

Robots on the Rise

Robotics: Usage and Trends in Packaging Applications

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Ironically, while the high initial investment cost has hindered past growth of robotics in the packaging function, it may be cost savings on the packaging line itself that will spur future sales. A further irony: while many user companies purchase robotics to reduce labor, the robots require additional skilled labor to operate and maintain them. However, the overall perception among robotics users is extremely positive; virtually no one regrets the investment made in robots. Furthermore, the use of robots in the packaging function is accelerating, from 9.5 percent of all packaging lines using robotics five years ago, to 17.4 percent today and projected at 41.7 percent five years from now.

These are among many findings in a 2008 study from PMMI, "Robotics: Usage and Trends in Packaging

Applications," in which 300 equipment manufacturers and packagers were surveyed, either by telephone or online, to piece together an accurate snapshot of the current and future robotics landscape.

For consistency's sake, respondents were offered the following definitions:

Robot: An automatically controlled, reprogrammable, multi-purpose manipulator capable of being programmed in three or more axes. The robot can be fixed or mobile.

Robotics: Machinery including one or more robots, controller, software application equipment and accessories integrated into a system to perform tasks.

Participant Profile

Of the survey participants, one-third represent machinery manufacturers and two-thirds are consumer packaged goods (CPG) companies who buy machinery. Half of the manufacturers report they currently provide robotics, but of the half that do not, 10 percent say they will within the next five years. Involvement with robotics is somewhat less prevalent among CPGs than manufacturers: 22 percent report robots at work on their packaging lines, and 21 percent say they will add robotics in the next five years. A few more than half of end users (57 percent) indicated no interest in robotics.

ROBOTICS USAGE – MANUFACTURERS



ROBOTICS USAGE – PACKAGERS



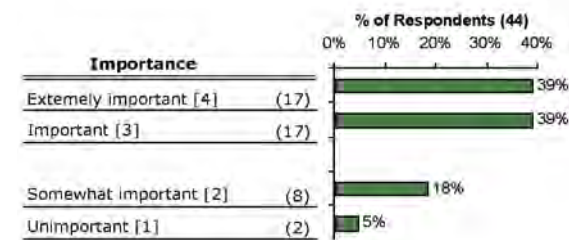
Most of the manufacturer respondents carry a title of president/CEO or sales/marketing vice president, indicating a high level of responsibility and involvement. For the packagers, most respondents carry an engineering or packaging director title. For both groups, the largest market served is food, followed by personal care, pharmaceuticals and beverages.

The survey goes on to explore how, where and why robots are being used in the packaging function; from this point on, only companies involved in building and selling robots or buying and using robots are tallied for statistical purposes. Responses to some questions include companies that indicate future plans to add robotics.

Robots Working Well

The perception among robotics users is quite positive: 80 percent of the CPGs rate robots as very important or extremely important to the success of their packaging operations. Among the food companies, in fact, 50 percent of the respondents rate the robots as extremely important. Durable goods companies also have a very high regard for robotics. Although one might expect that people who have already invested in robots would rate them highly, the degree to which they do is revealing of the importance placed on the functions robots perform.

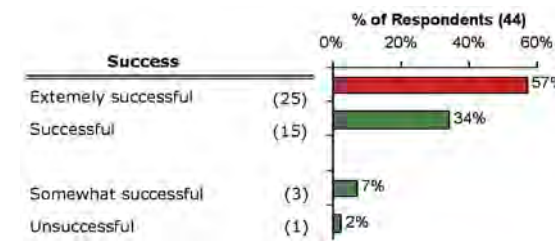
HOW IMPORTANT DO YOU FEEL ROBOTS ARE TO YOUR PACKAGING OPERATION?



Perhaps the reason for such high opinions is that the robots are doing their jobs so well — 98 percent of the packagers rate their installed robotics as successful. Of these, 57 percent rate the robotics as “extremely

successful.” The tiny minority that is less than happy seems to indicate problems very specific to their operation, such as the robot experiencing difficulty picking up bags.

HOW SUCCESSFUL ARE THE ROBOTS PERFORMING THE JOBS?



The largest subset of packagers evaluates performance success based on speed and throughput. Also considered in the evaluation are flexibility, overall cost savings (especially in relation to labor costs), reliability and efficiency. Among those who are considering a future robotics investment, speed and throughput is the highest priority, followed by accuracy and efficiency.

Overall, almost all of the reasons named for using or adding robotics capabilities relate to money — either reduced costs or increased production and, hence, revenue.

Surveyed packagers report their companies invested between \$30,000 and \$1.2 million on the robotic installation. The average cost [two huge numbers that were skewing results have been deleted], is just over \$375,000. Most companies say payback has taken between one and three years.

Measuring Robotic ROI

“We are always looking at efficiency and uptime, and then quality,” says one respondent.

