

How To Use Long Zones On ABEZ

The model ABEZ equipped with *EZLogic*® Gen3 zone controllers is an excellent conveyor for controlling carton flow in systems where frequent staging and merging of product is required. Features such as dynamic zone allocation provide good management of individual cartons, even of widely varying size and weight. Such control is ideal in areas of a system where each box must be handled separately.

There are areas in a conveyor system where such individual carton control is not necessary, however. These can include areas near the “upstream” end of the conveyor system where zero-pressure accumulation is important to create temporary storage, but where cartons don’t require separation. In fact, often it is desirable for the cartons to be densely packed to more fully utilize the storage space of the conveyor.

The ABEZ conveyor can be used in its standard form in all areas of a conveyor system where zero-pressure accumulation is required. However, since ABEZ has a higher up-front cost than transport-type conveyors like the 190-LR, often the less expensive conveyors are used to cut cost out of the system. This of course cuts down the usable accumulation space of the conveyor system.

The purpose of this document is to describe a way to configure the ABEZ conveyor to provide the needed accumulation while at the same time cutting some of the cost out of the conveyor. This document will also give application guidelines for the use of this method of accumulation.

Concept

The long zone ABEZ concept takes advantage of existing features of the ABEZ (mechanically) and *EZLogic*® to achieve the long zone effect.

“Freewheeling” Tread Rollers. A flat belt drives the tread rollers of an ABEZ zone. Drive is removed from the rollers by allowing the belt to sag away from the rollers, which allows them to “freewheel” like those of a gravity conveyor. A separate brake mechanism is used to stop some of the tread rollers (usually the four downstream-most rollers of the zone in the standard ABEZ) in order to stop a carton in the zone. The remaining rollers are free to rotate.

***EZLogic*® Accumulation Delay Function.** This standard function of *EZLogic*®, when activated, will cause a zone that would otherwise have stopped to drive an additional 1.8 seconds before shutting down.

The conveyor is built up with “longer-than-standard” zones, which can be from five to ten feet in length. Each zone includes one *EZLogic*® zone controller located in the standard location in the zone (three inches from the discharge end of the zone). Also included in each long zone is one standard ABEZ four-roller brake, located in the standard location (braking the last four rollers at the discharge end of the zone) and one standard *EZLogic*® solenoid air valve, plumbed to operate all of the air bags in the long zone. The exception is the

discharge zone, which may have as many as three or four of the four-roller brakes installed, all at the discharge end of the zone.

The accumulation process begins as the first carton travels down the conveyor and reaches the discharge end of the discharge zone and is detected by the zone controller in that zone. If the zone stop is active in that zone, the carton will stop at the end of the conveyor. (Of course, if the zone stop is not active, the carton will continue to the next conveyor.) The brake(s) are applied to the last few rollers at the discharge end of the conveyor to hold the carton. The drive belt drops out of contact with all of the rollers in the entire long zone. All of the non-braked rollers are allowed to freewheel.

As the second carton reaches the discharge end of the second long zone, the zone controller in that zone detects it. Normally this would cause *EZLogic*® to stop this carton at that point since there is already a carton detected in the discharge zone. This is of course undesirable in this case, as it would leave most of the long zone empty and wasted. To prevent the carton from stopping, the “accumulation delay” function is enabled in the second zone controller (and in all upstream zone controllers). The function allows the zone to drive an additional 1.8 seconds after it detects the carton. (See Figure 1)

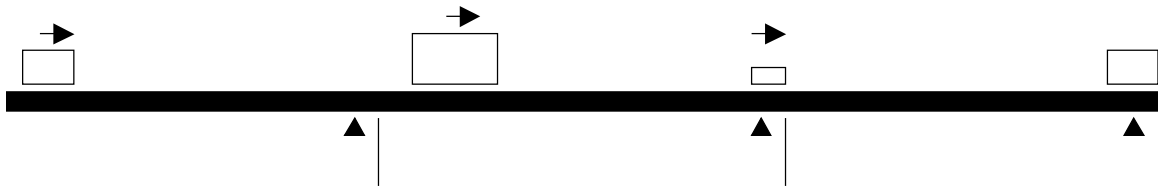


Figure 1

As the second zone continues to drive for the duration of the accumulation delay timer, it pushes the second carton into the first zone onto the freewheeling rollers, where it coasts to a stop. The distance the carton coasts is a factor of conveyor speed, carton weight, and the condition of the carton bottom. Once the second carton clears the sensor of the second zone controller, the accumulation delay is reset. (See Figure 2)

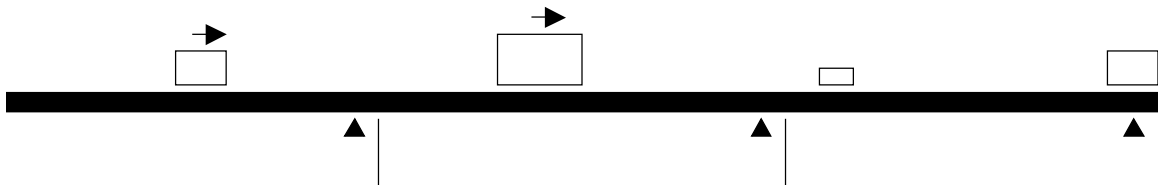


Figure 2

The process repeats when the third carton arrives at the discharge end of the second zone. As the third carton is pushed into the first zone, it makes contact with the second carton, pushing it further into the first zone. (See Figure 3)

