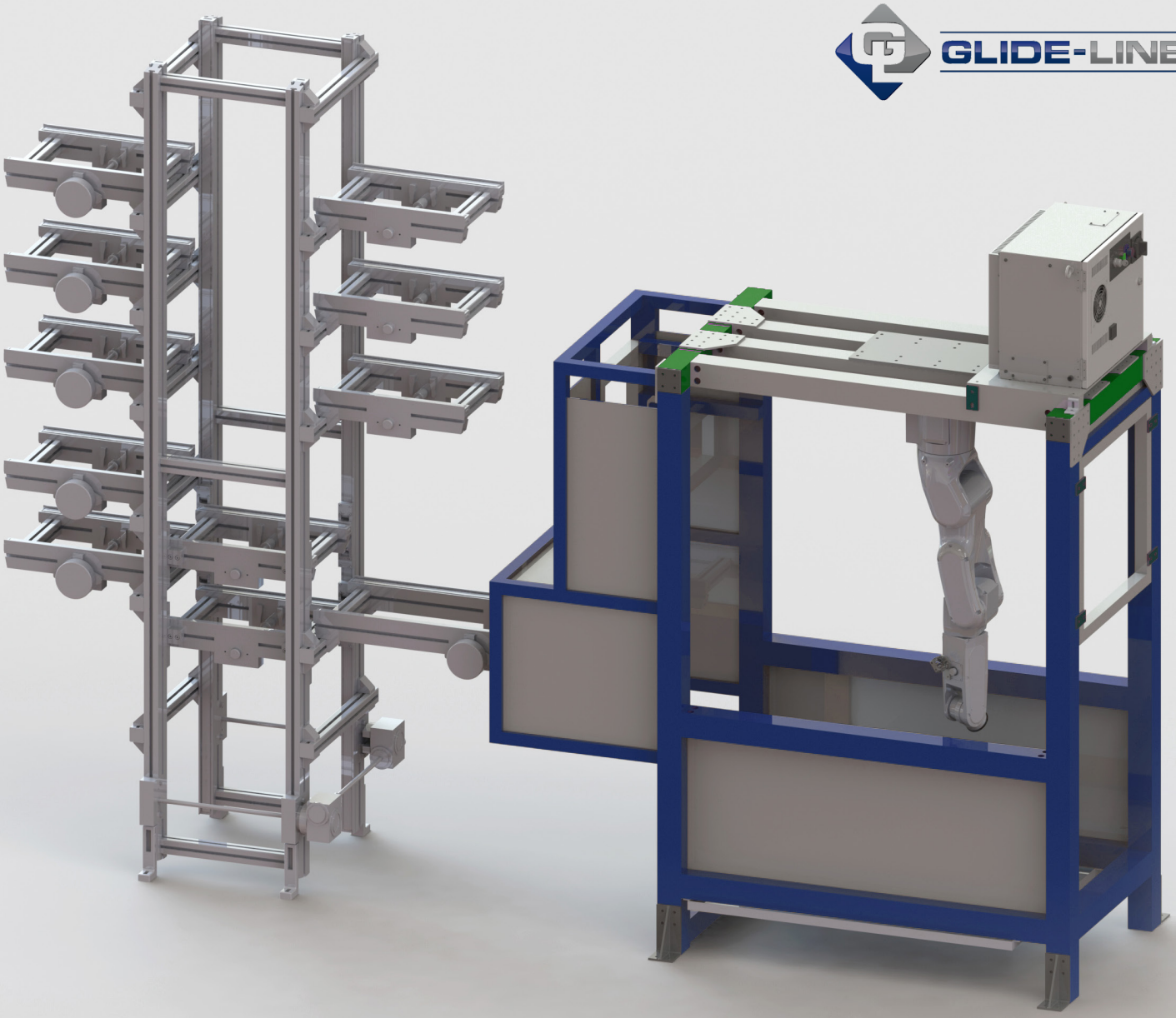
GLIDE-LINE™



INNOVATIVE WAYS TO **CREATE CUSTOMIZED LIFTS** AND **VERTICAL CONVEYORS**

CONTENTS

INTRODUCTION

In the world of conveyor systems, VTUs, or vertical transport units, go by many different names: elevator, lift, and vertical reciprocating conveyor just to name a few. No matter what you call it, a design engineer's goal in using a VTU is usually fairly commonplace: lift a section of the conveyor, and the product on it, from one level to another.

But what if an elevator could do more than simply move product from one conveyor to another? What if a lift could also:

- Save you space?
- Create improved access for robots or employees?
- Rotate a product for the next station?
- Increase throughput?
- Eliminate the need for other devices?

Vertical transport units may seem like a standard offer from all conveyor system manufacturers, but at Glide-Line, these lifts are multi-purpose solutions applied to creatively solve challenges other manufacturers have failed to solve – or worse, have charged outrageous fees to customize. One of Glide-Line's guiding principles is to make conveyor systems flexible. That flexibility encourages innovative non-standard uses. In this ebook, we explore challenges solved by VTUs and review innovative, real-world examples of how design engineers have developed creative lift-based solutions.

CHAPTER ONE

THE TOP 6 WAYS CREATIVE LIFT APPLICATIONS HELP DESIGN ENGINEERS

1. SAVING SPACE

When you're faced with the challenge of limited space for a new conveyor line, VTUs can save the day. The most common way other manufacturers save space with a vertical transport unit is by creating an inverted return loop under (or over) the main line. But there's another space-saving design application for lifts that's already in the name: vertical transport.

We've used pallet elevators, sometimes multiple per line, to vertically transport a conveyor section or pallet up a small distance to a workstation just above the line. Then, a robot or employee can perform a parts operation directly on the elevated section. This effectively doubles (or triples) the number of workstations available on a single line by stacking them vertically. Traditionally, the only other way to accomplish this would have been to have additional lines side by side. Instead, integrators can improve efficiency while saving space by creatively incorporating VTUs in the system.

