

A CISCO-EAGLE WHITE PAPER

# END OF LINE ROBOTIC PALLETIZING APPLICATIONS: A MATTER OF WHEN



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# AT THE END OF LINE, WE PACKAGE, WE PALLETIZE, WE WRAP, WE INSPECT, WE SHIP. WE MUST ALSO ADD VALUE.

The end of a manufacturing or distribution line is where “the rubber meets the road”.

It’s frequently the last place you have direct control of your product before it ships to retail or distribution channels or direct customers.

The end of the line is where you can add—or spoil—lots of value

The end of the line is more important to your company’s image than any of its public relations efforts, websites, slick brochures and other efforts to create a positive customer image. Your image with paying customers is created in great measure at the end of the line.

You have to win at the end of the line

When budgets are tight, qualified workers hard to find, and production demands push the limits of your existing operation, you must find a way to optimize performance levels for every dollar spent.

Robotic palletizing is an excellent way to increase performance without hiring more personnel, taking on more labor liability, or expending money on training only to see your new worker go out the door to another job months later. With robotic palletizing, you free up personnel for more customer centered jobs, while the robot consistently delivers well-stacked pallet loads at exceptional speeds.



## EFFICIENCY AND ACCURACY - MORE THAN VALUE ADDING

Automated processes allow greater quantities to be processed more quickly than could be done before. Machines work tirelessly, with repeatable accuracy and amazing efficiency.

When you add automated palletizing, you step up the level of effectiveness and precision in those operations. Robotics and automated equipment perform the exact same actions time and time again – without lunch breaks, vacation days or exhaustion. Where manual labor begins to break down from fatigue and monotony, automation continues to perform at a consistent rate.

This level of productivity increase becomes more than a value added proposition – it makes a real difference on the bottom line – profits. Fewer broken bags, bundles, and stacks, and more stable pallet loads from accurate positioning mean that you have more product going out the. Costly product losses are cut dramatically in warehouse storage, on the shipping docks, and in transit.

While initial investment is significant, fewer human touches mean labor costs are reduced. Production levels increase without hiring more labor, hastening return on investment.

## ROBOTIC PALLETIZING — AN AUTOMATION POINT THAT EXCELS

There are particular points in each production, warehouse, or distribution facility where automation is ideal. Robotic systems makes palletizing more productive, reduces the cost of handling, reduces error rates, and increases throughput. It's becoming increasingly affordable, so that operations of smaller scale are utilizing this technology to compete with larger operations.

Loading and unloading of parts, boxes, bags, containers and other items to or from pallets is an activity where automation increasingly makes sense. It's an activity where the presence of a person adds no particular value; it's often an ergonomic nightmare.

## Conventional Palletizers

Conventional automated palletizers arrange product into specific patterns as it is received from the conveyor.

As each layer is arranged, it is placed on the pallet until the specified number of layers has been reached. It then either sends the palletized load down a second conveyor, or a forklift picks up the load and it is stretch wrapped and shipped.

Conventional palletizers generally fit into either low speed or high speed palletizing groups. Low speed palletizers handle 1-10 cases per minute. High speed palletizers stack over 150 cases per minute. In-feed levels can be at floor height, a fixed 3' height, or at a fixed 10' height. If high speed palletizing is your requirement, then a conventional palletizer is the solution.

## Robotic Palletizers

Robotic palletizers pick goods from the conveyor and place them precisely on a pallet in specific patterns to stabilize the load as it is stacked. Robotic palletizers are slightly slower than high speed conventional palletizers but offer incredible pattern flexibility. These patterns are often complex and change from layer to layer in order to create the most efficient pallet load possible.

Robotic palletizers fall into four basic types: Cartesian, SCARA, or articulated arm. The most popular robotic system for palletizing is the articulated arm because of its flexibility and reprogrammable logic.

There are also hybrid automated combinations that utilize both conventional and robotic processes for the most accuracy and efficiency in palletizing.

Benefits: The primary benefit to automated palletizing is the precision with which materials are placed on the pallet, creating a tightly fitting



stack with limited shift during shipping. Additional benefits include increased throughput and reduced labor costs compared to manual palletizing. Damage reduction during shipment due to the quality of the palletized load also brings a cost savings while the small foot print such equipment requires opens up floor space for other operations.

