

# The Advantages of Robotic Palletizers Compared To Conventional Layer Palletizers

By ESS Technologies, Inc. Blacksburg, VA



Robotic Pallet Cell with Integrated Pallet Flow-Through Conveyor

## Introduction

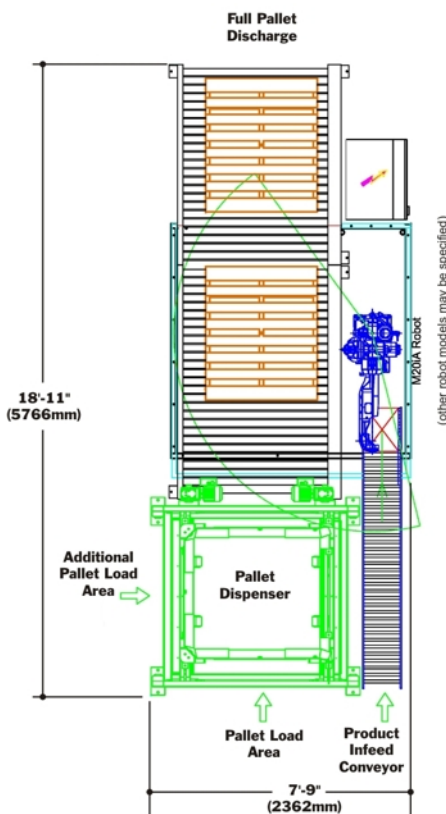
Palletizing has evolved since the days when manual stacking presented the only solution. Today low infeed and high infeed layer palletizers can be specified to automate the process, reducing back injuries and increasing speed and efficiency. Since the 1990's robotic palletizers have begun to replace traditional layer palletizers as the cost of robotics technology has decreased substantially. At the same time, retailers looking to streamline operations and reduce inventory have increased their demands for custom-mixed pallet loads, creating a need for a flexible palletizing solution.

Both layer palletizers and robotic palletizers find wide use in end-of-line packaging applications. The initial equipment cost for a single conventional vs. robotic palletizer can be comparable for the most basic system, and the system footprint is similar, although robotic palletizers typically require less floor space. However, as retailer demands for multi-SKU pallet loads increase and manufacturers continue to think in terms of sustainable packaging and “lean-and-clean” processes and facilities, the advantages of robotic palletizers make them ideal for most palletizing applications.

## The Problem with Layer Palletizers

Conventional palletizing systems typically use a layering technique that forms the pack pattern of cases (or bags, or bundles), squeezes them into shape and deposits them one layer at a time onto the pallet. Low infeed palletizers receive cases at an infeed conveyor near pallet level and stack from the bottom up. A moving rack next to the pallet accumulates the cases into a pack pattern and moves them one layer at a time onto the pallet. High infeed palletizers receive cases from a conveyor located above the pallet, accumulate the cases on a tray above the pallet, and lower each layer into place. This solution works well in applications where a single product is palletized at a fairly high speed. However, it fails to address retailer demands for mixed pallet loads.

In a traditional retail scenario, full pallets of a single type of product leave the manufacturer and arrive at the retailer's distribution center, where, according to the needs of individual stores, personnel break down the single-load pallets and custom-mix new pallets. To increase efficiency, more retailers now require manufacturers to ship custom-mixed pallets directly from the manufacturing plant. While layer palletizers can produce “rainbow” pallet loads that place a different product on each layer — one full



Layout of Robotic Pallet Cell with Integrated Pallet Flow-Through Conveyor

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Optional Deck Sheet Dispenser



Robotic Palletizers Can Reduce Conveyor Costs and Floor Space



Innovative Packaging Solutions

layer per product — they cannot address mixed pallets that require different products to be placed on the same layer.