Dual Axis VTU

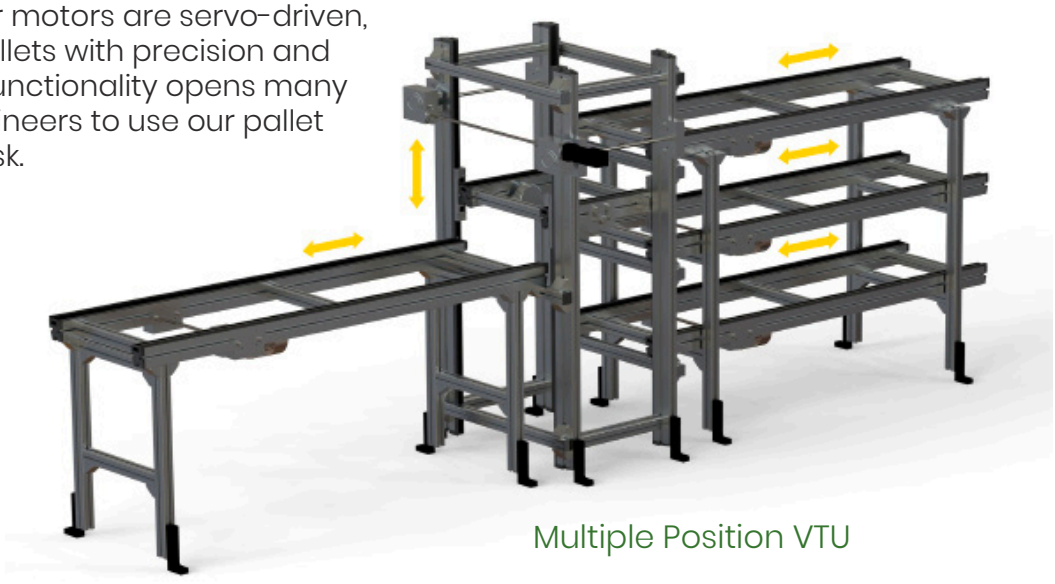
2. CREATING ACCESS

When vertical transport units aren't tied to single-function designs, the possibilities for use are greatly expanded. VTUs create access within an automated conveyor system. Instead of an employee, maintenance worker, or robot being required to move, climb, or adjust to various points on a conveyor to perform an operation, using a lift within the conveyor line creates access to the product without loss of time. Even better, a servo-driven lift can be programmed to the exact right height for optimal working conditions – whether it's high above the main line, creating access to the underside of the product, or below the main line, allowing operators or quality assurance personnel to view the top. Creatively applying these additional uses for a VTU creates access to the products within your clients' automation system.

3. MULTI-TASKING WITH EFFICIENCY

There's another way to apply elevators within your automated conveyor system that many design engineers aren't aware of: using VTUs to combine multiple steps within the system.

Because our elevator motors are servo-driven, we're able to stop pallets with precision and without jarring. This functionality opens many doors for design engineers to use our pallet elevators to multi-task.



Multiple Position VTU

MULTI-TASKING
ELIMINATES COMPLEXITY

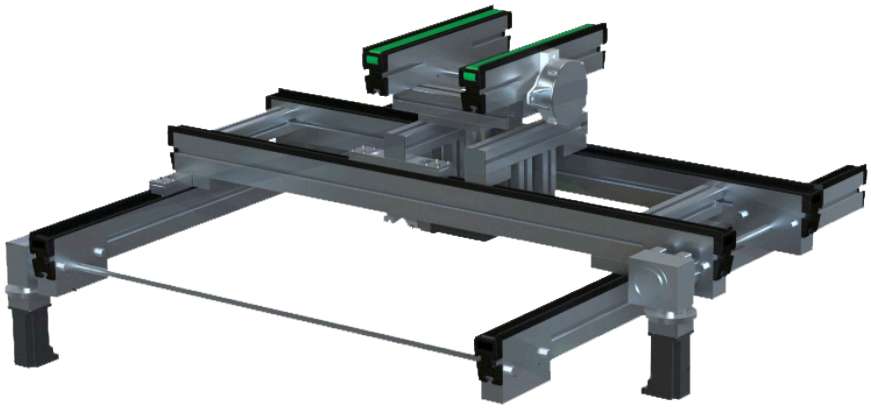
Locating or rotating a product on a conveyor line is typically a separate function requiring additional equipment. Using Glide-Line's VTUs, this can be accomplished within the lift. The product can be conveyed inside the lift and the pallet itself can rotate.

Another concept that we've recently completed is a Tilting Deck VTU. This VTU is designed so the deck can be tilted towards a robot to improve the access. This allows for robotic operations to occur within the lift. Now we've combined the lifting and rotating with an entire operation by a robot, all occurring within one VTU.

Tilting Deck VTU

We help concept innovative, multi-functional conveyor solutions as part of our process when we assist integrators with quotes. It's what we do. When it comes to non-traditional solutions, or conveyors that by most standards would require complex or customized components, Glide-Line applies simple but flexible options to create a customized standard option that's usually more efficient, more cost-effective, and saves space.

4. IMPROVING THROUGHPUT



Glide-Line 360

The mindset of using elevators to accomplish tasks within a process is different. It requires the ability to think creatively about solutions and think strategically about the ultimate goal of the process. For example, if your client's ultimate goal is to increase throughput, increased efficiency is the way to do so. There are many traditional ways a manufacturer may suggest improving throughput by adding lines and widening the conveyor system to accommodate the additional product. But, instead of removing a product to perform a new operation within a client's process, consider using a VTU.

A vertical transport unit (specifically, the Glide-Line 360 conveyor) can lift pallets from the main line while allowing more product to pass underneath the raised pallet. A function can be performed at the raised level, then the product can be added back to the operational process. This can be repeated at multiple levels, and at many points throughout the line. Typically, this process would starve the line and leave a huge hole in the system, but using the Glide-Line-360-based VTU concept, products can pass under the lifted pallet using a double elevator. Using access to different heights in the automation process significantly improves throughput without taking up additional space.