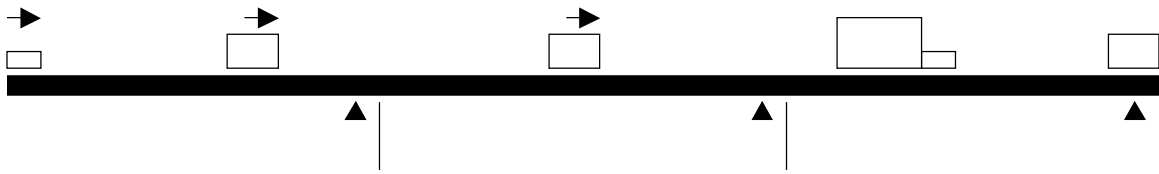


Figure 3

As subsequent cartons arrive at the discharge end of the second zone, they are each pushed into the first zone and bump all of the preceding cartons further into the first zone. This process continues until the second carton finally makes contact with the first carton at the end of the conveyor. Since the first carton is sitting on braked rollers, it prevents the train of cartons from being pushed

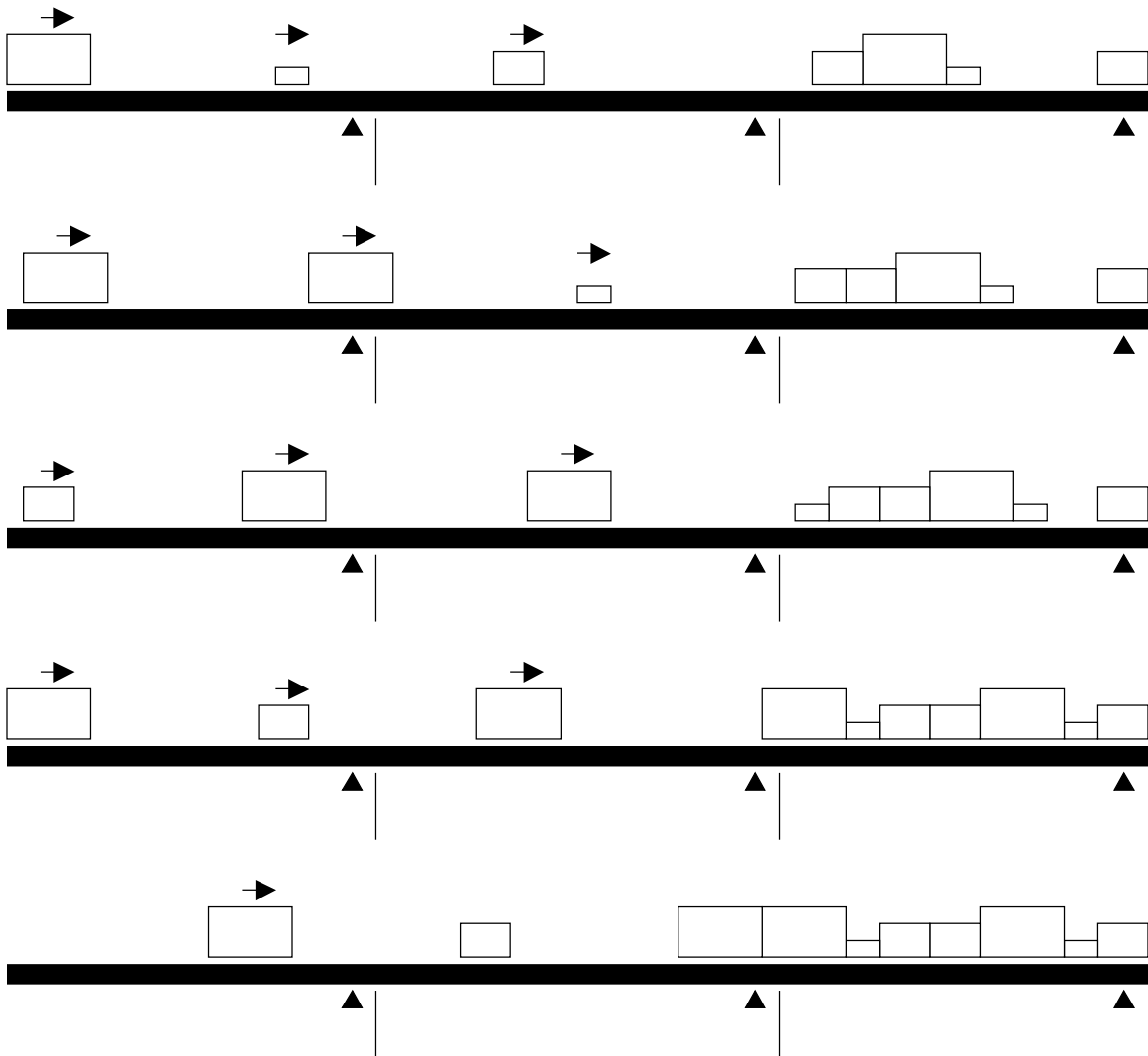


Figure 4

further. At that point, the carton currently being detected by the second zone controller will be pushed by the second zone rollers until the accumulation delay timer expires. Since the carton is prevented from advancing further, the rollers of the second zone spin under the carton until the expiration of the timer, at which point normal zone accumulation is triggered and the second zone stops driving. (See Figure 4)

