

Accumulation Solutions



Re-Flow
Accumulation Table

Accumulating Conveyors and Accumulating Machines

Choosing the Right Accumulation Solution for your Application

Planning for Accumulation

Accumulation is required in high speed production lines to make sure that the generating unit continues to run during malfunctions of downstream equipment. Simply stated, if the generating unit is idle, the production is lost forever. Further, a certain amount of products or packages can be damaged during the stop and start cycles. Often manpower is utilized to unload product and then re-load the product back into the production flow. A reliable accumulation system results in more production, less waste and decreased manpower.

There are three main considerations when researching an accumulation solution.

1. Consider the product weight, shape and packaging. Is the product stable when conveyed? Can the product handle back pressure to accumulate? The type of product may be the defining factor in the best accumulation choice for the application.
2. Determine the area available for the equipment. In some production floor layouts, there may be conveyors overhead which would eliminate most of the vertical accumulation solutions. Similarly, the floor layout may be already crowded and the only way to accumulate is to go up.
3. Calculate the amount of accumulation time needed. This will affect either the footprint or the

height of the equipment, depending on the type of equipment.

This article is an overview of different types of conveyor systems and machine solutions that provide accumulation. Criteria is also examined for each solution, including:

- Type of Product: Round, non-round, packages, cases
- Sequence: FIFO (First-in, First-Out), FILO (First-in, Last-Out) and random
- Cost: \$ = less than \$50,000, \$\$ = \$50,000 - \$100,000 and \$\$\$ = over \$100,000
- Controls: Simple or Complex
- Footprint: Small, medium, large
- Capacity: Small, medium, large
- Back Pressure: Zero, reduced or normal pressure

Accumulating Conveyors

Accumulation Solutions: A comparison of Packaging Line Accumulation Equipment and Capabilities

	PRODUCTS				SEQUENCE			COST			CONTROLS		FOOTPRINT			CAPACITY			BACK PRESSURE		
	Round	Non-Round	Package	Case	FIFO	FILO	Random	\$	\$\$	\$\$\$	Simple	Complex	Small	Medium	Large	Small	Medium	Large	Zero	Reduced	Normal
CONVEYORS																					
Tabletop	●	●	●	●	●		●			●		●	●		●	●					●
Mass Flow	●					●	●			●		●	●		●	●					●
Serpentine Conveyor	●	●	●		●		●			●		●	●	●	●	●					●
Serpentine Table	●				●					●		●	●		●	●					●
LBP Chain	●	●	●	●	●					●		●	●		●	●				●	
Roller Top				●	●					●		●	●	●	●	●				●	
Zero Pressure Lift			●	●	●					●		●	●	●	●	●		●			
Multi-Lane	●	●	●		●					●		●	●		●	●					●
EQUIPMENT																					
Re-Flow Table	●	●				●	●			●		●	●	●		●	●			●	
Bi-Di Table	●	●			●					●	●	●	●		●	●				●	
Flex Flow	●	●	●		●					●		●	●		●	●		●			
Alpine	●	●	●		●					●		●	●		●	●				●	
Vertical Accumulator*			●	●	●					●		●	●		●	●				●	
Rolco Serpentine*	●		●	●	●					●		●	●		●	●				●	
Rolco Multi-Level*			●	●	●					●		●	●		●	●				●	

* While the equipment provides zero pressure in the machine, back pressure is required for staging.



Tabletop

Tabletop Chain Conveyors
Tabletop chain conveyors are a single product flow accumulation solution. The accumulation occurs in the gaps between the products.

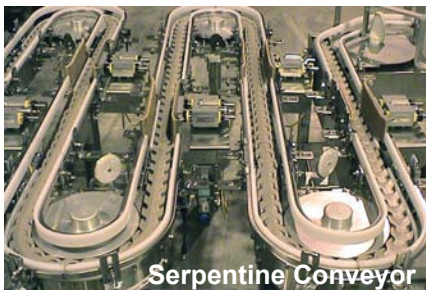
Mass Flow Conveyors

Round containers are suitable products to travel on mass flow in-line accumulation conveyors. The conveyor system accelerates or decelerates depending on the demand from downstream



Mass Flow

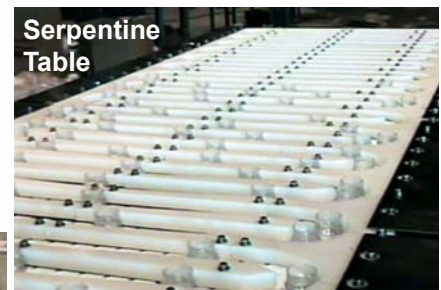
equipment. The width of the mat style belt determines the accumulation capacity. Individually controllable powered accumulation zones prevent buildup of excessive line pressure.