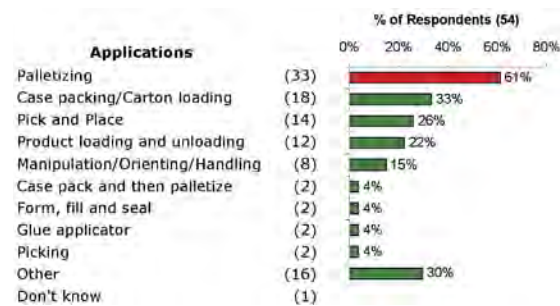
“We look at the same measures we use for all equipment — time, efficiency, cost to maintain,” says another.

But, notes a third, “It’s not about payback. Many times, the robot is the only equipment that can get the job done.”

Job Description

According to the packagers, palletizing/depalletizing is the most common function for robots on the packaging line, followed by conveying/placing, case/tray packing and cartoning. The tabulations are almost identical to manufacturers' responses as to the types of robots they most often sell. Several other functions are mentioned in this aided-recall question — such as inspection/detection or labeling — but the number of responses drops off significantly past those top four functions.

APPLICATIONS WHERE ROBOTS ARE USED – PACKAGERS



All types of robots are in use on packaging lines. The four-axis robot is definitely the most common, however, accounting for half of all installations. Delta, Gantry and SCARA robots are each reported at about 25 percent usage, and about 15 percent of companies have six-axis robots (the remainder currently in use are custom-made robotics).

More than 40 percent of the packagers say they never reprogram their robots, leaving it exactly as originally

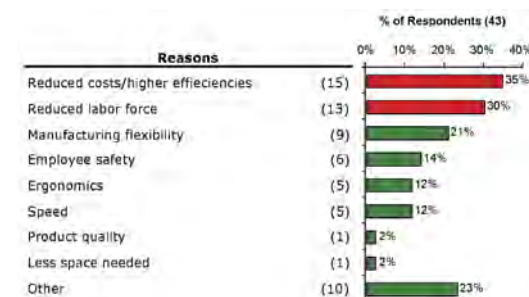
installed. Nearly one-third (31 percent) say they reprogram their robots once a year, on average. Another 29 percent reprogram more often, some even as much as 20 times per year. When reprogramming does become necessary, 40 percent of the participants claim the effort is done online.

The robot manufacturers strive to be supportive and responsive, so the packaged goods companies can look to them for help when needed. More than 90 percent of the robot makers provide installation services, and 80 percent offer maintenance services. Three-quarters of the manufacturers also provide engineering and design work, although the smaller of those firms are more likely to outsource that function to make it available to the buyers.

Several survey participants suggest equipment manufacturers may be able to help packagers with estimating cost savings and payback, as well as offering financing options

INITIAL REASONS FOR PURCHASING ROBOTS – PACKAGERS

What are two reasons why your company initially added robotics to packaging lines? (Unaided)



that go beyond what's offered with other machinery — anything that can help the packagers get past that initial investment hurdle. Packagers need to build a cost justification model that would include not just labor savings, improved ergonomics and increased productivity, but also maintenance and training.

The Good, the Bad ...

Manufacturers are quick to sing the praises of robots over other fixed equipment, but by far the leading benefit mentioned is flexibility and versatility.

The second benefit robot makers cite is reliability, as measured by Mean Time Between Failure. Also mentioned by a few respondents are small footprint and low maintenance requirements.

While generally agreeing with the manufacturers' opinions, the surveyed CPGs are more likely to praise their robots' operational characteristics, such as reliability, dependability and consistency of performance. Cost savings is also on the list, especially as it relates to labor. Also related to labor is the ergonomic advantage of letting the robot do the heavy lifting, so to speak. And, as one participant, only somewhat tongue-in-cheek, points out, "Robots don't complain."

But the picture is not entirely rosy, according to the packagers. Aside from the steep initial investment, robots require a higher technical level of maintenance and supervision than most other equipment and, therefore, a higher level of skilled labor. Also, while there's an ergonomic

VERSATILITY

One manufacturer says, "When internal (marketing) or external (consumer) changes to products or production lines are implemented, in most cases, hard automation is scrapped, where robots can be reprogrammed and End Of Arm Tooling can be changed."

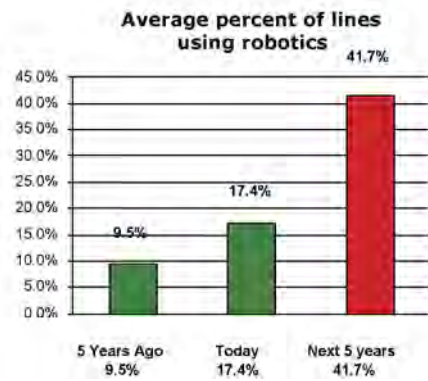
Another explains: "Robots can handle a wide variety of constantly changing products with modifications to End Of Arm Tooling and reprogramming."

advantage for workers, a robot can also present a safety hazard, often requiring guarding to protect people from accidentally wandering into its path. One respondent further points out that, in many cases, a single robot performs end-of-line functions for multiple packaging lines. Hence, if that robot goes down, so do all of the lines feeding to it.