The process now starts over, this time filling the second zone. This process continues as long as the zone stop remains active and cartons continue to enter the conveyor. (See Figure 5)

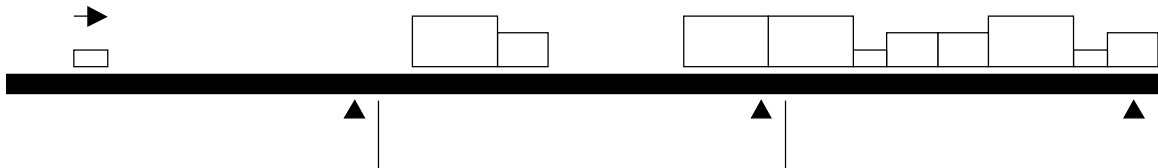


Figure 5

When the zone stop in the discharge zone is made inactive, the discharge zone cartons are released. The way the cartons are released depends on the accumulation mode selected. In singulation mode, the entire contents of each long zone will release one zone at a time, with a typical gap between zone-length “slugs” equal to the length of a long zone. In slug mode, all cartons are released together. Cascade release may be used to create a controlled gap between each long-zone “slug.”

Application Information

The following information should be used as a guide when considering the use of the long zone concept in an application.

Product must “coast” well on non-powered rollers

As described previously, one of the features that makes the long zone concept possible is the ability of cartons to easily coast or be pushed forward on non-powered, freewheeling rollers. There are a number of factors that affect this ability.

Condition of carton bottom surface

The bottom of the carton should be firm and flat, with no protrusions or other imperfections that might interfere with the carton’s ability to flow freely on the rollers. Soft bottoms that conform slightly to the rollers are not recommended. Cartons with bulging bottom surfaces may not flow as expected.

Use of guard rail

The cartons should not make contact with any guard rail or any other surface what might impede their ability to flow freely.

Conveyor speed must be sufficient to provide adequate momentum for coasting

The speed of the conveyor must be high enough so that cartons will coast into the freewheeling zones. For most carton types the minimum recommended speed is 100 FPM. Slower speeds may require the use of shorter zones to allow for the effect of the resulting decrease in carton momentum.

Higher speeds can make the long zone concept work better. Speeds up to 150 FPM offer a dense accumulation without creating too much extra pressure on the cartons. However, faster speeds increase the amount of impact force as the cartons make contact. Higher speeds also increase the possibility of side-by-side cartons.

Use of skewed rollers is recommended

The use of skewed rollers before cartons enter the long zone ABEZ and at regular intervals along the length of the conveyor run can help reduce the occurrence of side-by-side cartons and carton rotation.

Setup

In order to use the long zone concept, the conveyor's mechanical and *EZLogic*® components must be properly chosen and configured. The following is a description of what is required.

Mechanical

The ABEZ should be ordered with longer-than-standard zones. Ten-foot long zones are the most cost-effective choice and are recommended for applications with good carton bottoms. If carton conditions are questionable a shorter zone length may be considered.

The long zones should be made up by combining standard zone pressure frames. For example, a ten-foot long zone would be made from four 30-inch pressure frames. Only one 4-roller brake assembly should be used in each of the long zones except the discharge zone, located at the discharge of the zone. The discharge zone should have three 4-roller brake assemblies installed, all at the discharge end of the zone. The extra brakes help to prevent the incoming cartons from pushing the first carton off of the end of the conveyor.

The conveyor speed should be selected based on the specific application. The recommended speed range for most applications using ten-foot zones is 100-150 FPM. If shorter zones are used, the speed may be reduced to 90 FPM if the cartons are of sufficient quality.

EZLogic®

Standard or enhanced *EZLogic®* zone controllers may be used. One zone controller is used per zone, with cordsets and extension cables as required to accommodate the length of the zone. One standard *EZLogic®* solenoid air valve should be used per zone, plumbed to operate all of the air bags in the long zone.

If there are products being conveyed that may be able to “bridge” over a photo-eye, such as plastic totes, the *EZLogic®* transducers may be angled upstream as required to help prevent this from occurring.

If slug mode is desired, all zone controllers should be set for this mode.

All zone controllers **except the discharge zone controller** should be configured with the “accumulation delay” set to “delay zone accumulation.” If cascaded release is desired, this should also be set in these zones.