

HOW TO SELECT AN ACCUMULATION SOLUTION



Accumulation Technology

Accumulation technology regulates the flow of product in a material handling system.

By buffering the product using zones, it achieves higher throughput and is able to convey both fragile items and items of different sizes without damage and jamming.

By utilizing programmable logic controls (PLCs) and photoelectric eyes, accumulation technology can achieve either zero-pressure or zero-contact zones. Minimum-pressure conveying can be accomplished in a number of ways, with various belts and drives that are customized to fit your solution.

Types of Accumulation

Three types of accumulation technology are available.

- **Minimum-pressure accumulation** – A conveyor with adjustable speed continues to run as product accumulates. This type of technology does not utilize logic or photoelectric eyes, and can be manipulated to allow for only minimal back-pressure on product.
- **Zero-pressure accumulation** – Product is allowed to gently coast to a stop, touching the product ahead without any back-pressure. By utilizing PLCs and photoelectric technology, zero-pressure accumulation lowers the drive belt and releases the rollers to create the coasting stop of product against the next. Zero-pressure technology can easily be adapted into zero-contact technology when needed.
- **Zero-contact accumulation** – Product stops instantly before contact with other items on the product line. Zero-contact accumulation uses short accumulation zones with PLCs and photoelectric technology in order to stop one product per zone. This kind of technology is easily adapted into zero-pressure technology when higher throughput rates may be needed.



Fig. 2-1



Fig. 2-2



Fig. 2-3

Factors in choosing accumulation

Before beginning an accumulation project, it is important to consider your **product**, **throughput rates** needed, **costs** associated, and the **ease** of both use and setup.

To best determine the type of accumulation technology to use, there are several factors to consider: product and conveyor length, current and future projected throughput rates, and associated costs with each.

Higher throughput rates is an advantage typically realized with accumulation solutions. By holding and buffering product until downstream operations are prepared, upstream operations may continue. This ultimately increases production operations. Typically, zero-pressure and minimum-pressure solutions achieve the highest throughput rates, as no gap exists between products. Zero-contact solutions have a slightly lower top throughput rate because of the minimal gaps that exist.

While this whitepaper references PLCs as a method to program zero-pressure and zero-contact accumulation, Hytrol's own solutions often use its EZLogic® technology, a simpler solution that provides intelligence to control the functions of accumulation without the use of a PLC.

Product

The product needed to convey is important to take into account with accumulation.

In addition to any “normal” products, also take into account seasonal products and throughput to apply the correct solution.

Products best for minimum-pressure

Products that have similar sizes where there is little chance of product damage may be used with minimum-pressure. Keep in mind that the longer a section of minimum-pressure conveyor, the more pressure is applied in accumulation. For this reason, many choose to keep minimum-pressure conveyor in shorter lengths. **(Fig. 2-1)**

Products best for zero-pressure

Products that are able to coast to a stop without damage or jamming may be used with zero-pressure. These products may have a variety of sizes and weights but should still have a flat surface so that side-by-sides and jams do not occur. **(Fig. 2-2)**

Products best for zero-contact

Products needing the most control and/or having a high risk of damage should use zero-contact technology. This technology allows for the most variety in product size, shape, and packaging while ensuring that no damage occurs to the product or equipment. **(Fig. 2-3)**



Cost

Total Cost of Ownership takes into account both initial costs and long-term costs associated with maintenance and operation. Considering this may help save these costs down the line. Any changing business needs should be a driving force in your investment decision.

Zero-pressure costs

Zero-pressure solutions often require a greater initial investment, but savings can be realized over time as the lack of constant pressure requires less maintenance and lower operating costs. Since zero-pressure technology is easily adapted into zero-contact technology, and vice versa, you may consider the future adaptability of your solution. These conveyors can utilize the “sleep mode” of EZLogic®, which shuts down conveyor operations when product isn't present and saves on maintenance and operating costs over time.

Zero-contact costs

Zero-contact solutions require as much initial investment as zero-pressure, but may save the most money over time. Using EZLogic®, a conveyor can go into “sleep mode” when product is not being moved, saving a considerable amount of money on maintenance and operating costs over time.

Minimum-pressure costs

Minimum-pressure requires the least amount of initial investment, but a constantly running conveyor can cost more money over time. It wears out parts more quickly, which requires more maintenance, and does not have a sleep function, so operation costs are increased. Any damage to product should also be considered in the cost of operation.

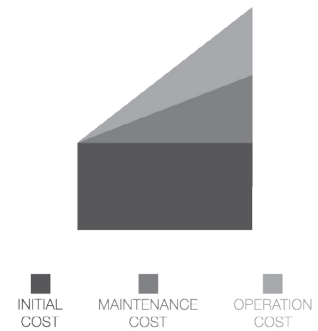


Fig. 5-1

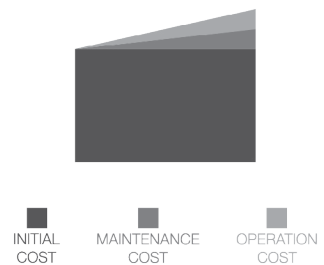


Fig. 5-2

Ease

Zero-pressure and zero-contact with a PLC

A zero-pressure or zero-contact conveyor using the advanced options of a PLC may lack the ease of setup other options have. It is recommended that a professional be brought in for setup—an integration partner or controls specialist can easily provide this function.

Once setup is complete, it is easily learned and run by the operators in your facility and can be adapted for throughput requirements.

Zero-pressure and zero-contact with EZLogic®

One of the biggest benefits of Hytrol's EZLogic® solution is that it's simple to install and operate. Since EZLogic® doesn't require the use of a PLC, this solution is easily and quickly installed.

Minimum-pressure ease

A minimum-pressure conveyor requires no extra setup for a basic straight line. For any change in pressure needed, the speed is adjusted. However, users must be aware that for options such as curves, minimum-pressure options can quickly become complicated. In addition, options with a minimum-pressure solution may be limited as product and throughput changes. If pressure builds up to an unsustainable level, both product and equipment may be damaged.



Conclusion

An accumulation system is an investment that can take your business into the future while solving the needs you have right now. Take your system requirements into account before selecting a solution that fits you. An authorized Hytrol integration partner can provide an expert consultation of strategies to achieve the greatest return on your investment.

This whitepaper was produced as a joint effort between Hytrol Conveyor Company, Inc. and Advanced Equipment Company. To learn more about Advanced Equipment Company, visit www.aec-carolina.com.



Chart

Product offerings for each of the above considerations: product, cost, ease of setup and use, and throughput rates.

	Cost	Ease of Setup	Throughput Rate	Product Variety
Minimum-pressure	★★☆☆☆ Lowest initial cost, but higher maintenance and energy	★★★★★ Very easy setup	★★★★★ High throughput rates due to no gaps in product	★★☆☆☆ Products of different shapes and sizes prone to damage/jams
Zero-pressure with EZLogic®	★★★★★ Higher initial cost, but less wear and tear on conveyor	★★★★★ Easier to set up and update in the field	★★★★★ High throughput rates due to no gaps in product	★★★★★ Products of different sizes may create side-by-sides as they coast into one another
Zero-contact with EZLogic®	★★★★★ Higher initial cost, but savings in equipment maintenance and energy	★★★★★ Easier to set up and update in the field	★★★★★ Small gap in products decreases throughput slightly	★★★★★ No jamming or side-by-sides, as product never touches
Zero-pressure/zero-contact with EZLogic®	★★★★★ Higher initial cost, but savings in equipment maintenance and energy	★★★★★ Likely need outside help for setup	See above	See above