Using VTUs to remove typically slow processes from the main line also improves throughput. For example, inspection control can lift a defective product from the main line to make an adjustment while good product keeps flowing underneath it using a pass-through VTU. Another example is to use a VTU to accomplish vertical accumulation of products in an automation process where there is a slower section of the automation system after a fairly quick process. Elevators help avoid delays while moving product through a process as efficiently as possible.

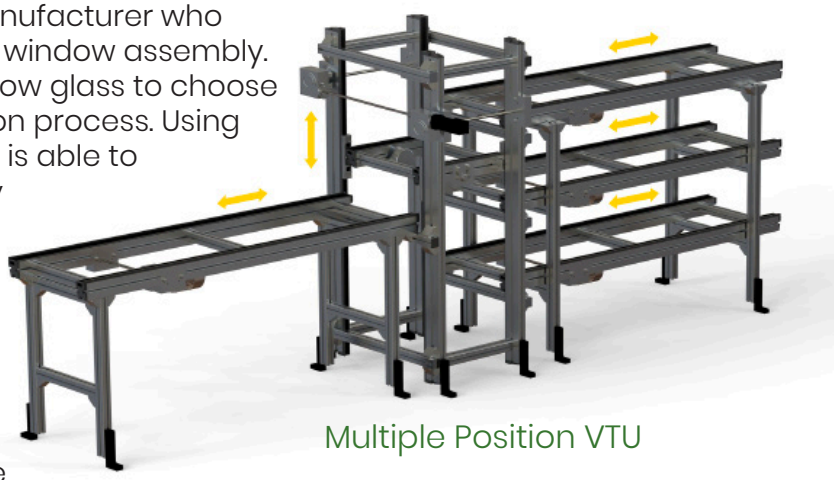
5. POSITIONING PRECISELY

When a conveyor elevator is controlled by a servo-driven motor instead of a pneumatic actuator, you're able to achieve multiple positions within the same elevator with precise motion control. The elevator can then be used to:

- feed other conveyor lines,
- fill a rack or stack application, or
- lift a pallet to multiple precise heights to complete an operation.

VTUs for Multiple Positions

Let's use an example of a window manufacturer who needs to cut glass to various sizes for window assembly. There are potentially ten sizes of window glass to choose from in the manufacturer's automation process. Using a servo-driven elevator, the conveyor is able to go to any of those ten positions easily to select and pull the correct window size for their frame for the assembly process down the line.



Multiple Position VTU

Multiple conveyor elevator positions are especially useful for a pallet handling system that conveys any products requiring a buffer or storage solution, including DVDs, soda, or products requiring a slow curing process such as paint drying or glue setting before starting the next step in the process. A lift is able to place these products in a storage setting for a set amount of time, and rotate them down when they're ready for the next step.

VTUs for Stacking and De-stacking

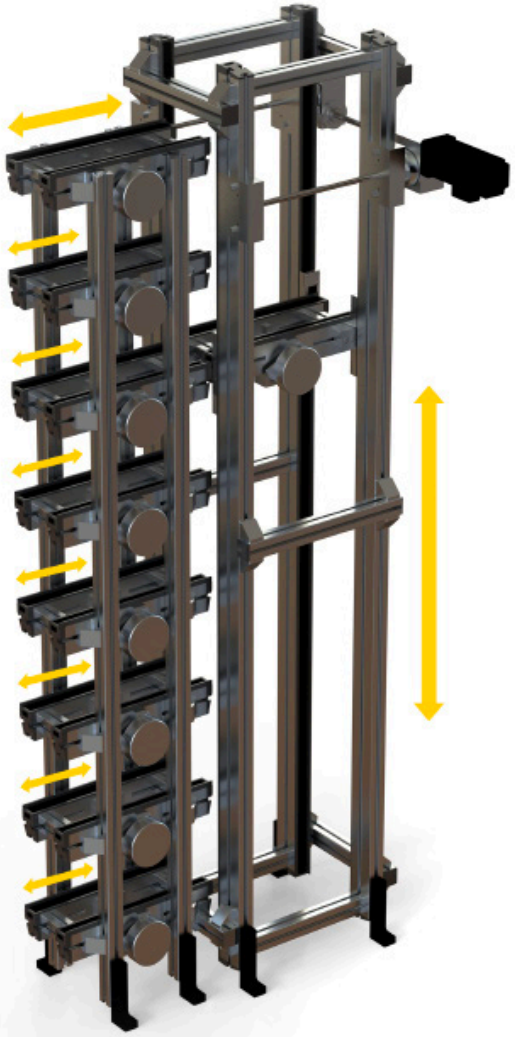
VTUs can also be used to stack conveyor trays or de-stack conveyor pallets automatically within your client's conveyor automation process. Whether stacking and de-stacking are needed at the beginning, middle, or end of the process, servo-driven VTUs are able to precisely position trays into a rack or remove them in the exact position specified.
Stacking pallets in a tall storage solution decreases the storage footprint within a process, allowing for more space to add additional lines or expand a facility's capacity.

Typically, clients are interested in increasing throughput or reducing overhead when this option is considered. Instead of a manual process requiring someone to risk climbing up and down to retrieve pallets to achieve higher throughput, automating this process using a VTU accomplishes this goal safely, efficiently, and with less risk of product damage.

Our clients typically add savings to their bottom line by automating this process using a VTU since it's efficient, predictable, and more precise than traditional methods. Since the VTU can run without stopping and doesn't require training to complete this repetitive motion, personnel are able to focus on more challenging responsibilities within the process.

