

Conventional vs. Robotic Palletizing

(Is Conventional Palletizing Dead?)

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Conventional automatic palletizers have been available since the 1950's. In the 1990's, gantry and then jointed-arm robots made significant inroads in palletizing, leading many to conclude that the conventional palletizer's days were numbered. Rather than getting immersed in ambiguous statistics and marketing buzz words like "flexible" or "fixed automation," this paper will look at the specific applications that favor each technology to determine if the future of palletizing is exclusively robotic.



Applications that Favor Robotics

Articulated-arm robotic palletizers have a "wow" factor, but may be a legitimate solution for high-SKU, lower-speed operations as well as applications where the product shape demands the precision of a robotic arm, such as bags and pails.

Low-Speed Multi-Lines – In order to handle more than one product at a time, a conventional palletizer needs to accumulate layers or loads of like product on an upstream conveying system, then feed them into a palletizer that automatically changes patterns. A palletizing robot can potentially simplify multi-line palletizing by eliminating the upstream conveyor system. Several loads can be built inside the robot work envelope, allowing the arm to work on all of the loads at the same time while storing the partial loads in cubic form at floor level. This is a very effective concept for lower-speed lines, generally under 15 cases per minute, per line.

Bag Palletizing – Jointed-arm robots dominate the bag palletizing business. Clam shell tooling allows the robot to pick the bag from a roller conveyor and place it on the load without disturbing the contents of the bag, resulting in a straight and square load. Furthermore, the bag being dropped into place allows the robot to achieve higher rates than case palletizing – frequently above 20 cycles per minute. Robots have the ability to work in confined spaces and dusty environments, adding to their appeal in the bag palletizing business.

Pail Palletizing – Most pails are constructed so that the bottom of the pail nests inside the lid of the pail below when stacked on a pallet. Robots can precisely place the pails so that each layer nests inside the previous layer, making pail palletizing an ideal robotic application.

Display Loads – Display loads frequently require four-way, labels-out orienting, multiple different sheets within a single load, special dunnage, etc. These requirements can be addressed with a conventional palletizer, but the cost may increase to the point where robotics is a more practical solution.



Applications that Favor Conventional Palletizing

Conventional automatic palletizers are capable of very high speeds, which is why they continue to be routinely specified for high-speed manufacturing lines found in the food, beverage and consumer goods industries. Surprisingly, they can also be more flexible than robots in regards to product packaging and stacking patterns.

High-Speed – 200 cases per minute and 20 layers per minute are possible on inline, continuous-motion palletizers. Robots are intermittent motion machines, and it would take many of them working together to achieve these speeds. For high-speed manufacturing operations, there is simply no other alternative that can get the job done.

Reduced Product Packaging – Robots pick and place the product, while conventional palletizers convey the product into position. Because they never have to pick up the product, conventional palletizers are more tolerant of packaging changes. Cases, trays, film bundles, poly sacks, etc., can all be handled on the same conventional palletizer.

Complex Pattern Forming – Conventional palletizers handle each case individually, and therefore pattern changes have a relatively small impact on rate. In order to get reasonable throughput from a limited cycle rate, robots are generally handling multiple cases at a time. If case sizes or stacking patterns change, dramatic rate reductions can result. For example, changing from a nine-block, column-stacked pattern to a nine-block pinwheel pattern will frequently result in a 50 percent rate reduction on a robotic system.



Conventional and Robotic Hybrids

These palletizers combine articulated-arm robots with conventional palletizers, yielding a solution that provides the flexibility and repeatability of robotic arms with the speed and reliability of the conventional palletizer.

Conventional Pattern Forming with Robotic Layer Deposit – The first common hybrid solution used the forming section of a conventional palletizer to form the layer and a large robot to deposit the layer. This solution offered few advantages since the robot was a complex and slow device in comparison to the conventional palletizer.

Robotic Pattern Forming with Conventional Layer Deposit – This concept seems to combine the best of both technologies for higher-rate applications. Robots are used to precisely turn and position the cases, while conventional technology is used to square and deposit the layers. Because the robot does not have to lift the product, it can operate at more than 40 cycles per minute on a wide range of package types. Because cases do not have to be positioned in fixed-lane locations, pattern flexibility is improved and new pattern creation is simplified. The cost for this concept is still higher than conventional high-speed palletizers, but the added expense can be justified in some applications.

Conclusions

1. Conventional palletizers will continue to provide a high-speed palletizing solution for years to come. Robots cannot duplicate the continuous motion operation of high-speed palletizers or the flexibility of the palletizer when handling complex patterns and multiple package types. Additionally, the palletizer's low cost and flexibility will ensure their ongoing popularity.
2. Robots already dominate low-speed, multi-line and bag palletizing applications. Other applications that benefit from robotic precision, and the robot's high-tech image, will ensure their continued growth.
3. Hybrid applications, using the robot as a component of a machine, will experience dramatic growth. Currently, robots are seen manipulating cases inside conventional palletizers. As mass production lowers robot costs, more applications, like tier sheet inserting, will be performed robotically.

In short, no single technology will dominate palletizing for the foreseeable future.

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