Beginners Guide

Types and functions of idlers

It has been stated above that there are basically two types of idlers namely, carrying and return idlers.

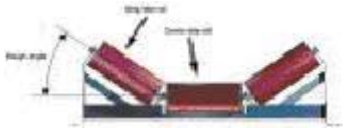
Within these categories however, there are a number of different designs of idler sets which have developed as a result of particular applications, the need to minimise the stress imposed onto the belt and the environment in which the conveyor operates.

These different types of idlers are described below, together with a functional explanation for each.

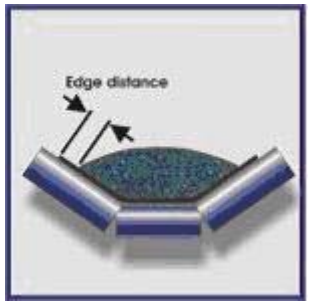
Troughing idler sets

Troughing idlers are found on the carrying-side, along the length of the conveyor. On any particular conveyor these idlers are identical, as are the bases.

The troughing idlers comprise a centre idler roll of a defined width, and 'wing' idlers on either side of the centre roll.

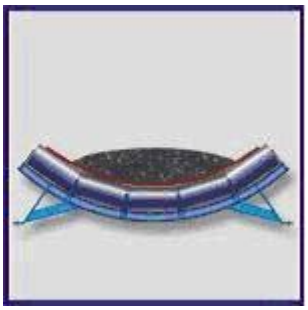


Unlike the centre, horizontal roll, the wing idlers are cranked up to an angle known as the troughing angle.



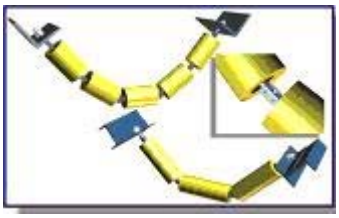
This troughing angle ensures that the carrying belt maintains the same cross-sectional area throughout the carrying strand, so that the load-bearing capacity of a particular conveyor belt is the same along the conveyors' full length. In so doing, material loaded to the maximum capacity at the loading point will not fall off of the belt en-route.

Troughing idlers can comprise 3-roll or 5-roll idler sets (seen above and right).
The 5-roll idler configuration offers a more uniform cross-section which results in a greater nett carrying capacity for the same belt width and belt speed.



Garland idlers are another type of troughing idler which is used.

The garland idler set (see thumbnail right) comprises either 3-roll or 5-roll idlers joined together at the ends of their respective shafts by special lugs, to form a continuous 'chain' of idlers.

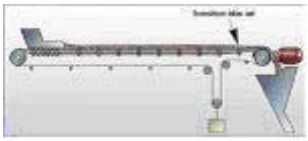


On either end of this 'chain', the shafts are connected to an attachment bracket which enables the idler set to be attached to the conveyor stringer structure.

Garland idlers are used predominantly on yard conveyors, shiftable conveyors, and dump conveyors, etc. where the alignment of the conveyor structure may not be completely correct due to the mobility of the conveyor, or the ground conditions onto which the conveyor structure in founded.

The garland idler design is more forgiving than the fixed-base troughing idler, due to its chain-like design which allows the belt centerline and idler centers to move relative to the supporting frame

Transition idler sets



Transition idlers are found at either end of the conveyor, adjacent to the head and tail pulleys.

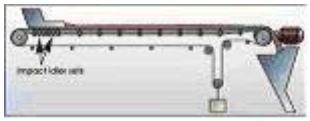
These idler sets comprise standard idler rolls however the bases into which these rolls are fitted, have a smaller troughing angle to that of the rest of the troughing idlers on the conveyor.

The reason for this is that the conveyor belt is flat as it passes over the pulleys, under high tension. As the belt changes its' form to a full trough of say 35 degrees (i.e. from tail pulley to full trough angle), the belt must be supported through this transition zone. If the belt was fed directly into a full trough from the tail pulley, the belt edges would be over-stressed and damage would result.

Similarly, as the troughed angle changes to zero at the head- end, transition idlers provide support through the transition zone.

