.

FOLLOW THE INSTRUCTIONS included with the splice kit!

BELT TAKE-UP / TENSIONING THE CONVEYOR BELT

Most CamFlex Conveyors utilize a manual screw-type belt take-up device for removing the slack from the belt. It is simple, yet effective, and requires only a minimum of effort to make it work.

No specific formula exists to determine the amount of tension that should be applied to a belt. A simple rule to follow, however, is that the belt should only be tensioned to a point that:

- A. When the belt is first started, no slipping of the belt on the drive pulley is observed;
- B. Enough tension has been applied to allow for good control of belt alignment at the conveyor pulleys.

When both A and B are achieved, then tighten it just a little bit more (maybe another 1/4 inch).

A new conveyor belt will experience most of the expected stretch in a short period of time. A belt normally stretches approximately 1.5% of the conveyor length. In other words, a 100 foot long conveyor will experience belt stretch of approximately 1.5 feet, or 18" of travel in the belt take-up. Again, the major part of this stretch will occur in the first several weeks of operation, and once that initial stretch is gone, belt tensioning maintenance may be done on a less frequent basis. Initially, however, much attention must be paid to belt tension in order to avoid damaging a belt by allowing it to run too loose.

As a belt is tensioned, care should be taken to prevent misalignment of the belt at the pulleys.

If misalignment occurs, correct it immediately!

ALIGNMENT OF THE CONVEYOR BELT

In order to realize maximum life from your conveyor belting, keeping the belt in proper alignment is a matter of the highest priority. Improper alignment may result in deterioration of the edge(s) of the belt, and will likely cause a considerable amount of spillage of the conveyed material at the inlet to the conveyor.

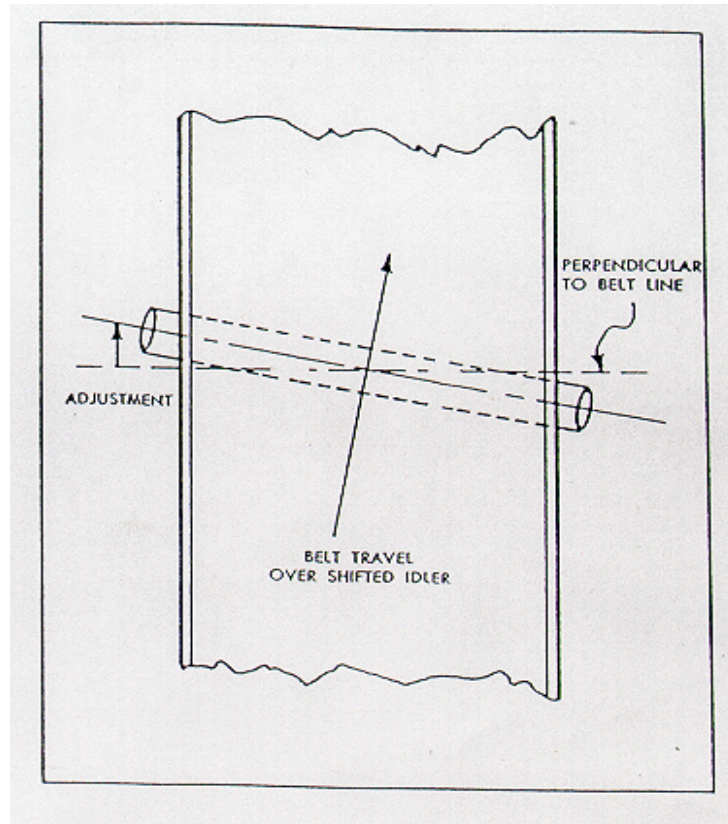
When the belt has been installed, the system should be started while empty and checked for alignment. A properly aligned conveyor has the belt running evenly in the center of the idlers, and therefore, prevents injury to the belt edges from contact with supporting structures or other objects. It is common, however, with most belts, to see some "wandering" of the belt from side to side on the conveyor. As long as the wander is not severe, simply set the belt alignment such that it averages out pretty well in the middle. If a misalignment problem exists, some adjustment of the belt may be accomplished by readjusting the head, tail or turn pulleys; however, you should not rely solely upon the pulleys for belt alignment as this may cause undue strains on the pulley bearings, belt, belt splice or conveyor frames.

If alignment problems persist, it would be well to check the conveyor structure alignment. As mentioned earlier in this manual, structural misalignment can make a belt almost impossible to track.

If one section of a belt runs true and another section runs out of line, then generally the belt ends were not properly squared when the splice was installed. If the belt runs out of line consistently at one point in one of the conveyor straight runs, or if adjustment of the pulleys will not correct misalignment at a pulley terminal, the condition may be attributed to misaligned idlers. Usually the idlers that require adjustment will be located upstream of the point at which the belt runs out of line.

Proper alignment is achieved by loosening the mounting bolts on several idlers on the upstream side and skewing them slightly. When one

side of an idler is shifted ahead of the other, the belt shifts to the side which is behind. Re-tighten the mounting bolts before restarting the conveyor.



