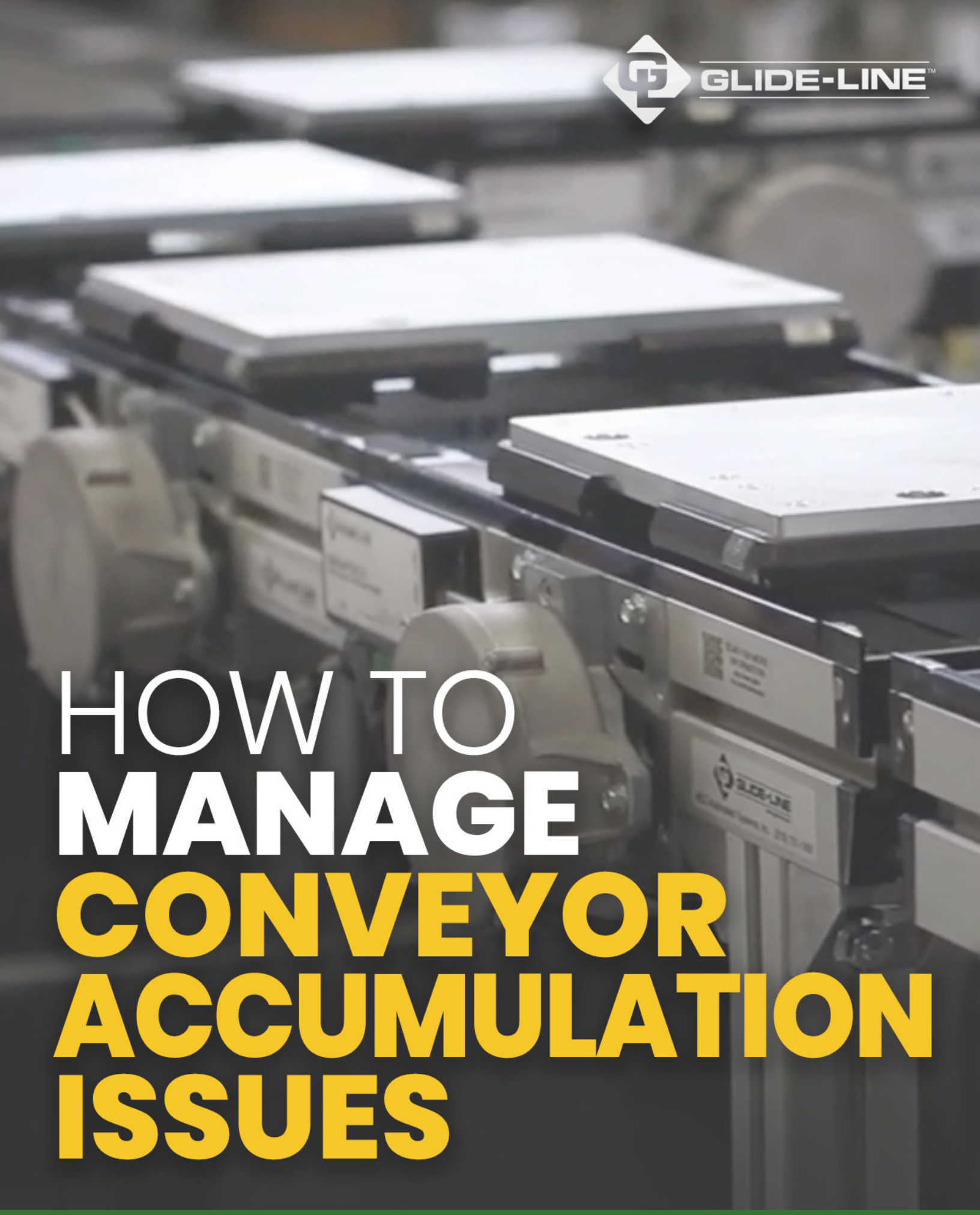
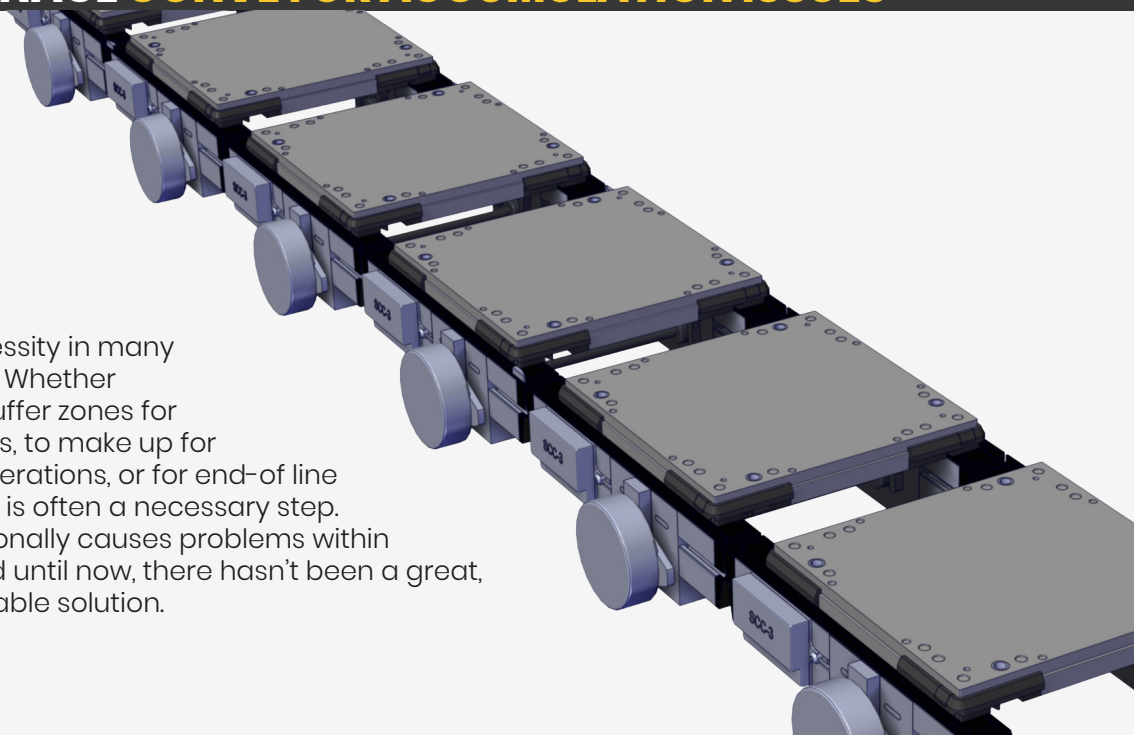