Conventional palletizers also tend to have more difficulty handling new lighter weight packaging materials, which leads to increased downtime for the system as well as an increased risk of damage to the product. In addition, they typically rely on some sort of “sweeper” mechanism that assumes the product slides nicely. This might not be true of some of the more recent “sustainable” package designs where, for example, a traditional corrugated case is replaced by a minimalist corrugated tray that is either shrink- or stretch-wrapped. The wrapping can grip, causing the case to not slide easily. Lighter weight packaging for sustainability reasons results in a more fragile package that can be damaged by conventional means. Robots can easily handle these package types with proper end-of-arm tool (EOAT) design. Conventional palletizers contribute a second source of potential damage: The squeezing action that forms the pallet pattern can damage the cases, leading to uneven and unstable pallet loads.

Non-robotic solutions also do not easily adapt to multi-SKU packaging lines, which increases the time needed for product changeover and the amount of floor space required for palletizing multiple packaging lines. Changeover is either complicated or not possible, especially in hard automation systems where the product handling tool has been designed for one product size, one palletizing speed, and one packaging line. Conventional palletizers also require a significant amount of case accumulation of a layer up to a full load. This increases system cost and required floor space in order to accommodate the conveyors needed for the case accumulation.

### ***The Reason for Robots***

A number of compelling reasons exist that make robotic palletizing solutions the ideal equipment for a wide variety of packaging scenarios. These reasons include reliability, flexibility and increased productivity with a small equipment footprint.

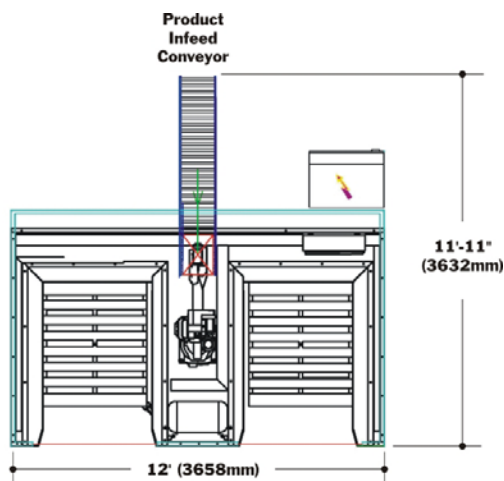
To begin with, robotic palletizers, such as ESS Technologies, Inc. Mini Robotic Palletizer Cell, can handle a case accumulation of a single case at a time if necessary, eliminating the need for extra conveyors. It also offers a more streamlined overall design compared to conventional layer palletizers. This results in fewer failure points for the equipment. In a conventional system, each sensor, cable, tube, bearing, seal, bracket, etc., represents a

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Dual Robotic Mini Palletizer Cell In A One-In, Two-Out Configuration



Footprint for Dual Pallet Cell

component that could fail in the field, increasing downtime and maintenance costs. Compared to conventional systems, a 6-axis robot, such as the FANUC Model M-20iA has at least 80% fewer failure points. This allows a robotic solution to provide a very high mean time between failures (MTBF); for example, the Model M-20iA has an MTBF of 80,000 hours!

Overall reliability is further increased by a vision system integrated with the robot, which enables it to pick randomly placed cases and stack them precisely according to a pre-programmed pallet pattern. This allows a robotic system to better handle packaging flaws such as irregular case forming or bulging. It also reduces the need for a precise pattern to be established as cases are accumulated. The robot can place the case in the exact pallet position regardless of its orientation at the infeed.

Increasingly, manufacturers and contract packagers look for flexibility in the equipment they specify for their packaging lines. The impetus for this is two-fold. First, manufactures are looking to do more with less — more productivity and more uptime, with fewer personnel, less floor space and less capital equipment. Robotic palletizers offer a higher rate of speed than most traditional palletizers, and fewer personnel are required to operate the equipment. A carefully designed robotic system will also greatly reduce the amount of floor space required for the system, especially in multi-SKU lines where conveyors require a substantial portion of the needed floor space.