Many of our integrators have also used VTUs for product accumulation or buffering. Delicate products can be damaged from back-pressure in horizontal accumulation zones; using a VTU to create a vertical buffer (typically in the form of a rack or stacking application) prevents product damage. Later in this book, we have additional examples of this use case. The precise positioning of a VTU, accomplished by Glide-Line's use of servo-driven motors, enables your conveyor to feed multiple storage locations to buffer a machine infeed or outfeed.

Whether you have delicate products requiring movement from one position on a line to another, or you simply need a basic automated pallet stacking solution to reduce overhead costs, a servo-driven VTU is a good potential solution.



Rack Feeder

6. REPLACING MULTIPLE DEVICES

Lifts can perform functions that would otherwise require another piece – or multiple pieces – of equipment within a conveyor system. Not only does this save the space that would have been taken up by ancillary equipment, it also makes the automated conveyor system more efficient to operate, assemble, and maintain.

A flexible conveyor manufacturer like Glide-Line can deliver any size lift that's needed, rather than you adjusting or compromising your detailed design to fit a standard size. You also don't need to add extra devices to support large products or control back-pressure for fragile products.

Using servo-driven VTUs creatively in your design, you're able to achieve precise positioning accuracy, reduced lead time, and an economical solution for your client's bottom line.

Dual Axis VTU

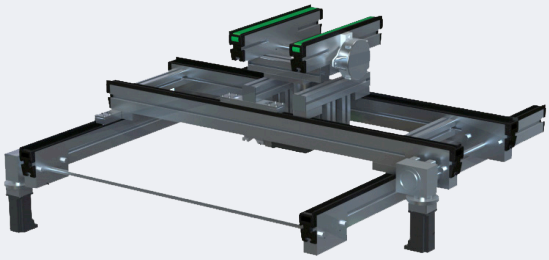
CHAPTER TWO

INTRODUCING GLIDE-LINE'S SUPERIOR VTUS

So, why aren't other conveyor manufacturers offering these types of solutions? Simply, they don't need to. Glide-Line, however, sees how customized options for innovative, electric-driven conveyors can help design engineers solve challenges while keeping costs in line with clients' budgets. We've made it our mission to fill this gap for integrators, and we've made sure we're the expert resource for creative conveyor solutions when we're needed. Here's what we mean.

How Our VTU is Superior to Alternatives

If, instead of a vertical transport unit, you're considering a linear actuator for large pallets and material handling, consider this scenario. Likely, you'd be looking at a self-contained high precision or high-capacity actuator. Purchasing one wouldn't accomplish what you need, since it's difficult to lift a heavy pallet from just one side. So you'd need to buy two or more (and/or lots of linear guiding), design and install them, and synchronize them, requiring a lot of engineering and experience. Typically, this is a costly endeavor, and the actuators themselves are overkill for what you need (which is precise elevation of your pallet). Typically in cases of pallet and material handling, your client just doesn't need the precision that an actuator offers - so why spend all this money for extra capabilities you don't actually need?



Glide-Line 360

The Glide-Line 360 concept, (which is what we use to build our VTUs) is, in fact, a linear actuator. It's nothing more than a traditional timing belt driven actuator – with the exception that it's tightly integrated with the conveyor. There are definite benefits to this: First, the service parts are identical to the rest of your conveyor. Second, you don't need to train your maintenance employees to fix conveyors from one company, elevators from another, and an actuator from a third. Finally, with Glide-Line, the parts are simple (and the results are impressive).

Standard Customizations

Dual Axis VTU

An elevator's weight and control capacity depends on how fast you need to move the product through your automated process and how fast it needs to be elevated. Much of the capacity comes down to servo sizing. In general, our conveyor elevators can accommodate higher weight capacities in less space because we're using four conveyors to do the lifting; many of our competitors use only a single pneumatic cylinder with a cantilevered load. We also know that servo-driven lifts give much more control within a conveyor elevator since they're able to slow gently, compared to a pneumatic lift that has only two stops and one speed can you say "slip-stick effect?").

Glide-Line's servo-driven VTUs also support the product in all four corners; pneumatic elevators cantilever the product instead, only supporting the pallet on one side. This also means we have no size restrictions for either product or elevator since we can adjust the entire shaft in one millimeter increments. Our elevators, like our conveyor, are built as standard custom sizes – meaning that customizations such as size and weight capacity are standard using our flexible building process, so you (and your client) aren't paying more to get exactly what you need.

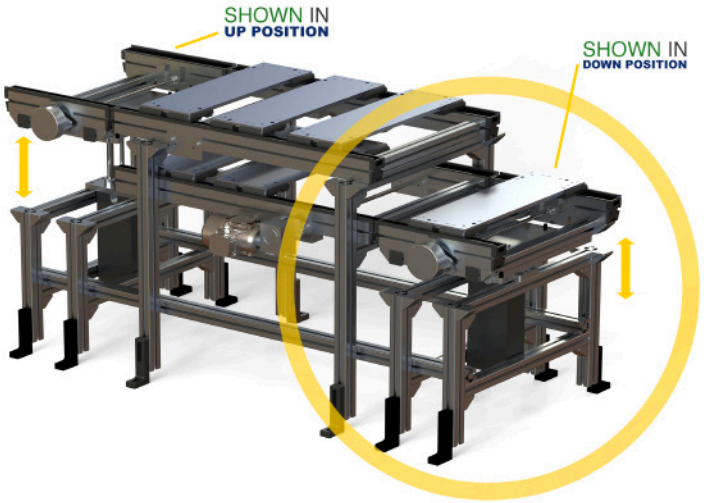
Lift Configuration Options from Glide-Line

Our competition will typically push you into one of three different sizing categories of conveyors since they don't want to accommodate customizations in size. We've actually build our entire manufacturing process around custom-built sizing, without charging more for it. It's simply a different manufacturing philosophy, and one that differentiates us.

A flexible conveyor manufacturer like Glide-Line can offer any size lift you need, rather than you adjusting or compromising your design to fit a standard size. Your clients' manufacturing spaces aren't standard – so why should your design options be?