HOW TO MANAGE CONVEYOR ACCUMULATION ISSUES



Accumulation is a necessity in many automation processes. Whether it's needed to create buffer zones for downstream operations, to make up for asynchronous inline operations, or for end-of line queuing, accumulation is often a necessary step. It's also one that traditionally causes problems within the production line, and until now, there hasn't been a great, cost-effective, truly reliable solution.

COMMON DRAWBACKS OF PRODUCT ACCUMULATION

Traditional accumulation causes a number of issues within automation systems.

Product Damage

Despite the inherent advantages of pallet assembly conveyors, traditional conveying methods have one large downside, particularly when it comes to fragile products: product damage.

Pallets colliding with each other is a common issue with accumulation on conveyors with traditional accumulation methods. This can cause damage to fragile products (or in a partially assembled or cured state) and can be a major hidden cost of damage in traditional conveyor systems.

Inefficient Operation

In addition, a traditional conveyor system typically runs non-stop, regardless of the actual production requirements. This means the conveying media – belt or chain – also runs continuously beneath the product, even during accumulation, while the product is stationary. Not only does this cause unnecessary wear and tear on the conveyor and the motor, it also wastes energy by causing friction between the conveying medium (the belt) and the pallets, putting more stress on the drive.

Backpressure

Traditional conveying systems experience backpressure caused by pallets piling up behind each other as they stack up behind the pallets in front. This backpressure can generate hundreds of pounds of force and, more importantly, compromise the integrity and quality of the products being accumulated.

This issue is particularly troublesome in production lines requiring human interaction as this creates dozens of pinch points along the system.