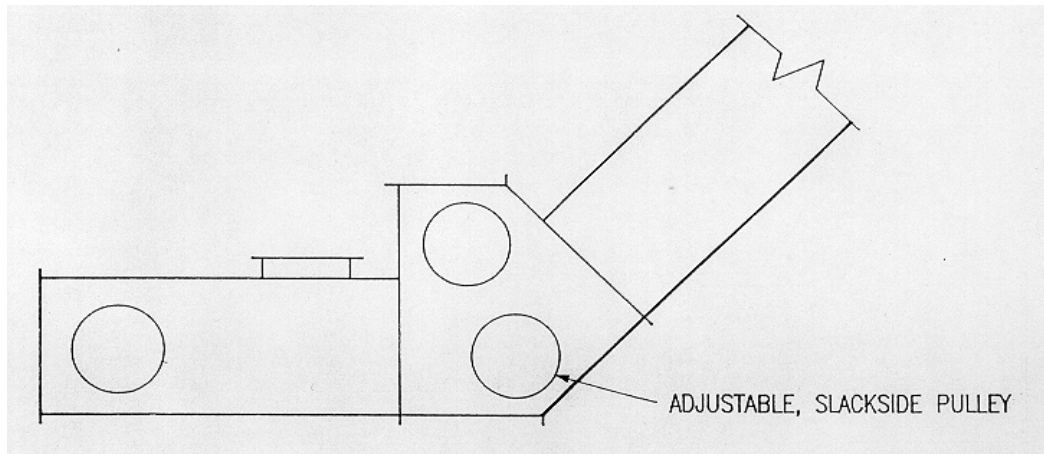
Do not shift idlers on a reversing belt as this will detrain the belt when it travels in the opposite direction.

Once constant central alignment has been achieved on the return and carrying run with an empty belt, the conveyor should be checked while carrying a full load.

It is not unusual to have to readjust belt alignment while the belt is loaded, even though the empty pre-aligned belt was running straight.

CamFlex Conveyors that are configured in "L" or "Z" configurations

present an alignment anomaly, in that they contain at least one adjustable pulley on the slack side or return side of the belt. This pulley(s) is normally the lower pulley in an increasing angle turn section (see illustration).



Belt alignment on the slack side pulley is accomplished by adjusting it exactly opposite from all other pulleys on the conveyor; in other words, the belt will naturally climb to the "high side" of a slack side pulley, so adjustment on this pulley will be opposite that which seems natural.

Be aware that adjustment of any pulley will likely have an affect on belt alignment at other pulleys. Be sure to check all pulleys for alignment before assuming that the adjustment on one pulley only is all you need.

Belt alignment just ahead of or prior to the flanged pulley in the conveyor turn section(s) is critical, and is of major importance, if your conveyor is of an "L" or "Z" configuration. Misalignment in this area will cause the belt to enter the flanged pulley in such a way that the corrugated sidewall will scrub against the interior side of the flange, causing severe abrasion to the sidewall. The existence of this condition will be clearly evident if you observe that the smooth, round edges of the corrugations of the sidewall are being "squared off". THIS IS A COMMON CONDITION, SO LOOK FOR IT! It is also possible that the sidewall of the belt may completely "jump" the flange of the pulley if misalignment is bad enough.

When it occurs, the remedy is idler adjustment just ahead of the flanged pulley. Follow the idler adjustment procedure described earlier in this section.

THE CONVEYOR INLET

History has shown us that a high percentage of problems experienced with belt conveyors originate at the conveyor inlet. Improper feeding of the belt may result in material spilling over the edge(s) of the belt and in overfilling the belt with material beyond what the belt is capable of carrying away.

Generally speaking, the use of skirtboards is impractical with a corrugated sidewall conveyor belt. We rely upon the sidewalls themselves to stop the flow of material from escaping or flooding over the edges of the CamFlex belt. It is vital, therefore, that, as much as possible, the flow of material into the conveyor inlet be directed toward the center of the belt and away from the sidewalls. If your CamFlex Conveyor has been supplied with a set of orifice plates and slide gate at the conveyor inlet, **DO NOT DISCARD THEM!** They will aid greatly in directing the flow of material onto the belt as is required to minimize spillage and overfilling.

A CamFlex Conveyor must not be overfilled at the inlet! A controlled feed is often required with a CamFlex Conveyor. Common methods are variable frequency vibrating pan feeders, screw conveyors, rotary valves, etc.; but again, the orifice plates and slide gate mentioned above are your best prevention against belt overfill.

Take good care of the conveyor inlet, and the most common CamFlex Conveyor problems will stay away.

THE CONVEYOR DISCHARGE

Always make sure that the conveyor discharge chute or transition is kept free from build-up or obstruction. The results of such a condition can be disastrous, as the conveyor housing will quickly fill full of material and jam the entire system. Regular inspection of the discharge chute, or installation of a plugged chute switch will go a long way toward eliminating such an unfortunate occurrence.