Innovative Solutions Meeting Challenges for Integrators

In the engineering world, you normally expect conveyors to move things horizontally on a flat plane, and to lift devices you use an elevator. Typically, you wouldn't think to use conveyors to move anything vertically. Glide-Line 360 is essentially a vertical conveyor, built with conveyor parts and moving like a conveyor – but with the added ability to lift products to different heights. Applying conveyor actions to vertical behavior is a new way of thinking.

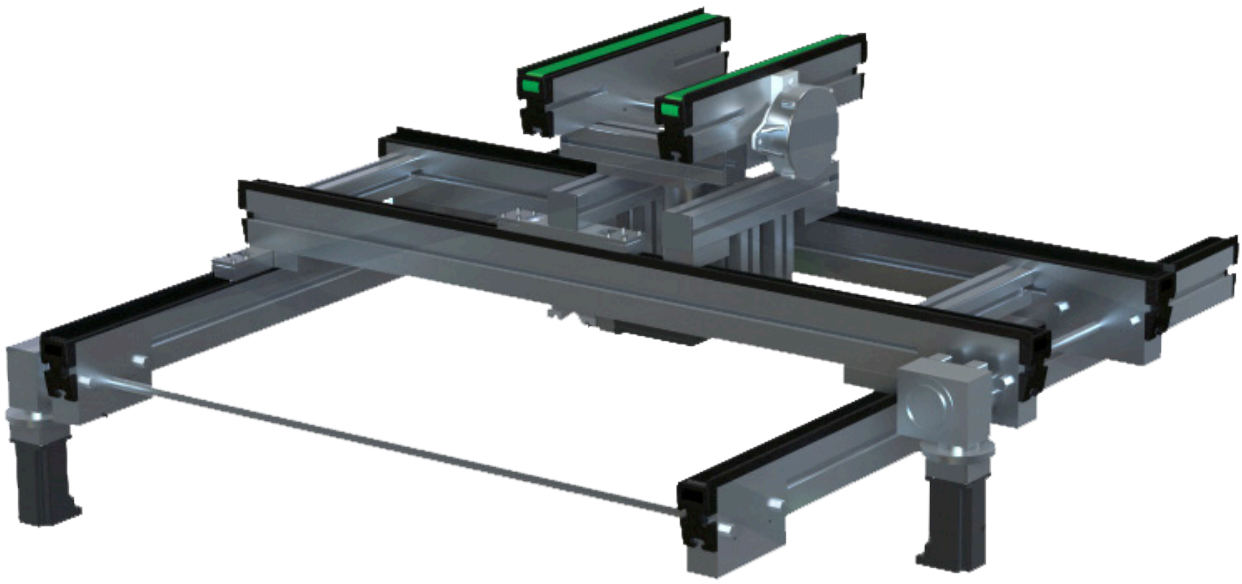


Low Cost Mini VTU

Decreasing floor space while also increasing throughput is a focus of our creative conveyor engineers. We are here to assist design engineers in applying unique conveyor solutions to meet those goals.

Our vertical conveyor VTU designs are electrically actuated, while many alternative conveyors are pneumatically-actuated cantilevered designs. Cantilevered designs are inherently a weaker design than one supported on all four sides, as Glide-Line's is. Electric-driven movement allows us to control the vertical motion for smooth acceleration and deceleration. It also gives us the ability to position the pallet precisely anywhere in the elevator with a smooth vertical motion. Faster, stronger, smoother, and more precise – exactly what our integrator clients are looking for.

Our focus in our manufacturing process is to reduce lead time for our conveyors. All our VTUs are made from conveyor components, which reduces lead time and keeps the price cost-effective. This is how we remain innovative: we have multi-use parts and we challenge ourselves to think beyond the traditional conveyor solutions to find new ways to meet challenges.



Glide-Line 360

CHAPTER THREE

WHERE TO START: INNOVATIVE VTUS & RECENT APPLICATIONS

In the engineering world, you normally think you move things horizontally on a flat plane, and you lift devices using an elevator. Typically, you wouldn't think to use conveyors to move anything vertically. It's a new way of thinking to apply conveyors to vertical behavior. These are some examples of different VTUs and recent ways our integrator clients have creatively implemented our conveyor applications.

Double Elevator

A double elevator is two lifts, or conveyor sections, contained within a single VTU footprint, which don't need to go up/down together. Instead, they can actuate independently. For example, it can move one product up while the lower unit remains as a pass through. The possibilities for this application are endless.

