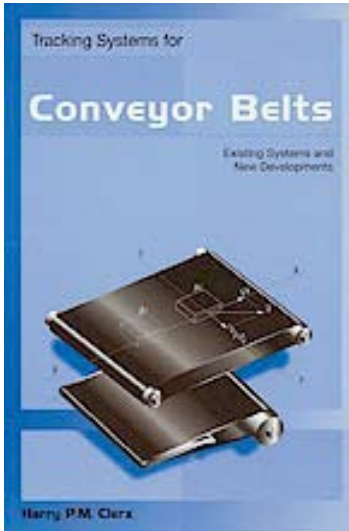


Ask Joe! Column

Preventing Conveyor Belts from Derailing!

Guest article by Ing. Harry P.M. Clerx of Centre for Concepts in Mechatronics



A flat conveyor belt sometimes has the tendency to transversely derail. This could lead to higher costs: production stagnation, repairs and even the replacement of the belt itself. So, it is of great importance to try and stop the belt from derailing.

There are numerous ways to stop a conveyor belt from derailing, all of which are described in the book *“Tracking Systems for Conveyor Belts; Existing Systems and New Developments”*. However, almost every one of these tracking systems, which have been known for quite some time and which will be referred to as “conventional systems” hereafter, are sensitive to pollution and tilting between the rolls.

But in this book two completely new tracking systems are described, which are completely insensitive to strong pollution, tilting of the rolls and the transverse forces that are applied to the belt!

These two new systems have been developed by Centre for Concepts in Mechatronics (CCM web site: www.ccm.nl) in the Dutch town of Nuenen, conducted by engineer Harry P.M. Clerx, the author of the book and the inventor of these new tracking systems.

Flat conveyor belts sometimes have the tendency to transversely derail – despite of the use of conventional tracking systems – especially when the conveyor has been polluted by, for instance, dough, fat, water, oil, earth, clay, sand or sugar. Other reasons for conveyor belts to derail are the tilting of the rolls in the conveyor and the transverse forces the products being transported apply to the belt.

Usually the derailed belt is not reset until the side of the belt comes in contact with machine parts. If the belt is extremely damaged, it will need to be replaced. Replacement costs can get very high, not only because of loss of production, but also because of the costs of producing a new customized and endless conveyor belt, and the demounting and mounting costs. Furthermore, early adjusting of the derailed belt is expensive too.

Methods

Research shows that the most part of the annually sold conveyor belts in The Netherlands – approximately 2,700,000 meters – is used to replace worn out belts. For the most part wear is caused by the derailing of the belt. A well working tracking system can save a lot of expenses. That is why, over time, many methods have been developed to keep flat conveyor belts from derailing.



Some of these methods rigorously prevent derailment, for instance by using a belt that has a vulcanized control belt on the bottom side. However, this method cannot be used on so-called “knife edge belt systems”. Furthermore, the costs of the belt and the conveyor are much higher. Other methods do not require the adjustment of the belt, but that of the features of the drive rolls and reversing rollers, for instance by using curves and adjustable snub-rollers. However, in actual practice, such facilities prove not to be sufficient enough in case of strong pollution or when the rolls are out of true.

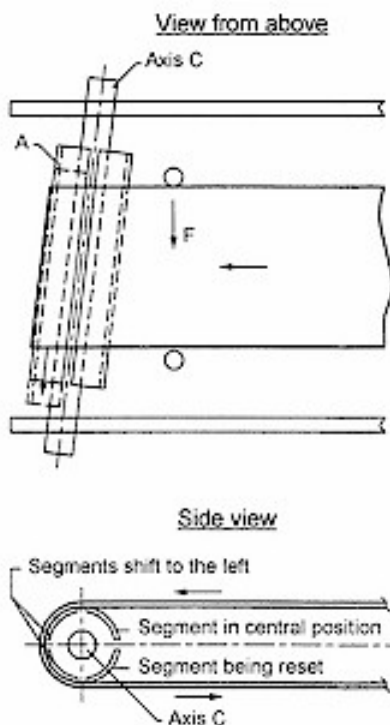
Besides these passive tracking systems, there are also active systems on the market. The active tracking systems use an optic, pneumatic or electro mechanic sensor to detect the derailment. If derailment occurs, the snub-roller will be adjusted (set out of true) by using, for example, an electro-engine or pneumatic cylinder, so that the belt is set back after which the same thing will happen on the other side of the belt after a while. However, these systems are very costly and sensitive to failure caused by pollution!

New Developments

Polluted rolls, rolls that are out of true and external transverse forces force the conveyor belt to the side, causing the belt to spirally derail further and further! When this happens, the belt cannot be stopped because of the great friction force between the belt and the rolls.