The number of transition idlers depends on the trough angle of the conveyor. In the case of a 45 degree trough angle, 2 or 3 transition idler sets would be used at either end of the conveyor. These idler sets would have incrementally greater trough angles of say 15, 20 and 35 degrees through the transition zone leading up to 45 degrees.
As with troughing idlers, transition idlers are available in fixed bases or the garland configuration.

Impact idler sets



Wherever material is loaded onto a conveyor belt, impact idlers are installed beneath the troughed belt over the full loading length. Impact idlers sets are spaced at intervals of typically 350 mm to 450 mm in order to provide a comprehensive support base for the belt.

Impact idlers comprise a small diameter shell, typically 'd' = 89 mm diameter, fitted with concentric rubberized rings at close intervals. These rubber rings provide a cushioning effect in the event of lumps of material falling onto the belt where an idler is located beneath the point of impact. The overall impact idler diameter 'D' = 152 mm

This cushioning ability of impact idler sets allows the energy associated with the impact to be absorbed more efficiently and with much less detrimental effect to the belt.

Impact idler rolls are either mounted into rigid, fixed base frames or can be manufactured in garland-type sets, depending on the application.

Return idlers

The mass of the return belt is the only load that return idlers are required to support. As such, return idler sets are spaced at two to three times the pitch of their equivalent carrying-side idler sets. Return idler sets usually have one or two rolls per idler set, for similar reasons.

There are of course exceptions to the above, one being where conveyors carry material along the top and bottom strands as would be the case on two-way conveyors. In this case, troughing idlers would be located along the bottom strand as well as the top strand.

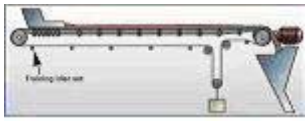
Flat return idlers comprise 1 or 2 rolls, the 1-roll design being more prevalent. In the case of a single flat return idler, the idler can be mounted onto two brackets which are secured to either side of the conveyor support structure as seen adjacent.

Where return idler sets comprise two rolls, a support frame is required which supports the idler pair and attaches the idlers to the conveyor frame. This 2-roll design forms the return belt into a 'v' trough and these return idler sets are referred to a 'V' return idlers.

The trough angle of the 'V' return idler is usually 10 degrees and this feature has been developed to assist with belt training along the return strand.

In addition to the fixed base frames for return idlers, garland-type return idlers are also available which, like their equivalent troughing idlers, are more tolerant of conveyor structure misalignment.

Training Idlers



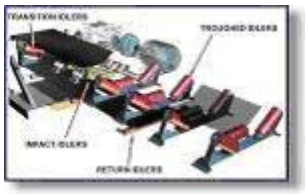
In spite of the correct alignment of a conveyor structure and belt splice, it is a common phenomenon for a belt to misalign at times, mainly as a result of incorrect material loading (off centre) or in cases where a conveyor is mounted onto a mobile stacker / reclaimer where the fall across the boom causes the belt to move to one side.

In cases where the belt misaligns, severe damage can be done to the belt should the belt rub against a fixed structure, the head chute or conveyor stringers.

A solution to belt misalignment can be to install self-aligning idlers sets or training idlers which are able to detect belt misalignment and automatically re-align the belt.

There are a number of different types of training idler designs available in the market which can be used on the carrying and return strands of the conveyor.

Functional Description



An endless conveyor belt in a conveyor structure is dragged from the tail pulley where material is loaded onto the conveyor, to the head pulley or drive pulley where the material is discharged.

Between a conveyors' tail and head pulleys, whether the distance is a number of kilometres or merely a few metres, the carrying and return strand belting is supported on idler sets.

There are two basic types of conveyor idler sets namely:

Carrying idler sets

These idler sets support the carrying-side (top) conveyor belt onto which the material is loaded and transported.

Return idler sets

These idler sets support the return-side (bottom) conveyor belt which returns to the tail pulley after having discharged product over the head pulley.

Carrying or troughing idler sets usually comprise between two and five individual idler rolls mounted into a common base, which is attached to the conveyor structure.

Each idler roll comprises its own idler design, set of bearings, seals, shaft and outer shell as can be seen in the following brochure.