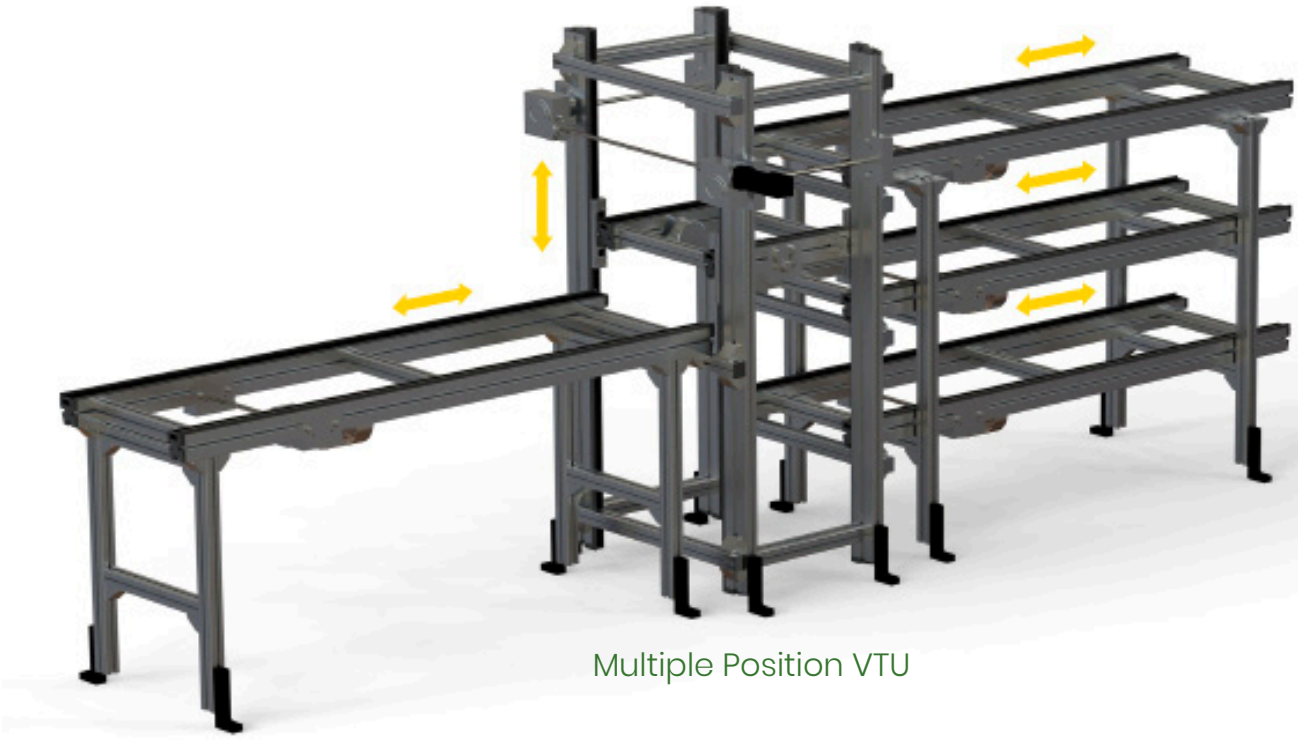
Dual Deck VTU

VTU INNOVATION IN ACTION

Double elevators are used by many of our integrators' clients for inspection and quality control. While a specific pallet, tray, or product is elevated to head level using the first lift, good product can continue to move through underneath. This prevents production from slowing down in the inspection phase.

Multiple Deck Lift

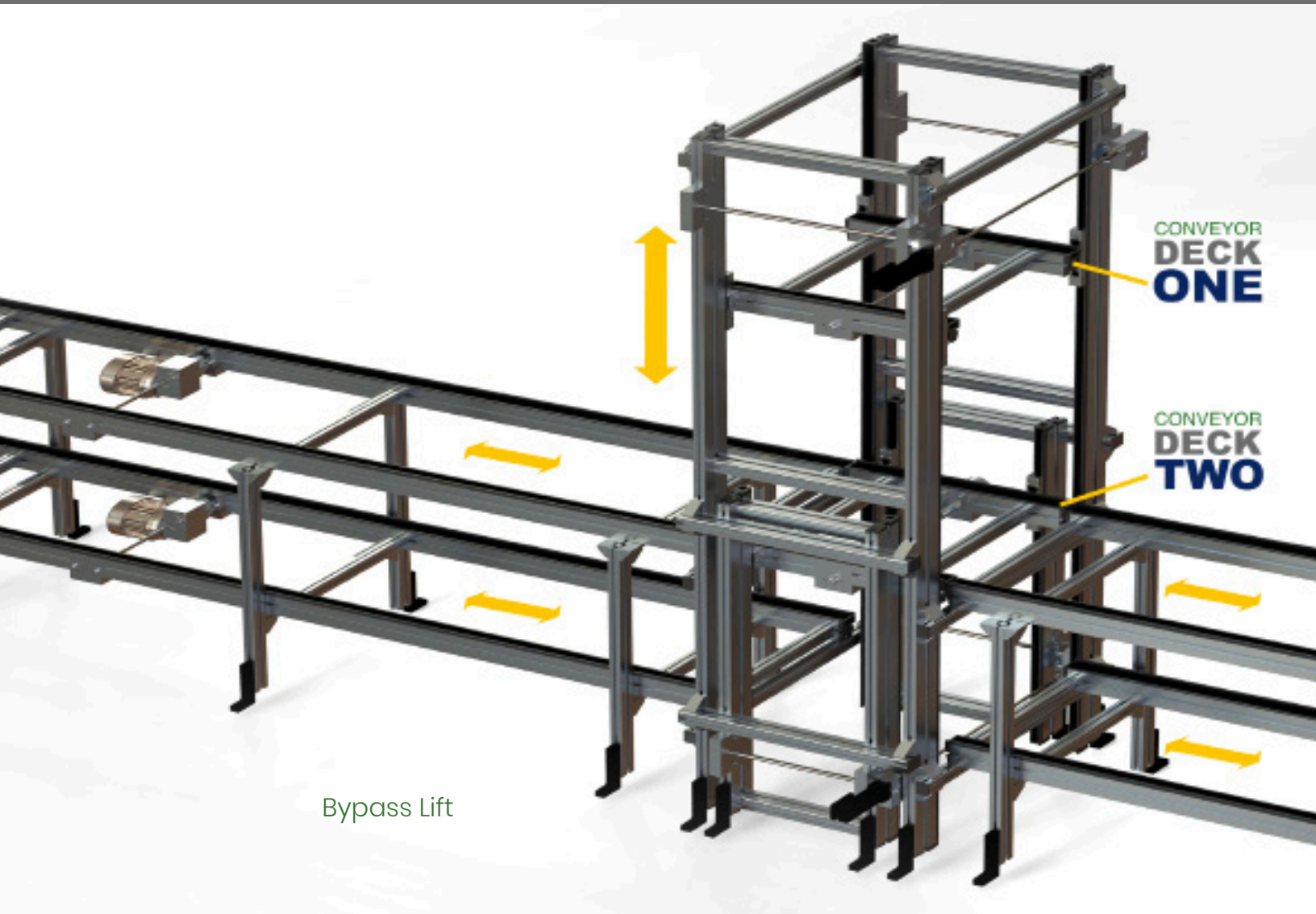
A multiple deck lift incorporates more than two lifts within one elevator footprint. It incorporates infeed from or discharge to two or more locations simultaneously. This is especially useful for processes requiring fast-paced throughput; we're able to increase the amount of product being shifted vertically by two, three, four or more times – as many elevators and additional lines as are needed.