## KEY FACTORS IN PALLETIZING SYSTEM SELECTION

- **Production throughput** – the speed at which product enters the palletizing area and rate at which the palletizer must stack product loads. Low speed palletizers stack 1-10 cases a minute, while high speed palletizers can stack up to about 150 cases a minute.

- **Available space** – the space required for a conventional automated palletizing system is approximately the same as in manual operations because of the machinery needed to assemble the stacked pallet. Robotic palletizers take up significantly less space because they palletize on the fly, often handling multiple conveyor in-feed and out-feed lines at a time.
- **Traffic patterns** – how materials flow through your facility may be impacted if you don't take traffic flow into consideration as you plan the automation. The out-feed from the new equipment may require a change to traffic flow through an area or new fork truck lanes.
- **Distance from packaging to palletizing area** – how will you get packaged materials from packaging to palletizer? What will best optimize the addition of the new automation equipment? Will you add conveyor instead of using fork trucks to deliver goods to the palletizer?
- **Type of secondary packaging to be done** – will there be additional packaging done, such as case packing, before goods arrive at the automation point? Will you want to automate that process as well? Have you considered that both these processes can be automated?
- **SKU change-over frequency in each production line** – the frequency with which you change sku's (and corresponding packing and palletizing) will impact which automation methods you choose. Robots with vision quickly adapt to such changes and are able to detect sku changes on the fly. Automation machinery will take re-configuring of the programming and sometimes the very components involved.
- **Finished load stability** – the secure placement of materials leads to finished load stability. When an automated system is doing the palletizing, load stability is greatly improved because of the precise placement and consistent handling of the materials involved. The repetitive motions required to palletize materials exactly the same way every time are not humanly possible.
- **Whether pallet, slip sheet or unitized load palletizing** – these choices determine what automation components and robotic end effectors are needed in the palletizing process. Considerations to keep in mind include shipping plans and the number of different sku's in a pallet load planned.
- **Stretch wrap requirements** – stretch wrapping assures your precisely loaded pallet stays in that way by securing the load in position. Consider how you want the palletized load to be delivered to the wrapping process – conveyor or fork truck? Can you move the wrapping process closer to the palletizing process? What about automating both processes so that the palletizer hands off to the wrapper?
- **Wash down requirements** – if your facility has stringent hygienic standards, you will need to inform your integrator of this fact. Not all automated and robotic equipment is up to the rigors of wash-down environments. Will you need to locate your palletizing process outside the wash-down area?
- **How many different products and patterns** – the number of different products you palletize and the patterns in which they best produce stable loads greatly influences the equipment you will ultimately select. If you are planning on adding products or going to mixed load unitized palletizing, you will want to build in those options now in order avoid making your system obsolete in a few years. Looking several years down the road can not only save you considerable cost in the long run, but also allow you to more quickly re-configure your operations when the time comes to do so.
- **Whether there is AS/RS interface** – if you have an AS/RS system, or are planning the addition of an AS/RS system in the future, ask your integrator about what it will take to make the two systems work together. Will you need product delivery to a conveyor which brings goods to the palletizing area?

When you have determined these factors, you are better able to work with your systems integrator to get the best match for your needs.