Serpentine Conveyor

Serpentine Conveyor

The Serpentine Conveyor is a single product wide accumulation solution that increases buffering capacity of the line. Like tabletop conveyor, it can be designed to handle round and non-round containers as well as packages.



Serpentine Table

The Serpentine Table is also a single product wide accumulation system. The table design is more compact than serpentine conveyor.



LBP or Roller Top Conveyors

LBP (low back-pressure) and Roller Top Conveyors are a one product wide accumulation solution. The rollers in the chain relieve back-pressure. Typically, LBP chain is used to handle packages and Roller Top chain is designed for case handling.



Zero Pressure Lift

The zero-pressure lift is designed to lift individual or groups of product off the chain. It is possible to zone an entire conveyor length. It is best used for products that cannot handle impact. The controls are more complex because they involve pneumatic lifts.

Multi-Lane Systems

Typically used in high volume applications, Multi-Lane Systems provide more accumulation than linear conveyor. These systems provide FIFO (First-In, First-Out) Accumulation.



This multi-lane accumulator uses a small roller LBP chain which alleviates back pressure to prevent package damage. The gates are controlled to deliver accumulated slugs of packages to different lines downstream.



Another example of a Multi-Lane system, this equipment uses pneumatic swing gates to deliver accumulated slugs of bottles downstream. These systems make excellent use of dense accumulation for the size of the footprint.



Accumulating Machines

Re-Flow

Accumulation Table

The Re-Flow Accumulation Table utilizes a recirculating design that relieves back pressure, allowing for smooth, jam-free single filing of products through the discharge. The footprint is relatively small compared to the accumulation table's storage capacity. This table is suitable for glass, PET and aluminum bottles or containers.

Bi-Directional

Accumulation Table

The Bi-Directional Accumulation Table is designed for right angle, randomly discharged accumulation. Featuring automatic cycling, a sweep bar can be added to the system to provide automatic and complete unloading of product.

Flex Flow Accumulator

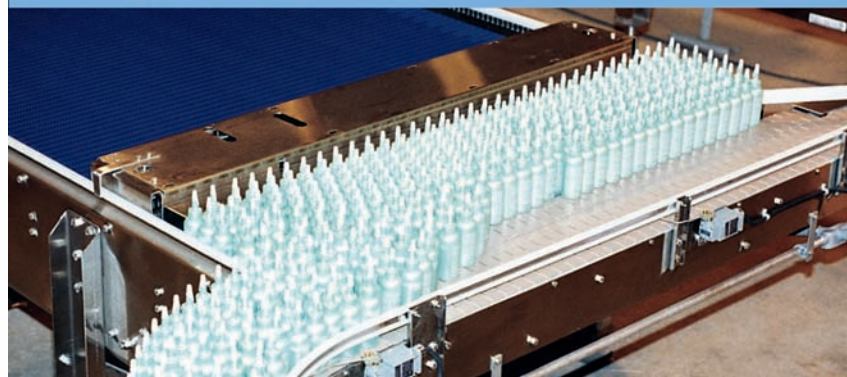
The Flex Flow Accumulator is a first-in, first-out accumulation table. One of the main benefits of this type of accumulator is that it can accumulate fragile or non-round products and packages. A zero pressure solution, a single crescent top chain transports the product, preventing product damage and waste. Separate drives at the infeed and discharge locations provide a consistent flow and allow products to discharge at a different rate than received.

Re-Flow Accumulation Table



Left: The Re-Flow Accumulation table can handle non-round containers. Right: This in-line accumulation method provides low back-pressure single filing discharge.

Bi-Directional Accumulation Table



When a line stoppage occurs, the table's belt is controlled to move at a right angle to the conveyor line, and begins loading. When downstream blockage is clear, the belt reverses for unloading.

Flex Flow Accumulation Table



The carriage moves to expand or contract the path on the Flex Flow Accumulator, to respond to fluxes in production.

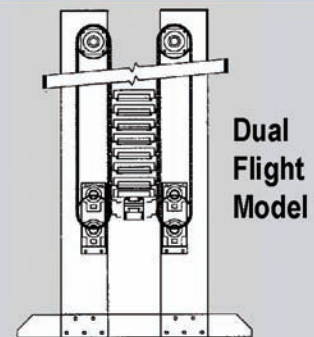
Vertical Accumulator

Offering FILO (First-in, Last-Out) accumulation, the Vertical Accumulator can be designed to accumulate in-line or as an off-line bypass, pending on the application. In normal operation, the product runs through or along side the accumulator. During downstream malfunctions, the product is grouped at the infeed location and these groups are indexed down and automatically loaded back onto the conveyor system. The vertical Accumulator requires infeed and discharge conveyor lengths of one and a half times longer than the width of the accumulator. Storage capacity is determined by the flight width and vertical height.