STARTING THE CAMFLEX CONVEYOR

Good conveyor system engineering practice requires that a conveyor be started prior to the introduction of product onto the belt. Whenever possible, adherence to this rule is very important. If your system includes a mechanical feed device just ahead of the belt conveyor, your system control logic should provide for sequential start-up which will start the belt conveyor approximately 5 to 10 seconds prior to the start-up of the feed device.

Your conveyor has been supplied with a drive package that has sufficient horsepower to start the belt with a full design capacity load on the belt. This does not necessarily mean, however, that the belt will start under all conditions. Conditions such as an overloaded conveyor housing, overloaded belt at conveyor inlet point, extremely cold temperatures, loose V-belts, etc., may cause failure of the conveyor to start.

SHUT-DOWN OF THE CAMFLEX CONVEYOR

Good conveyor system engineering practice requires that the feed source to a belt conveyor be terminated prior to the shut down of the belt conveyor itself. Whenever possible, adherence to this rule is of major importance. If your system includes a mechanical feed device just ahead of the belt conveyor, your system control logic should provide for sequential shut down which will stop the feed device a few seconds or more prior to shut down of the belt conveyor. This will prevent excessive build-up of material on the belt at the inlet point which, if allowed to occur, could make restarting of the belt difficult, and could also cause product spillage at the inlet since the belt would not be carrying product away.

LUBRICATION OF THE CAMFLEX CONVEYOR

All of the bearings on the CamFlex Conveyor (both pulley bearings and idler bearings) have been pre-greased by their respective manufacturers. The bearing cavity may not be completely filled with grease, however, so you should lubricate all bearings prior to commissioning your conveyor.

CAUTION: DO NOT OVER-LUBRICATE BEARINGS -- SEAL DAMAGE MAY OCCUR!

It is not necessary to see grease "oozing" from the bearing to know it is full of grease. If you do observe grease oozing from the bearing, you have just ruptured the seal, and lubrication will now need to be performed on a much more frequent basis than would be required if the seal were still intact. When pumping the grease gun and resistance greater than normal pumping resistance is felt, STOP!! Your bearing is full! Further pumping will rupture the bearing seal!

Only you can determine the right bearing lubrication frequency for your particular operation. A few factors that should be considered in determining your frequency of lubrication are:

- * Duty Cycle (hours per day of operation)
- * Temperature at which conveyor operates
- * Cleanliness of installation - dusty conditions
- * Quality of the bearing seal

CAUTION: The gear reducer supplied with your conveyor only has enough lubricant in it to allow for very short duration testing of the gear reducer. Prior to commissioning the conveyor, fill the gear reducer to the recommended level with the lubricant listed on the gear reducer nameplate.

ROTARY BELT THUMPER

A Rotary Belt Thumper is a belt cleaning device that is used on a belt that does not have a smooth belt surface, thus prohibiting the use of a belt scraper. The thumper creates a beating action on the backside of the belt very near the point where the belt leaves the conveyor head pulley. Its purpose is to shake loose any material which may have stuck to the belt at the discharge point.

If your conveyor has been equipped with a belt thumper, there are several items which should be checked periodically.

1. When installing the belt thumper, be sure that the rotation of the thumper is running counter to belt travel direction. If the rotation is incorrect, change polarity on the motor wiring to correct the direction of rotation.
2. Slotted holes and adjusting screws have been provided as a means of adjusting the belt thumper upward and downward to provide a means of adjusting for proper amplitude of the thumping action against the belt. Make sure good solid contact is made with the bottom of the conveyor belt. However, the belt thumper should not be allowed to beat the belt so hard as to cause excessive or premature wear of the belt.
3. The external shaft bearings of the belt thumper should be checked and lubricated as needed.
4. The oil level in the right-angle gearbox of the thumper drive should be checked as a part of your routine maintenance.
5. Visually inspect all four (4) thumper rollers and the thumper roller bearings on a regular basis.
6. If your thumper is equipped with chain drive, visually inspect and oil the chain as necessary.

INSTALLATION, OPERATION AND MAINTENANCE MANUAL
for
CAMFLEX CONVEYORS

ADDENDUM “A”

SUBJECT: Waste-Pack Enclosures and Stuffing Material

Many enclosed CamWall and/or CamFlex Conveyors are equipped with waste-pack boxes that encase the take-up bearings on the conveyor’s tail pulley. Absent of these boxes, the bearings would be constantly exposed to dust and spilled or carried-back material(s) that accumulate in the take-up frames around the bearings.

The waste-pack boxes come from Cambelt’s factory completely and tightly stuffed with new, clean cotton string material. The tightly packed string acts as a filter through which contaminants would have to first pass before coming into contact with the bearing and its own factory manufactured seal system. Under normal operating conditions, unless highly unusual conditions exist, the string should be adequate and not require replacement or re-charging during the lifetime of the take-up bearing.

When take-up bearing replacement occurs, previously used string packing may be re-used if it is clean. Any soiled or contaminated string should be replaced. The key issue here is: pack the box full and tight!