## END-OF-ARM TOOLING:

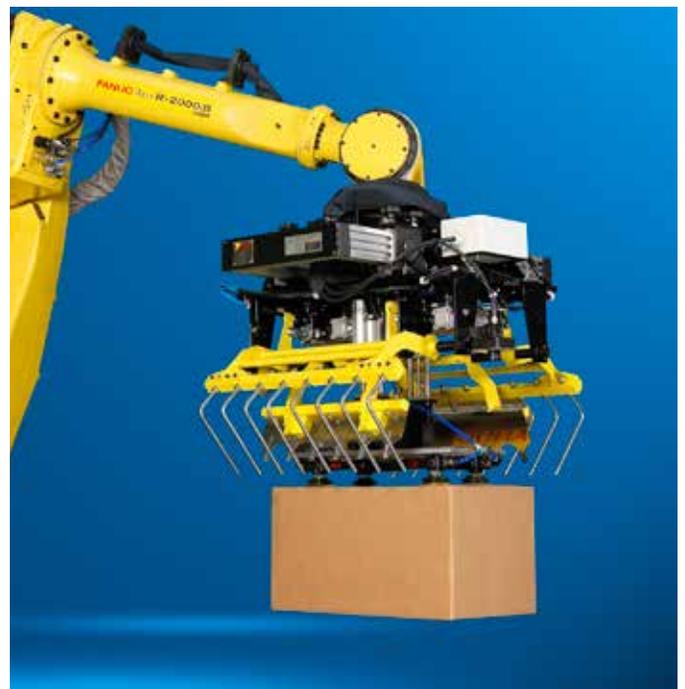
- **Bag Grippers** – are mechanical clamp grippers. These end-effectors have angled arms that fit between conveyor rollers to align the bagged product, reach under it, and lift it without damaging the bag.
- **Vacuum Grippers** – using vacuum pressure,



these end-effectors attach to the product and then lift it up. Objects being gripped must have a planar surface in order to assure accurate placement. A vacuum system is required as part of the robotic automation. These grippers require less grasp analysis than many other grippers. Very good for small, lightweight objects.

- **Magnetic Grippers** – magnetic manipulation is a good choice for heavy or irregular metal objects. There are two types of magnetic grippers: electromagnetic and permanent magnets. Electromagnetic grippers require electrical power to actuate the magnetic force that “grips” an object. Permanent magnet grippers operate without external power but require a secondary

action to “push” the gripped object off the magnet. Benefits of magnetic grippers are that the gripping action takes place very quickly, the gripper requires only one gripping surface, and that gripped objects don’t have to have a planar surface in order to get a solid hold, unlike suction grippers.

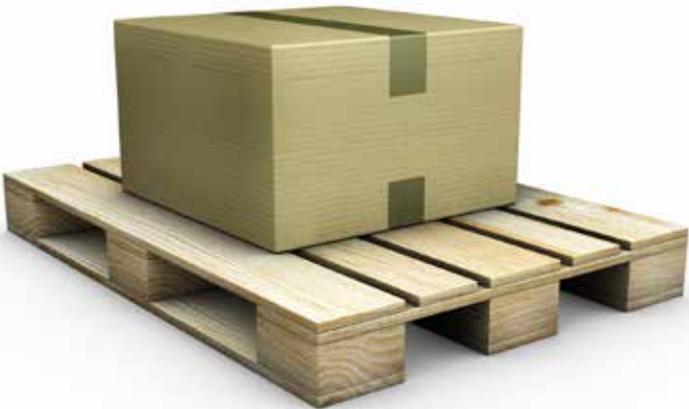


# CONCLUSION: THE END OF THE LINE IS THE IDEAL PLACE FOR AUTOMATION

## THE RELATIVE COST OF AUTOMATION IS FALLING

With costs rising for land, labor, and space, while automation costs are static or in decline, many companies are moving faster than ever toward end-of-line automation.

Choices made early in the automation development process directly tie to the finished product quality.



## VENDOR SELECTION

Selecting the right equipment requires working with a systems integrator who has extensive knowledge of design, applications, controllers and communications interfaces. Plus, the integrator should possess the right tools, accessories, monitors, and components that, when combined as a whole, will allow you to deliver a true “move the needle” automation project.

Be sure your systems integrator includes in his project team representatives from the equipment, parts and robotics manufacturer(s), a systems and design engineer, your materials supplier, your operations or production manager, and essential personnel for configuring your facility and doing installation work.

Each of these individuals should have hard copy of the complete specifications for the project including detailed drawings and specs of the parts and other materials included in the process. Specifications should also detail timing for various stages in the process from station to station.

## THE END OF THE LINE IS A MOMENT OF TRUTH

When it comes to your end-of-line operations, your focus should be on how to deliver the best pallet of goods to your customers, the quickest, for the least cost. In the past, that’s been through manual labor for many operations. That’s quickly changing today.

Since what happens at the end of the line is so critical from almost every perspective, it’s critical to understand how dramatically it can affect every part of your operation. Get started today.



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