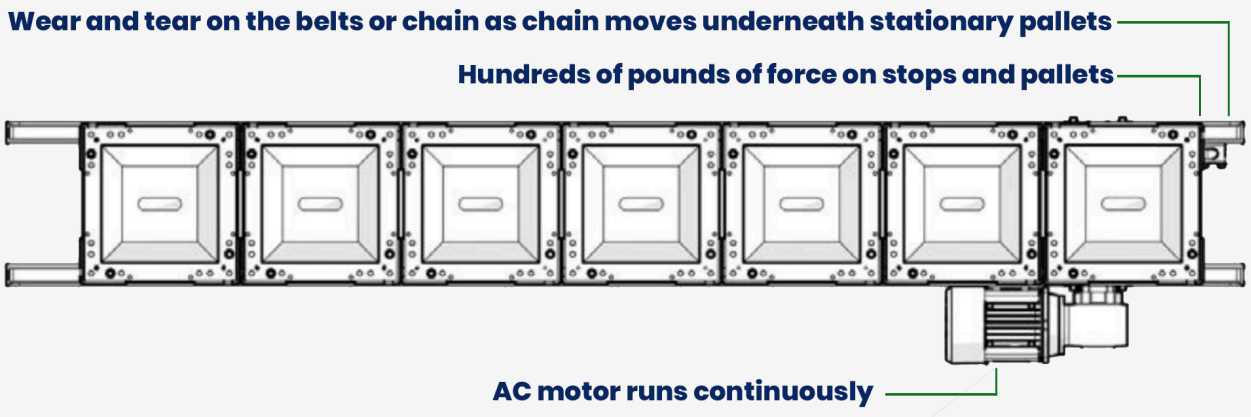
THE TRADITIONAL SOLUTION

So, how do conveyor designers and manufacturers typically deal with the extra loads, friction, and wear and tear that occur during accumulation? Simply, they up-size the conveyor system in an attempt to minimize the backpressure and prevent too much accumulation.

Inevitably, up-sizing the conveyor costs more money and uses more energy.

Of course, this means heavier-duty (and sometimes larger) components, which adds cost, both in terms of the conveyor itself and in higher energy usage. Plus, accumulation and backpressure still have to be managed with pneumatic stops and eyes, which require PLC I/O, wiring, and code development, in turn driving extra costs and effort into the project.

Although not the most desirable solution, until now, up-sizing the conveyor system has been the easiest and most effective way to handle the consequences of product accumulation.



Traditional conveyor systems generate backpressure during accumulation, experience significant wear and tear, and waste considerable energy.

INTRODUCING: **THE ZERO CONTACT ZONED CONVEYOR**

Accumulation is a necessary part of many asynchronous assembly processes. However, we just discussed some common drawbacks to typical accumulation practices. At Glide-Line, we've developed a solution - the Zero Contact Zoned Conveyor (previously called the Zero Pressure conveyor). When pallets or products collide, become dislodged in their fixtures, or otherwise get damaged on the conveyor line, it's a detriment to the overall production and quality - not to mention the economic impact of scrap, rework and stopped production. You need to find a gentler, more controlled, and more flexible conveyor. Traditional conveyor accumulation techniques can also waste energy. A better option would be a more efficient conveyor without the backpressure created or the energy wasted.

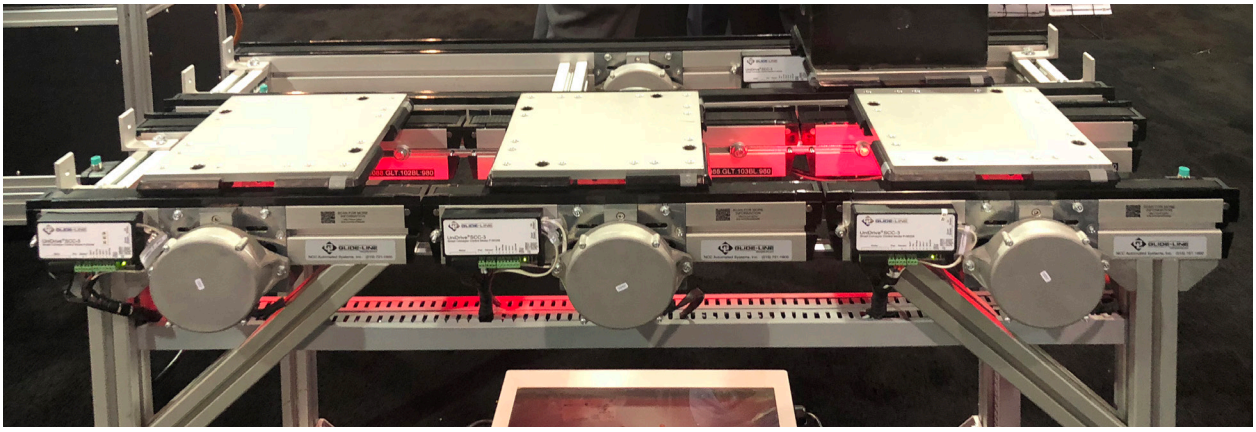
The Zero Contact Zoned Conveyor could be a great solution.