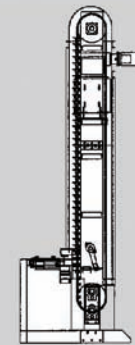
Alpine System

Alpines can be used as an elevator, a lowerator and an accumulation system. It is used when layout versatility is needed. Alpine systems can be designed to convey between floors, over aisles or overhead. They are also used for in-line processing such as warming or cooling. The Alpine system is a linear, one product wide solution that makes effective use of vertical space. It can handle rounds, non-rounds and packages as long as they are stable traveling on the slight incline.

Vertical Accumulator



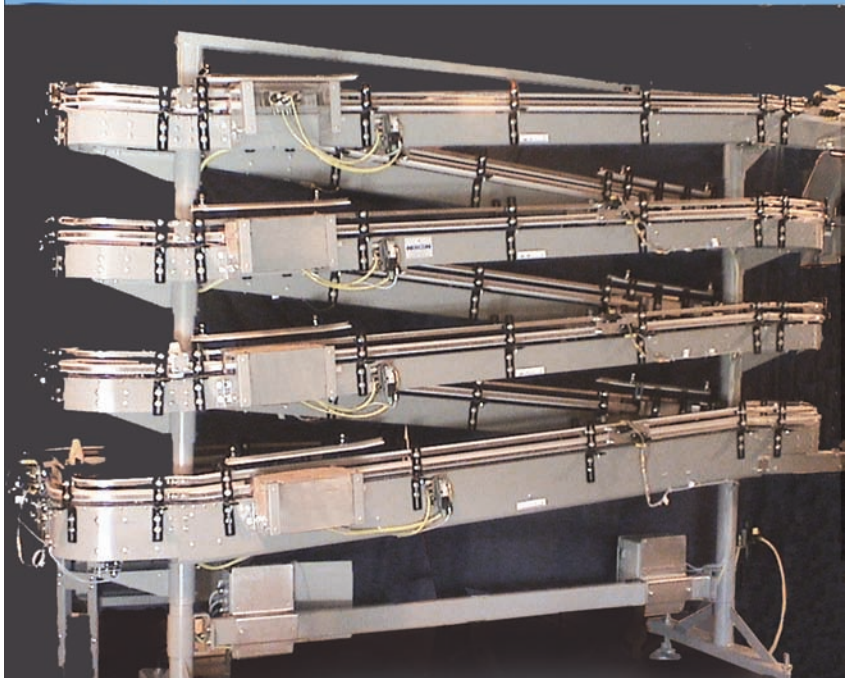
Dual Flight Model



Single Flight Model

The Vertical Accumulator can be used in high volume applications, with 13-14 indexes per minute. The dual flight model is used for heavier products. The single flight model is used for lighter-weight products; both sides can be used for accumulation.

