

Six Steps to Evaluating Assembly & Packaging Processes for Automation

By ESS Technologies, Inc. Blacksburg, VA • www.esstechnologies.com



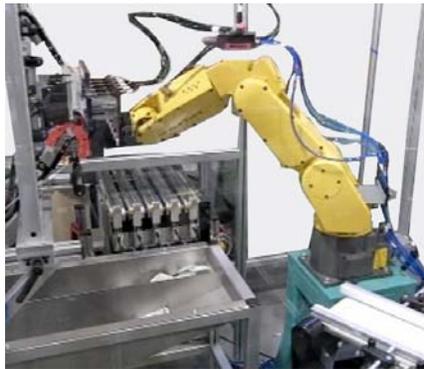
Innovative Packaging Solutions

Introduction

Companies may consider automating an assembly or packaging processes for many different reasons—to increase productivity and line flexibility, to reduce rework or overhead, to maximize floor space. Robots seem like a trendy idea, and not one that every packager can embrace, believing that automating the assembly or packaging process will be time-consuming or require significant financial investment. In truth, robotic automation is more than a trend; it represents the next generation of assembly and packaging equipment and a shift in how manufacturers evaluate their processes.

Many reasons exist to explain this shift. Robot prices have come down, and the flexibility allows manufacturers to automate a variety of processes while reducing changeover times and expensive tooling. Robotic systems are getting “smarter” as well. Integrated vision systems allow robots to be easily configured for line tracking, inspection, and other applications that require the robot to “see” what it is doing. Built-in connections to the robot and easy-to-use programming tools allow these sophisticated systems to be implemented in both assembly and packaging systems in a relatively short span of time.

ESS Technologies, Inc., an authorized FANUC Robotics system integrator, has seen firsthand the reluctance that many companies experience when they consider automating their processes. A thorough audit of the current packaging line can help break through this reluctance. In fact, auditing the existing process is critical to the success of any automation project. It not only allows the company to fully understand the current process, but it is helpful when writing the equipment specification and calculating the return on investment (ROI). This white paper will outline the six steps to evaluating an assembly or packaging process for automation.



FANUC LR 200iC Robot Holding Up Blister-packed Medical Devices to a Vision System For Inspection

1) Understand what the audit will determine.

A thorough audit gives all parties in the decision-making process an understanding of how the investment will save time, money and resources. An audit also allows packagers to understand which parts of the process are most suited to automation and gives them the ability to prioritize. Automating a production line doesn't need to happen all at once. A complete system audit allows a company to understand its current strengths and weaknesses and put the money where it will have the greatest impact.

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FANUC Clean Room Class LR 200iA Loading Pharmaceutical Blisters Into a Cartoner Infeed

2) Establish goals for automation.

An audit allows a company to establish goals based on the audit results. Goals may include increasing efficiency, reassigning valuable human resources, reducing scrap and rework, improving quality, and increasing line speed. Of these goals, increasing efficiency is usually the easiest to accomplish. Often, a few simple changes to the material handling and controls can improve efficiencies by 10% or more. Proper material handling allows a system to run at its intended speed because the machines are not starved at the infeed or bottled up at transfers. Increasing line speed may be the most difficult goal to achieve, as it requires additional space for longer machine infeeds. However, increased productivity doesn't necessarily require increased line speed. Automating to reduce the downtime due to size changeovers will increase productivity simply because the machine operates for a greater amount of time each shift.

3) Identify the processes that will benefit from automation.

By assessing the current process, packagers can identify the areas that will benefit from robotics automation. This includes quantifying current staffing requirements for the production line. Robots do not replace valuable human resources, but integrating robotics will allow those resources to be placed where robots are not usable. On the other hand, robots do not suffer from repetitive motion injuries, reducing costs and downtime due missed work, making these types of processes ideal for automation. The assessment should also be used to pinpoint weak areas in the line's efficiency, especially in the areas of material handling. Finally, the audit should include information about the line's overall downtime and the reasons for that downtime, as well as the current scrap and rework rates.



Automatic Top Cap Forming System and Robotic Pallet Cell for Creating Retail-ready Display Pallets

4) Evaluate the factory space and components.