Scan to view the Zero Contact Zoned Conveyor in action.

Our Zero Contact Zoned Conveyor has:

- individually managed accumulation zones
- brushless DC (BLDC) motors

Each of these features allow the Zero Contact Zoned Conveyor to be flexible while eliminating backpressure, preventing a majority of damage-causing issues with accumulation, and adding increased efficiency of the automation system.



BENEFITS OF ZERO CONTACT

Reduce Product Damage

The entire reason to use the Zero Contact Zoned Conveyor is to reduce product damage typically caused by accumulation. But damage is also reduced in a few additional ways:

- **More controlled, gentler product handling:** By controlling the acceleration and deceleration of a conveyor, you're able to minimize shock loads on the product. Zoned conveyors allow you to program this aspect of the handling process to automatically eliminate this risk. The result is a gentler, more reliable conveyor when it's needed for your clients' precision products.
- **Minimize slippage:** Damage rarely occurs to products while the conveyor is moving the product; rather, scratches, scuffing, and/or denting of a product in the assembly process typically occurs when a pallet stops or starts. Smooth acceleration and deceleration can be a preventative measure. Avoiding the belt or chain slipping underneath the product leads to the gentlest motion possible.

CASE STUDY

Consider a client that manufactures high-quality, specialty refrigerator doors. Their integrator reached out to us at Glide-Line to solve some specific challenges:

- **Reduce slippage/rubbing of belts on their product**
- **Eliminate product damage during conveyor transport**

First, we recommended the Zero Contact Zoned conveyor to eliminate product damage during accumulation. This made sure the doors couldn't collide during the automation process, since separation was coded into the system.

To further reduce any chance of damage to the doors through the conveyor process, we eliminated the pallets altogether and placed the doors directly on the belt surface. We customized the belt with a high-friction material to prevent slipping.

With this change and by controlling zone to zone movement with the Zero Contact Zoned Conveyor, our integrator customer's client was able to eliminate $1 million annually in lost damaged products due to this element change.

Eliminate Backpressure

The Zero Contact Zoned Conveyor from Glide-Line eliminates backpressure while adding and maintaining space between pallets, eliminating product damage caused by these issues.

Unlike a traditional conveyor system, Zero Contact Zoned Conveyor lines run multiple individually-managed accumulation zones carrying pallets from workstation to workstation. Instead of a single belt, as most conveyors have, the belts in the Zero Contact Zoned Conveyor are built in separate zones. This creates a permanent gap between pallets (and, therefore, products).

The Zero Contact Zoned Conveyor also doesn't accumulate pallets in a traditional way (with the belt running under the accumulated pallets). Instead, the individually-zoned belt automatically stops. If one of the zoned products does hit a stop (which is sometimes unavoidable for precision location stations) , our 24VDC driver cards have integrated zero-contact logic built in to automatically turn off the zones upstream one by one, preventing subsequent pallets from colliding. This is all handled automatically.

With no product-to-product contact, there is a lower chance of product damage and with no backpressure, the energy is reduced and wear and tear is minimized.

Use Less Energy

Traditional accumulation conveyor typically run all day using an AC motor and, often, a worm gearbox. This results in a less efficient use of power because the conveyor is not using this electricity to move product in these accumulation areas. It also creates a loss of efficiency in the gearbox. Additionally, traditional accumulation zones create backpressure, which only adds to increased energy costs, since the motors are working harder to keep the conveyor running despite the build-up of friction.

With the Zero Contact Zoned Conveyor, each zone is powered by a dedicated brushless DC motor with a purpose-built driver card that allows the conveyor to only run when needed zone to zone. This uses much less energy than a traditional conveyor. And, since backpressure is eliminated, the system runs with less friction, therefore much more efficiently when it is running.

Overall, the Zero Contact Zoned Conveyor can reduce energy costs by 20-40%.

Reduce Wear and Tear

Thanks to its unique design, Zero Contact Zoned Conveyors have a longer useful life, reducing long-term capital expenditures.