Alpine System





Accumulating Machines

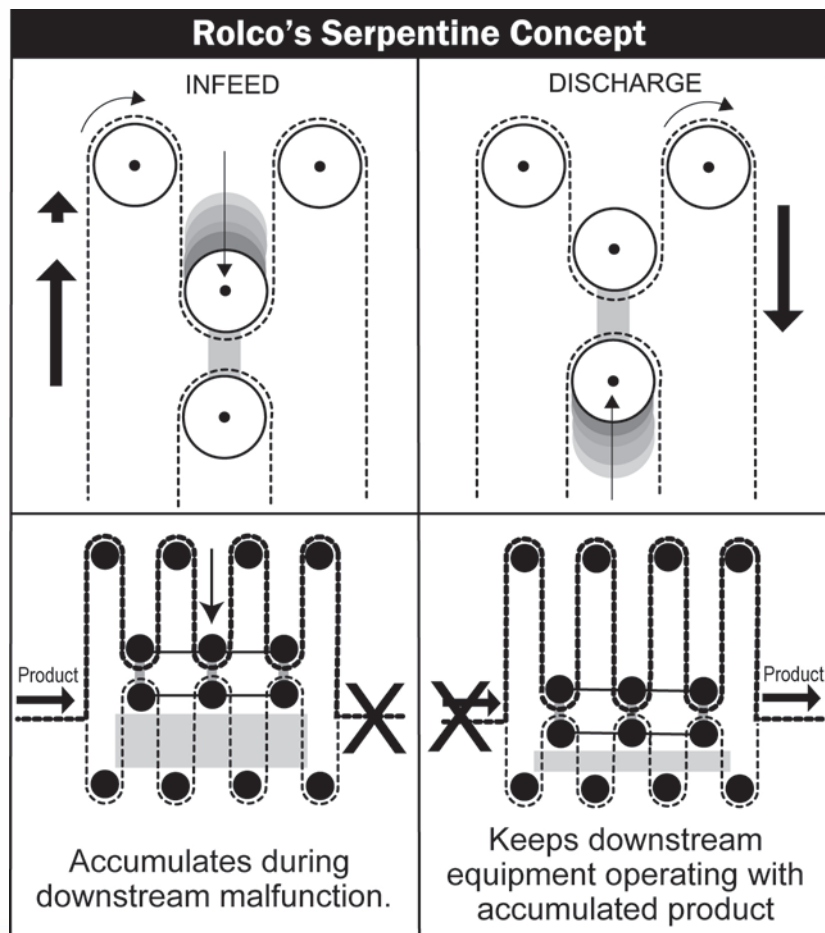
Rolco's Serpentine Accumulator

The Serpentine Accumulator is available in a first-in, first-out design or a first-in, last-out design. Both designs are engineered to use vertical space for storage and can be built to the available ceiling height.

The First-In, First-Out Serpentine Accumulator allows the infeed of products at one location and the discharge of products at another location. This unit also allows the infeed and discharge to operate at the same time, and it also is engineered to discharge products faster than the infeed of the product.

The Serpentine Accumulator returns the product on the same conveyor that it was received.

In normal operation, product is delivered to the accumulator infeed, transferred into a product carrier, progressed through the system and discharged back into the production line, as required by the downstream equipment. If the downstream machine is not ready to accept product, the accumulator discharge does not operate. The infeed continues to operate, storing all of the production in the accumulator. The unislide continues to descend as the accumulator gets filled. As soon as the downstream machine is ready to accept product, the discharge operates at a faster rate than the infeed, gradually removing all of the accumulated product and getting back to a one for one with the upstream equipment.



Rolco's Multi-Level Storage/ Distribution System

Rolco's Multi-Level Storage/
Distribution System maximizes
floor space due to the vertical
design. The unit can be designed
as a first-in, first-out or a first-in,
last-out delivery system. Change-
over time between different
cases sizes is non-existent. The
Multi-Level Storage/Distribution
System is simply interfaced with
other equipment. A distinguishing
feature of the system is that it can
be used to condition products by
installing it in a warming or cool-
ing environment.

Effective Controls Add to Accumulator's Performance

While the right accumulation
equipment increases the through-
put of the entire production line,
effective controls define the
performance of the accumulation
system. Accurately placed photo
eyes sense upstream product
staging, as well as downstream
equipment status. Effectively
programmed and reliable sen-
sors can reduce the hard wire or
Ethernet communication between
upstream and downstream equip-
ment. Operator Panel Views also
add to the efficiency of an accu-
mulator, by having the ability to
immediately diagnose machine
status. A sound controls package
will take full advantage of pro-
duction fluctuations and maintain
a flawless interface with the rest
of the equipment.

Multi - Level Accumulator



Line Controls




Adding to the efficiency of the packaging line, an HMI (Human Machine Interface) panel allows for programming and automation of different recipes and package sizes, as well as machine and line monitoring.



Identifying the Parameters of the Accumulation System

The product information, area available and accumulation time must be taken into consideration when planning for an accumulation solution. Once the accumulation equipment type(s) are narrowed down, parameters need to be identified in order to confirm the final engineered accumulation solution.

These “Top 10” parameters are all necessary in confirming the final engineered accumulation system; however the product information (1-3) will influence the type of accumulation and the precise product handling needed. (See checklist on the right.) In determining the product size and weight, it is also important to identify any variance of the sizes and weights, or even if the weight within the product is prone to shifting. The handling of odd product shapes and fragile packages requires a great deal of expertise and must be a consideration when choosing the best accumulation system. Further, it is important to consider the other product sizes required to run on the equipment as well as future sizes being planned into the product line.

Top 10 Parameters of an Accumulation System CHECK-LIST 	
1	Product Size Information Length, Width, Height, Shape and Weight
2	Define the conveyability of the product
3	Identify other products that will be accumulated and all product size variances, including future products
4	Product orientation requirements
5	Production rate of generating unit and packaging or down stream equipment
6	Accumulation time required
7	Infeed and discharge elevation
8	Ceiling height and available floor space (CAD drawing)
9	Electrical specifications
10	Mechanical Specifications

Ranging from In-Line Accumulation Conveyors to Rolco’s unique Product Accumulators, Nercon has a great depth of accumulation solutions and experience to solve many types of production needs. Having engineered and manufactured

accumulation conveyor systems for over thirty-five years, Nercon has the expertise to determine the best performing accumulation equipment for your packaging conveyor line.

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