Multiple Position VTU

VTU INNOVATION IN ACTION

Multiple deck lifts are used in situations where time savings and efficiency are of the utmost importance. For example, a recent window manufacturing client used a multiple deck lift with two conveyors inside. One went to the left, and one went to the right. Both lifted at the same time to push the windows onto two separate racking systems ten feet in the air. Another long vertical movement by conveyors moving in opposite directions transported the elevated windows to their destinations, all ten feet above the main line. This exact solution could have been modified to add more lifts to support more products, whether products needed to be added to a racking system for curing or screws needed to be installed to a mechanism.



Bypass Lift

Bypass Lift

A bypass lift is similar to a double elevator, with the main purpose being increased throughput and space savings. Traditionally, a parallel conveyor workstation is needed in a process automation system for an operation to be completed; using a bypass lift to vertically shift the operation to a level above the main line keeps the product flowing efficiently while not requiring additional width to be added to the conveyor system. We typically see the use of multiple bypass lifts within one conveyor to perform the operation on multiple pallets throughout the conveyor.

The following example describes how a multiple deck lift in conjunction with a bypass lift were used to combine steps in a process and save space while increasing throughput, delivering a more efficient automation process for the client.

VTU INNOVATION IN ACTION

Our integrator client was working with a large coffee manufacturer on an automated conveyor system solution for single-use brewing pods used for coffee, tea, and hot chocolate. Their process required six filling stations along one main line.

Traditionally, this would have required a line that was wide enough to accommodate six offline workstation " filling stations along the line. The line would have been at least three times as wide as the main line to make room for the added conveyor, the filling station equipment, and the product used to fill the pods. This was simply not workable in the manufacturer's space.

The solution? A multi-tasking approach with a Glide-Line vertical transport unit using a multiple deck lift. Our engineers worked with the integrator's design engineer to create an automation system combining multiple functions of a traditional system into one single, skinny, tall line – and accomplished the same task with more efficiency. We added multiple VTUs within the system to lift empty trays at multiple points to filling stations above the main line. While

an empty tray was rising to be filled, fifteen other empty trays were able move underneath to another elevator to be lifted up farther down the line.

This process produced high throughput using all vertical filling stations along one massive line that housed six decks – essentially, six lines – and eliminating the need for bypass solutions to accomplish this.

At the end of this automation process, an additional VTU was used to stack the filled trays in a rack. The creative use of vertical transport units improved efficiency and saved space, turning what would have been a very complex process into a smooth, easy, and deceptively simple process.

Pass Through VTU

Pass Through VTU

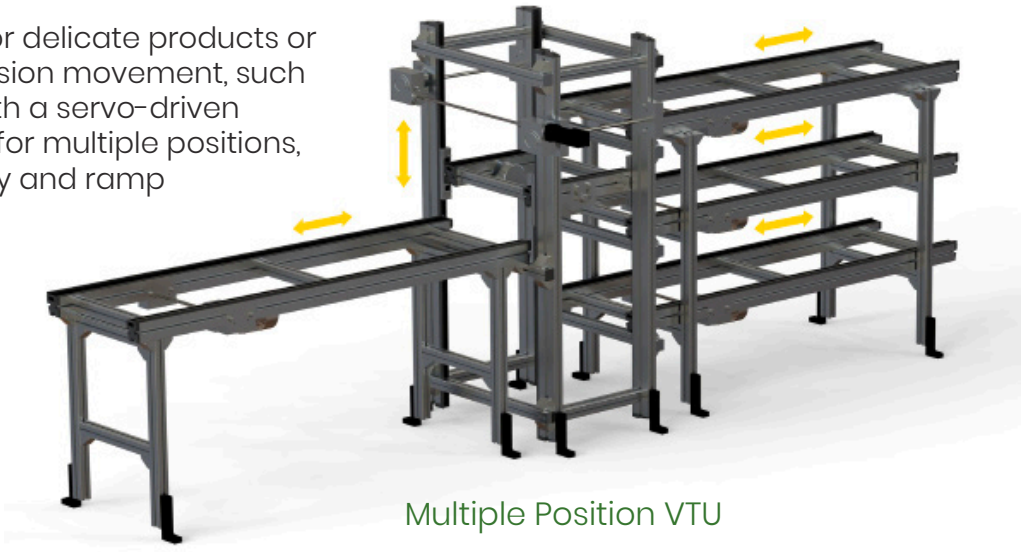
A pass through VTU, similar to a bypass, lifts product up and out of the way of the main line, allowing for downstream product to bypass and get ahead. Work is then completed on the lifted product while it is raised above the main trunk line.

When multiple people need to complete the same process, picture two workstations directly next to each other when utilizing a pass through VTU. A lift elevates a pallet from the main line to the first workstation at working height, while the conveyor continues and brings a second pallet to the another workstation on the main line and lifts it to working height as well. Two can perform the same function simultaneously next to each other without causing a gap in the line.

Multiple Positions in a Servo-driven Conveyor

A servo-driven conveyor can be programmed to stop at multiple positions, customizable to the millimeter, throughout a lift. This innovative use of servo-powered motors allows for multiple stops along a conveyor and in an elevator, instead of just two stops, which is traditional. Most other elevators are pneumatic-driven using a cylinder; it's difficult (if not impossible) to have multiple positions. With a servo-driven system, the motor has a built in position encoder, so it knows how to get back to that exact spot and can stop within an elevator as many times as needed, in any increment needed.