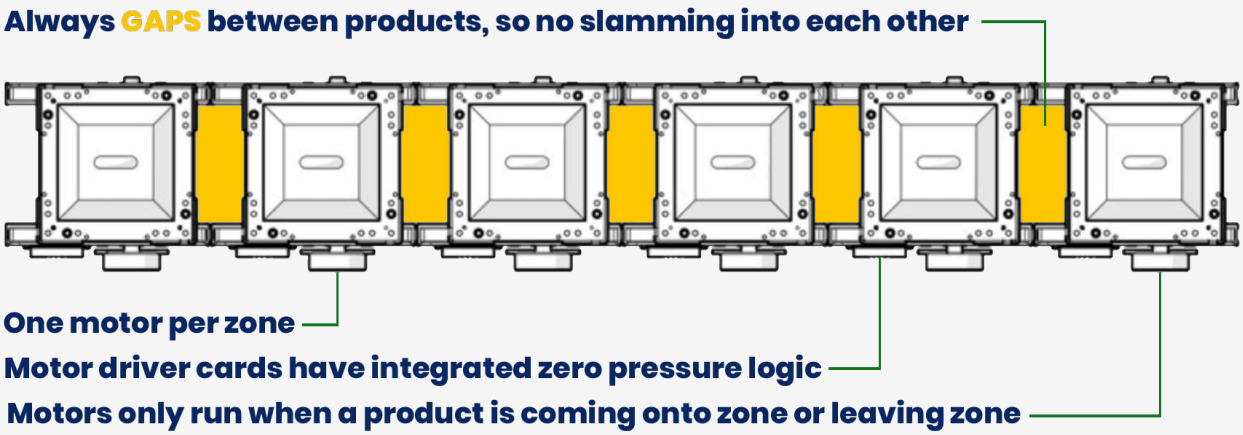
Wear and tear is minimized by eliminated friction from running belts under static pallets. Additionally, the power transmission is simpler with fewer moving parts (our DC motor has a single moving part and a 300,000 hour bearing life) to improve both reliability and reduce maintenance needs, reducing total cost of operation tremendously.

ZERO CONTACT ZONED CONVEYOR FEATURES

Individually Managed Accumulation Zones

Referred to as "zero contact accumulation," the Zoned Conveyor is a conveying system with individually managed accumulation zones to ensure there is always a gap between products. This provides gentle product handling by eliminating the backpressure that can cause product damage. Each individual zone on the Zero Contact Zoned Conveyor can handle up to 200 pounds with our DC motors, so the ability to transport heavy loads is not compromised. We can handle much heavier loads with our AC motor solution.

Individually controlled zones eliminate wear and tear due to friction by dividing the conveying system into multiple zones and operating each zone only as the process requires. This means that the individual zones' conveyor belts stop during accumulation rather than running continuously under the stopped product, like the conveying media would in a traditional conveyor. The Zero Contact Zoned Conveyor eliminates friction and reduces the unnecessary need to continuously run the motors and conveyor media. This reduces energy consumption as well as wear and tear on the conveyor.



The zero pressure accumulation of the Zero Contact Zoned Conveyor provides gentle product handling, reduces wear and tear, and significantly lowers energy consumption.

Brushless DC Motors

Brushless DC motors are small and efficient – an ideal fit for zoned accumulation. They can provide full torque at low speeds and their small size means less inertia, allowing them to respond quickly to changing load conditions.

With traditional conveyors, there is a single AC motor powering the belt. Whether or not the product needs to move, the belt will continue moving forward. The Zero Contact Zoned Conveyor's individual zones are powered by their own dedicated motor. This means the products and conveyor only move when necessary.

To manage each zone individually, the single AC motor used on a traditional conveyor is replaced by multiple small 24V brushless DC motors – one for each zone. Each motor incorporates a driver card with integrated "zero contact" logic, and the motors are daisy-chained together to ensure that each zone operates only when needed. Pallet sensors are wired directly to the driver card for the motor, which means even less I/O, fewer motor starters or VFDs, less code development, simpler wiring, and reduced overall effort. Not only does this simplify the control scheme and hardware costs, it significantly reduces wear and replacement parts.

The DC motors used in Zero Contact Zoned Conveyor are compact and have virtually silent operation, making them ideal for noise-sensitive environments (or those where noise is already at or near maximum acceptable levels). Not only does individual zone management reduce wear and tear on the conveyor, the 24VDC motors are constructed with bearings that have a 300,000 hour lifespan. This virtually eliminates the need to replace motors during the conveyor's operational life.