Second, as previously mentioned, retailers who are in the process of streamlining their own operations have started to require manufactures to deliver mixed pallets — pallet loads that consist of multiple products. Robots handle changes in package size and weight more efficiently, and robotic EOAT can be designed to handle multiple product types. Even EOAT dedicated to a single product can increase flexibility as changeovers require no tools and can be accomplished in under two minutes. Additionally, robotic controllers allow multiple pallet patterns to be stored, making the switch from one product to another a simple “one-button” process.

Flexibility makes robotic palletizers ideal for custom-mixed pallet loads. Infeed conveyors from multiple packaging lines can source a single palletizing cell, allowing the system to pick only the items it needs from each infeed to complete the mixed pallet load. Another advantage of robotics is the ability to control the orientation of individual items in the load. This can be critical for club-store

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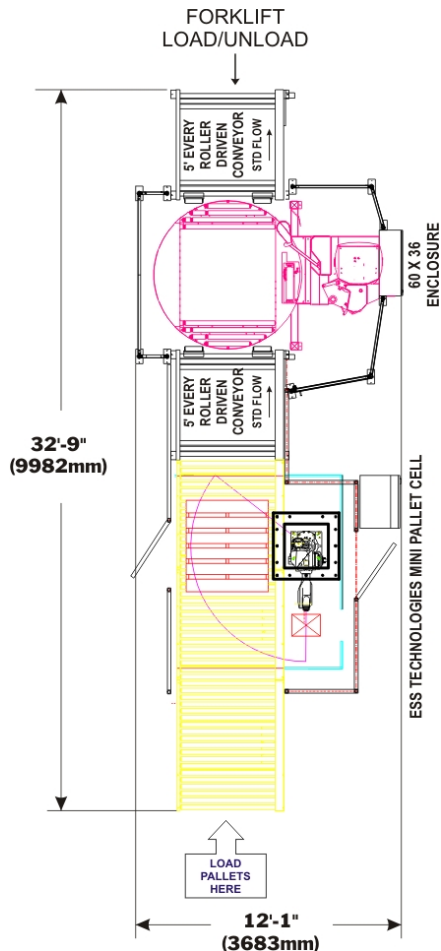
display pallets (pallet as the retail “shelf”), helps logistics where consistently outward-facing barcodes or labels are convenient, and may eventually assist with developing “track and trace” requirements, especially in the pharmaceutical industry.

Perhaps the greatest example of a robot’s flexibility occurs when companies discontinue one product and introduce another. Because layer palletizers are designed with hard automation components, they typically only handle one product size or configuration. In order to take on a new product line, it may be necessary to replace some or all product handling components, which carries a high expense in both time and money. In addition, layer palletizers are designed according to the height of the infeed conveyor that supplies the cell. In situations where the product height necessitates a change in conveyor height, layer palletizers would essentially need a complete makeover to handle the new product.

By contrast, robotic palletizers can be reconfigured for new applications by changing only the EOAT and the programming. The programming also allows for the re-configuration of the infeed and discharge conveyors without a major equipment overhaul. In fact, multi-axis robots are so flexible in packaging scenarios, that the system, with some adjustment to EOAT and programming, can be used in completely different packaging processes. For example, a robot being used in a palletizer cell can be retooled for use in a robotic case packing application or as a high speed infeed for other machines, such as blister packaging machines or automatic cartoners. The usable life of a robotic system is usually much longer than that of traditional hard-automation systems.

### Conclusion

Robotic palletizers offer a more flexible and reliable solution for palletizing products from single or multiple packaging lines. System options such as automatic pallet dispensers, tier and deck sheet dispensers, automatic full-pallet removal and integrated stretch wrapping equipment allow manufacturers to configure the exact system needed to meet in-house production and maintenance goals as well as retailer demands for custom-mixed pallets. The low maintenance costs and ease of operation give robotic palletizers a very fast return on investment (ROI), and their flexibility and high reliability make them useful for many years as they tackle the packaging challenges that non-robotic systems cannot address.



Pallet Cell with Integrated Stretch Wrapper Begins to Load an Empty Pallet as the Full Pallet is Being Stretch Wrapped