This is especially good for delicate products or products requiring precision movement, such as for moving liquids. With a servo-driven conveyor programmed for multiple positions, you're able to start slowly and ramp up the speed, then slow down slowly without launching the product (thanks, Newton's First Law of Motion).



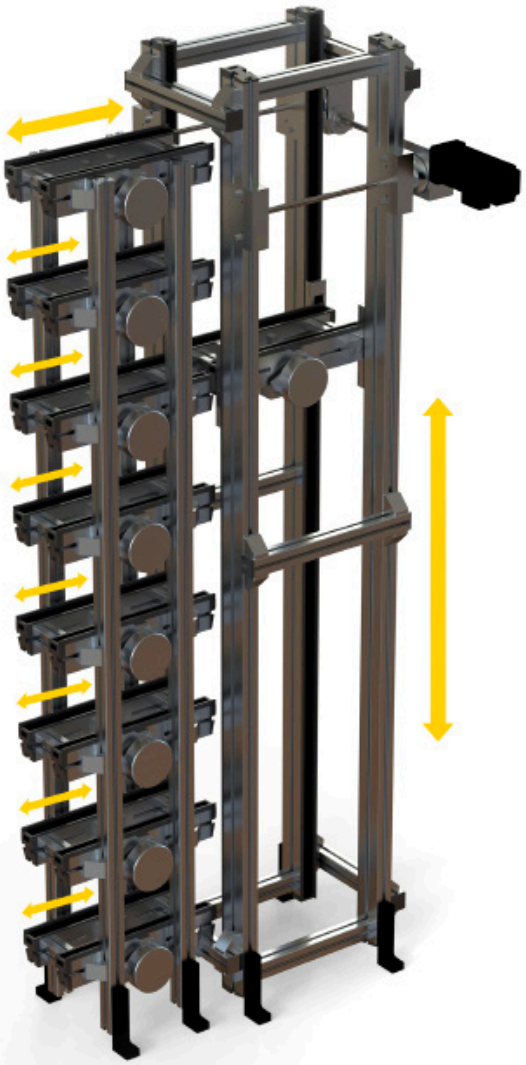
Multiple Position VTU

VTU INNOVATION IN ACTION

One customer embraced the “build up rather than out” philosophy and we helped them create multi-level storage systems for product totes. They’re using an inventive version of the Glide-Line 360 to load and unload products into a large, multi-level cell-beam system using multiple positions in servo-driven conveyors able to stop at any location.

Rack Feeder

A variation on the multiple deck lift application, a rack feeder serves a specific purpose: storing product vertically until it’s ready to be used. With this application, we’re using multiple lifts within a single VTU footprint. Then, we unload the product, at the same time, from the lifts onto elevated conveyors moving in opposite directions. These conveyors feed the storage rack with the product trays or pallets. The rack feeder can also be reversed to retrieve the products when needed.



Rack Feeder

VTU INNOVATION IN ACTION

Our client manufactures large windows. They wanted to take twenty windows at a time and store them vertically. We set up the lift to run at ten levels within the same lift, but with two pallet widths encompassed in the same VTU footprint (a double elevator). The VTU had ten stopping points, and at each point, two windows are unloaded to separate conveyors going in opposite directions. At the end of each conveyor is the storage unit; each one houses ten windows.

Stacker/De-stacker

This is another multiple deck lift example. Similar to the rack feeder, multiple lifts are employed within one VTU and then the product is fed to an adjacent conveyor by stopping at multiple positions within the VTU. However, in this case, a stack of pallets is formed instead of adding them to a storage rack. The goal may be to stack products such as packaging products, or simply stack them for a defined time period to cure until they're ready for de-stacking. Our ability to build this is unique.

VTU INNOVATION IN ACTION

Our integrator client was able to prevent damage to delicate products for their silk screening client using a VTU and a vertical portable stacking system for buffering. Because our VTUs are servo-driven, precision rack loading can be achieved easily. Using small movements, we stored the delicate product to allow for accumulations before the next process took place, which was slower. The buffer then fed multiple other, slower processes in various lines from the rack.

CONCLUSION

It's clear that an elevator can do more than simply move product from one conveyor to another, or lift a product from point A to point B. We've expanded the definition of a VTU and found it can:

- Save you space
- Create improved access for robots or employees
- Rotate a product for the next station
- Increase throughput
- Eliminate the need for other devices

At Glide-Line, VTUs are multi-purpose solutions used to creatively solve challenges other manufacturers have failed to solve. VTUs can be more than a simple application to move products vertically, just as conveyors can be more than a single-function piece of equipment to move products horizontally. Combining them has allowed us to apply creativity to challenges design engineers are asked to solve every day.

Learn more at Glide-Line.com.

Dual Axis VTU

ABOUT

GLIDE-LINE

Glide-Line solves problems other conveyor systems manufacturers won't. We developed Glide-Line from the ground up with a few key, driving factors in mind. First, our conveyors had to be robust and reliable. Second, they would be simple – easy to maintain and service. Finally, we insisted on flexible configurability, creating an efficient, hassle-free customer experience. We've built the most versatile multi-strand panel and pallet-handling solution available for the assembly automation industry.

Glide-Line aims to be dependable from all directions. We want our customers back. We'd like them to call us in a pinch because they know they'll be getting a comprehensive solution after a collaborative, thought-provoking conversation with industry experts who think outside the box. If you have a challenge, throw it our way and we'll do whatever we can to make it happen.

THE AUTHOR: CRAIG NEWBERRY

Craig Newberry is a Product Specialist for Glide-Line. His past involvement in a variety of competitive sports along with current passion for obstacle course races spills over into his desire to drive business forward. Concurring challenges motivate him on daily basis, while his family fuels his desire to succeed in life. Although a bit of an adrenaline junky, he also tries to live by a brilliant statement made by Ferris Bueller "life moves pretty fast, if you don't stop and look around once in a while, you may miss it."