Note that the Zero Contact Zoned Conveyor is available with heavier duty AC motors as well. We do not offer all of the same features, such as embedded logic, with this. Please consult Glide-Line for more info on heavier load applications.

Flexible Design Elements

Glide-Line conveyors, including the Zero Contact Zoned Conveyor, are entirely modular and flexible. We've innovated many elements of our modular conveyors to avoid damage to your clients' precision products.

Conveying Medium

Consider alternative belt or pallet materials if needed. In a typical conveyor, the belts don't directly interact with the product, but the pallet does. However, there are instances where the belt itself can be doing the conveying of the product. The conveying medium is completely flexible for Glide-Line's entire array of products, including the Zero Contact Zoned Conveyor.

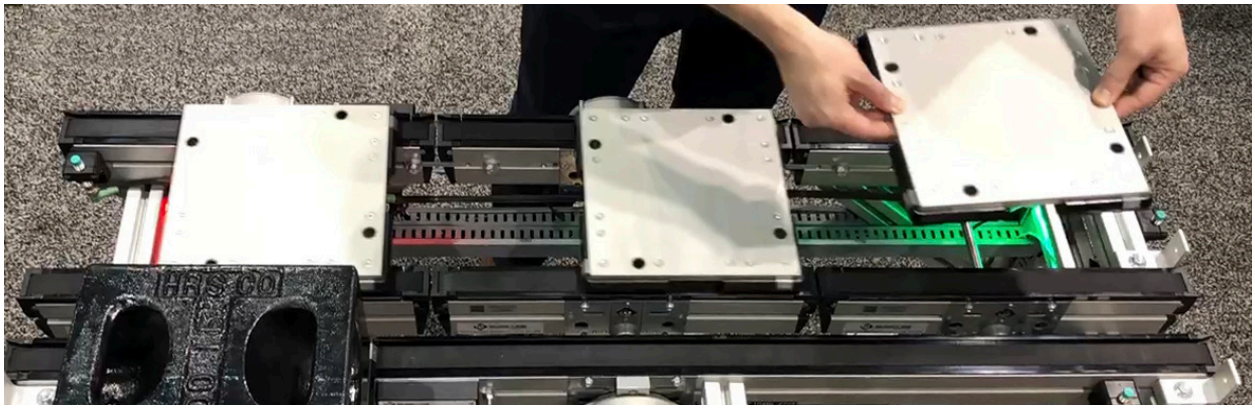
For example, a very high friction (grippy) material can help prevent a product from moving on the conveyor line at the start and stop of your client's process. A soft material like cotton could also be used for your client's product; medical supplies or phone screens could benefit from a similarly soft surface to transport between workstations and prevent damage to these pieces. A final example is the addition of tiny "teeth" on a belt to help speed up indexing and preventing slippage.

The goal of these alternate belt materials is to maintain control of the pallet or workpiece carrier and, ultimately, maintain control of the product itself to reduce risk of damage during the assembly process.

Expanding Access

Expanding access to the product via an open center design eliminates the need for a specialty handling system to lift the product off the pallet or belt and flip it over to complete work on the bottom side of the product. This innovation reduces the cost of the pallet conveyor automation system and reduces the risk of damage to the product. Another possible use of the open center design is that vision systems can be installed to inspect parts from underneath.

Those are only two examples of the flexibility offered in the design of our Zero Contact Zoned Conveyor.



GLIDE-LINE OFFERS A BETTER BUILD PROCESS

Lead Times

Our lead times are half those of our competitors.

Shortened lead times start with engineering and assembling conveyor pieces into your conveyor design software. Typically, you're required to reach out to the manufacturing salesperson for quotes, model numbers, or conveyor expertise. We offer an in-context configurator called IMPACT! for integrators to use for planning any size variations or configurations they need - and it offers pricing immediately.