Robotics manufacturers recognize the shortcomings, especially the financial hardship of high initial investment and ongoing skilled maintenance. Several makers also point out that robots are not suitable for handling all package types, so a robotic installation is not recommended for every application.

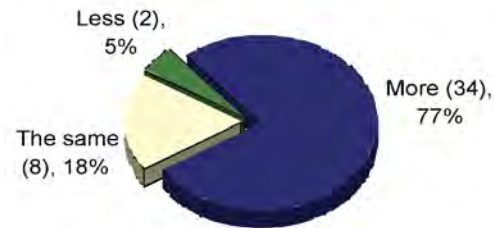
PERCENTAGE OF PACKAGING LINES USING ROBOTICS – MANUFACTURERS

What percentage of packaging lines use robotics today? Five years ago? Five years from now? (Unaided)



USAGE TREND FOR ROBOTICS – PACKAGERS

Do you expect to use more, the same, or less robotics in your packaging lines in the next five years?



Looking Ahead

The growth in robotics use in packaging functions is accelerating. Packaging machinery manufacturers reported using robotics in 17.4 percent of the lines they build or collaborate on today, and predicted that percentage growing to 41.7 percent in five years. Yet more revealing, 77 percent of the CPGs who currently use robots expect to expand those applications over the next five years.

DRIVERS FOR GROWTH MOST FREQUENTLY MENTIONED BY MANUFACTURERS AND PACKAGERS

DRIVERS	PERCENT OF MANUFACTURERS MENTIONING	PERCENT OF PACKAGERS MENTIONING
Reduced labor force	81%	35%
Increased manufacturing flexibility	68%	32%
Reduced costs/Higher efficiencies	62%	35%
Improved operational flexibility	60%	0%
Less floor space needed	40%	12%
Improved sustainability	36%	0%

Packagers and manufacturers differ in their projections for which part of the packaging line — primary packaging functions or secondary packaging lines — will grow fastest over the next three years.

Of course, growth is seen in applications already using robotics, such as palletizing/depalletizing and case packing. But manufacturers also cite vision systems as a

Which Brand Owns the Packaging Robotics Market?

More than 300 machinery manufacturers and consumer packaged goods companies had their say on this question, and a clear leader emerged: Fanuc Robotics North America. But Fanuc is by no means the only player in the packaging market.

Among the manufacturers who include robotics in the equipment they sell, 50 percent named Fanuc as the brand they sell, and 23 percent identified ABB. Another 13 percent each mentioned Adept Technology, KUKA Robotics and Yaskawa Electric America. The list goes on. Also named, in order of decreasing frequency, are Motoman, DENSO Robotics, Intelligent Actuator, Panasonic, A-B-C Packaging Machine, AFAST Robotics, BluePrint Automation, Bosch Rexroth, Epson Robots, Fuji Yusoki Kogyo, Okura USA and Yamaha Robotics.

More than half (58 percent) of the manufacturers install only one brand of robot on their machinery. However, some sell multiple brands: 29 percent carry two brands, 10 percent have three, and 4 percent identify more than three.

The packagers in the study are almost as solidly in Fanuc's camp, as the manufacturers, with 43 percent naming the company as a robotics supplier on their packaging lines. From there, the frequency of other brands mentioned goes down considerably. However, in addition to the companies identified above, these packagers also reported using CBW Automation, Columbia Machine, J&J Robotics, KHS, Krones and Shubert Packaging Systems.

future growth target, and they see secondary packaging lines growing at a slightly faster rate than primary packaging functions (57 percent and 46 percent, respectively).

This focus on secondary packaging growth may account for why case packing and palletizing — secondary and tertiary packaging, respectively — could trigger a need for robotics to improve productivity. However, the CPGs in the study say primary packaging is growing faster, at 54 percent over the next three years vs. 38 percent for secondary packaging.

Regardless of whose crystal ball is most accurate, study respondents agree that growth is in the forecast for

packaging, and wherever there is growth, there is also opportunity.

ORDERING INFORMATION

This Packaging Intelligence Brief is adapted from the 2008 PMMI report "Robotics: Usage and Trends in Packaging Applications". Non-PMMI members may purchase copies of the report from PMMI for \$2,500. Contact Paula Feldman, director of research and statistics for more information: paula@pmmi.org, 703.243.8555 or 703.243.8556 (fax).



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