Centre for Concepts in Mechatronics (CCM) theoretically researched why it is that a flat conveyor belt derails under the abovementioned circumstances and then used test arrangements in their lab to verify their findings. Of course, CCM also used test arrangements to extensively test the two new tracking systems. When the belt of a regular conveyor belt derails, it will continue to cumulatively derail. In other words: the belt will eventually spirally run off the rolls.

This problem has been rigorously taken care of in the two new systems!



In the first system, side guides (simple, vertically placed pens) keep the belt in track, forcing the drive roll and/or reversing roller to either the left or right. So, compared to traditional conveyor belts, the opposite occurs in this system (all movements are relative!). In order to realize this, a guiding is used that allows the rolls to be moved in axial direction across the axel. The only force the side guiding applies to the belt is the reaction force of the internal friction of the guiding. As is known, this friction is very low.

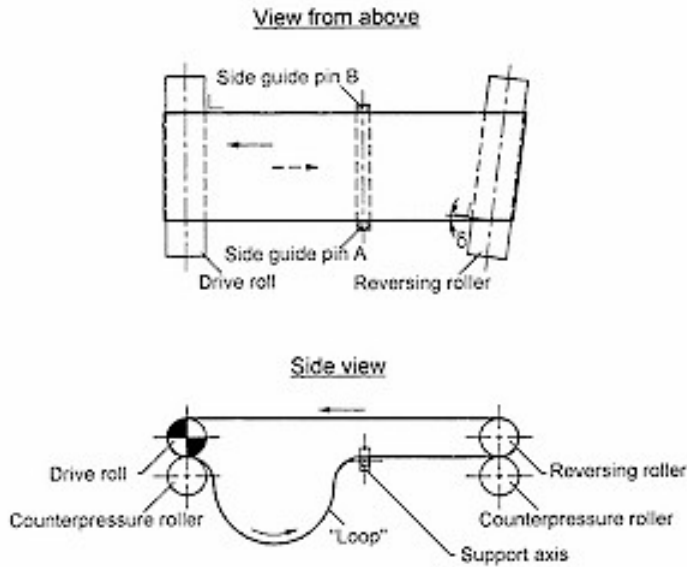
It is obvious that the lateral movement of the roll can only take a very short while, because the roll can already come in contact with the frame of the conveyor or another machine after a few rotations.

The core of this invention is that the roll is now separated in four segments. These segments can, loose from each other, use their own side guides to axially shift (See image).

Side guides are used to keep the belt itself in track. The image shows how the belt will derail when the roll is out of true (in the case of the image above, the belt will derail to the right as seen from the direction of running of the belt). This causes the belt to come in contact with the side

guiding that applies a force F on the belt. As a reaction, the belt pushes those segments that are in the angle of contact spirally to the left until they are out of the angle of contact.

Next, a feature pushes the released segments back to their original central position.



The second system also uses a belt that is kept in position by simple side guides. However, now a slack belt part – a “belt loop” - is included into the belt track.

As soon as the belt in the “tight” track derails, the side guide pens will reset the “loose” part to its original central position. The side guides will hardly apply any force to the belt, because the belt can shift in lateral direction without any force inside the “loop”. The belt does derail, but just one belt rotation and not cumulatively as is the case in conventional conveyors! Tests conducted by CCM and actual users show that the belt in both new tracking systems remains exactly in place under all circumstances.

In the meantime, the patents on both systems have been released so that everyone may apply the systems.

Besides the usual passive and active conventional tracking systems and the two new tracking systems, the book also describes a few other special conveyor belt systems. Of course, these systems are also theoretically well-founded!

The book “*Tracking Systems for Conveyor Belts; Existing Systems and New Developments*” (336 pages, 15 pictures and 155 drawings) can be seen as the standard work on the tracking of conveyor belts. It is published by Conveyor Belt Tracking Systems (CTS) and can be ordered in three different languages: Dutch, German and English. Inclusive is a CD-ROM with several special designs. CTS can give advice regarding the appliance of the two new revolutionary systems in existing or new conveyors.

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Welcome to Ask Joe!, a monthly column by our resident materials handling guru, Joe Marinelli of Solids Handling Technologies. Joe addresses the issues that bug you the most. And Joe knows!! Formerly with Jenike & Johanson, Solids Flow and Peabody TecTank, Joe is an expert on materials handling.

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Guest articles for the **Ask Joe!** Column are always welcome, for more information please contact Joe Marinelli directly at his email address: joe@solidshandlingtech.com.