Flexible, Modular Builds

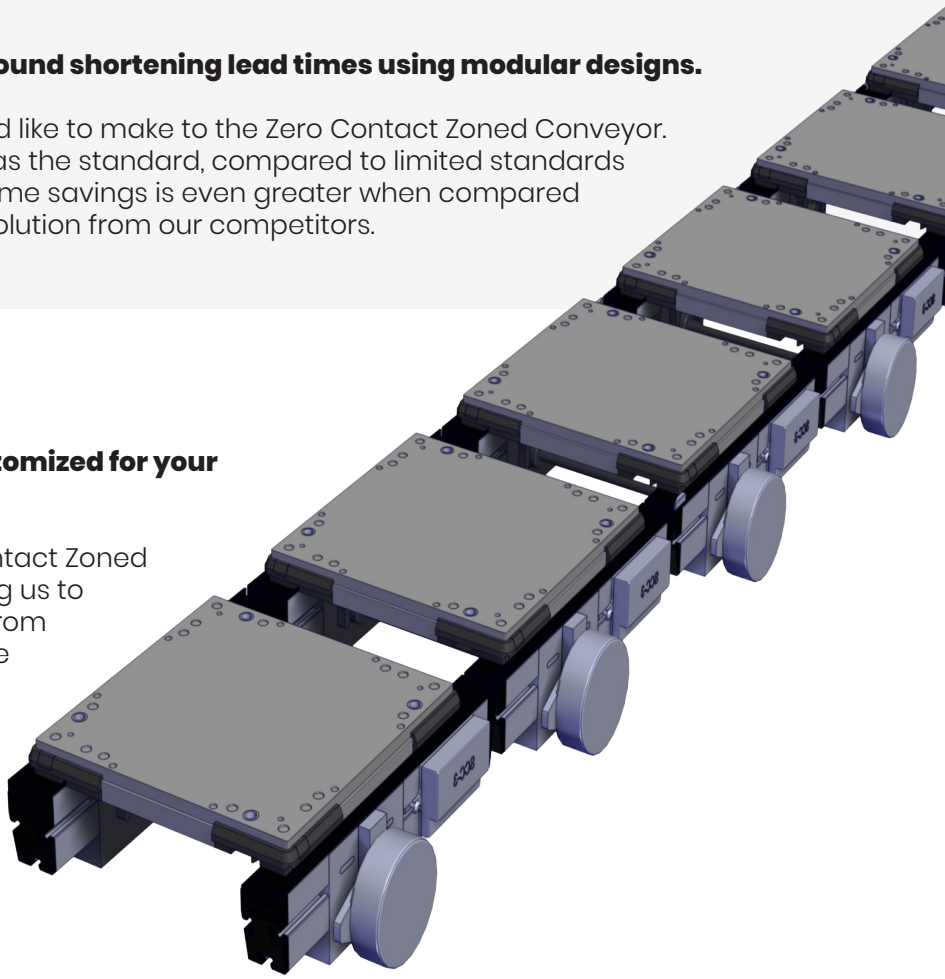
Glide-Line has built its processes around shortening lead times using modular designs.

This includes any customizations you'd like to make to the Zero Contact Zoned Conveyor. Our conveyors are built to be flexible as the standard, compared to limited standards from other manufacturers. And that time savings is even greater when compared to fabricating a completely custom solution from our competitors.

Customization

All Glide-Line conveyors can be customized for your clients' specific needs.

Our conveyors, including the Zero Contact Zoned Conveyor, are highly modular, allowing us to quickly deliver customized solutions, from the size of the conveyor (customizable to the millimeter) to the number of strands, and any additional features you need. We can easily modify any design to create a custom solution to meet your clients' challenges.



CONCLUSION

The Zero Contact Zoned Conveyor is an elegant solution for managing accumulation – with much less chance for product damage, much less wear and tear, incredible energy savings and a much safer system. .

Our team has seen the consequences of traditional accumulation and we've designed a zero contact zoned accumulation option for our clients. This means no more damaged product, scrap, rework, and stopped production due to the bumps and shocks that products endure during traditional accumulation. Instead of increasing cost, as many product "improvements" do, Glide-Line's Zero Contact Zoned Conveyor reduces cost through energy savings, fewer worn parts, and reduced maintenance.

Additionally, today's manufacturer demands a custom system that can be quickly designed and delivered. Glide-Line has built its business around meeting this demand, allowing us to provide lead times half those of our competitors. Our conveyor is highly modular and designed intelligently, allowing us to quickly deliver conveyors and devices customized to your clients' needs.

To learn more about Glide-Line and the Zero Contact Zoned Conveyor, visit glide-line.com or contact us at 215.721.1900.

GLIDE-LINE™