A thorough audit must consider the facility where the equipment will operate. Floor space is expensive, and robotic solutions typically occupy a small footprint. Depending on the application, robotic systems need less product accumulation to perform. For instance, a robotic pallet cell needs just one case at the infeed in order for the robot to begin palletizing while layer pallet cells require an accumulation of one entire layer before palletizing begins.

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FANUC M-16iB Robot With Multi-purpose EOAT Nudges Pharmaceutical Bottles Into Place After Loading Them In the Crate

In addition, robotic systems offer the flexibility to perform multiple processes within a single cell. A robotic cell with properly designed end-of-arm tooling (EOAT) and controls can de-puck, inspect, reject and load product into trays. In a secondary packaging line, EOAT may be designed and programmed to pick and place multiple bottles into a crate, nudge the bottles into the final position and place tier sheets between layers. A single EOAT can also be designed to handle multiple product sizes, greatly reducing required change parts.

A careful evaluation of the products and the components in the process is necessary to confirm their suitability for automation. RSC cases, trays and cartons need to be scored in certain ways to allow them to be automatically erected. The shape and stability of the container may also affect the packaging processes, as a product's center of gravity will dictate its stability on a moving conveyor, affecting decisions about infeed and collation systems. In addition, automated processes are easier to implement with products that can be consistently manufactured within required tolerances. EOAT design must take a product's dimensions (and the allowed tolerances) into consideration and may not be able to consistently handle product outside of these tolerances.

5) Evaluate the cost advantages of automation.

An audit allows packagers to evaluate the cost advantages of automating their production or packaging lines. Models such as ROI and total cost of ownership (TCO) allow those making the purchasing decisions to justify the expense or justify a partial solution that fits the budget. While either of these models works well enough individually, to fully evaluate the potential cost savings of an automated system, the audit must employ both models. Categories for cost savings such as increased speed and reduced scrap, rework and personnel injury belong in an ROI calculation. The impact of reduced changeover time, repeatable changeovers, fewer change or spare parts and clean-room consumables such as gowns belong in a TCO calculation.

Cost calculations also must include a full understanding of operational cost savings over time. Too often, the purchasing decision is based solely on the initial capital purchase, but a system designed after a thorough audit has greater value in the short term and the long term due to reduced changeover time, repeatable changeovers and reduced change parts. Downtime for changeovers



FANUC M-16iB Case Packing Pharmaceutical Bottles with Topserts

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FANUC M-1iA Robot Unloading Vials from a Monoblock Filler/Capper and Placing Them on a Labeler Infeed Conveyor

can have a significant impact on overall line productivity. A changeover time of 22 minutes per shift translates into 220 hours per year of downtime. Robotic systems, which typically require fewer change parts, greatly reduce this downtime and increase productivity. The flexibility of robotic systems provides a further increase in long term value. Robotic systems are easily reconfigured for new products, often requiring only new end-of-arm tooling and programming. When one factors in these scenarios, the cost for robotic automation becomes easy to justify.

6) Select the right system integrator for the job.

System integrators now take on the job of deploying robotic systems, shifting the focus from the robot manufacturers. With the expertise to integrate not only robotics but all the equipment in the packaging line, system integrators can assist in auditing the packaging line from end to end to maximize the potential of robotics automation. A qualified system integrator has established business relationships with other manufacturers and usually acts as the single source project management integrator with system responsibility. This assures a smooth transition from initial engineering concepts, to whole line final acceptance testing, to plant installation. For example, ESS Technologies offers a number of services as a system integrator for FANUC robotics and a strategic partner with FANUC for secondary packaging and palletizing. These include resource / production analysis, line design, line integration, factory acceptance testing, start up services, IQ/OQ/PQ, validation, and operational training. Single source integration is often the most cost effective way to complete the project.

Conclusion

Moving from trend to tradition, more and more packagers are adding robotic systems to their packaging process. Experienced robotics system integrators can help packagers understand the impact of a well-performed audit of the current process and the advantages of cost savings and productivity that robotics automation has to offer packaging processes. By partnering with an experienced systems integrator, packagers can increase their line productivity and reduce scrap and rework by automating both primary and secondary packaging processes.



ESS Technologies, Inc. is an Authorized FANUC System Integrator and Strategic Partner for Secondary Packaging and Palletizing Solutions