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INDUSTRY REPORT

Robotics in Packaging & Processing

PMMI Business Intelligence

pmmi.org

PMMI The Association for Packaging and Processing Technologies
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Who We Are and What We Do

PMMI is a global resource for the packaging and processing industry, unifying the industry across the manufacturing community. PMMI members promote business growth in a variety of industries by developing innovative manufacturing solutions to meet evolving consumer demands, today and in the future. PMMI membership represents more than 1,000 manufacturers and suppliers of equipment, components, and materials as well as providers of related equipment and services to the packaging and processing industry.

PMMI Business Drivers support the industry by delivering a variety of valuable resources, such as in-depth market research, practical best-practice tools and reports, specialized technical training, networking events, and other essential services.

PMMI connects consumer goods companies together with our members' manufacturing solutions through the premier PACK EXPO portfolio of trade shows, including PACK EXPO International, PACK EXPO Las Vegas, PACK EXPO East, PACK EXPO Southeast, EXPO PACK México, and EXPO PACK Guadalajara.

About This Report

This report was produced by PMMI in conjunction with leading market intelligence company Interact Analysis, a global research house with offices in the U.S., China, and the UK. Interact Analysis specializes in the entire automation value chain from product manufacturing in automated factories, through to storage in automated warehouses, and finally to distribution via fleets of increasingly electrified and automated commercial vehicles. Interact Analysis boasts a wide industrial client base that includes market leading industrial automation companies. The report was compiled by a team of experts with a wealth of experience and knowledge in the field, conducting extensive primary analysis informed by the following research methodology.

Methodology

For the purpose of this report, an online survey was conducted among 173 qualified professionals from U.S.-based End User companies, including consumer packaged goods (CPG) and contract packaging/manufacturing organizations, as well as packaging/processing machinery OEMs, system integrators, and robotics suppliers. Respondents represented a range of functions, including executive leadership, engineering, IT/OT, logistics and supply chain management, maintenance and service, plant management, and purchasing/procurement. End-user respondents were required to have at least some involvement in robotics purchasing decisions within their organizations. In addition, a series of in-depth, semi-structured interviews were conducted with industry experts representing End User companies, packaging and processing machinery OEMs, system integrators, and robotics suppliers. Survey and interview findings were analyzed by Interact Analysis subject matter experts and supplemented with additional industry context and insights.

Definitions

Industrial robot: Automatically controlled, reprogrammable machines that can move across multiple axes to manipulate materials, parts, products, or tools in industrial environments. They include robot types such as Articulated, Cartesian, Delta, and SCARA.

- **Articulated robot:** Has a jointed arm, typically with four to six axes, that allows it to move in a way similar to a human arm.
- **Cartesian robot:** Also known as linear robots or gantry robots. Cartesian robots have three prismatic joints whose axes are aligned with a linear coordinated system. They move along three linear axes, typically X, Y, and Z, using a gantry or rectangular coordinate structure.
- **Delta robot:** Robots with arms and prismatic or rotary axes in parallel that are connected to universal joints at the base. Delta robots operate in 3, 4, or 6 axes.
- **SCARA robot:** The acronym SCARA stands for Selective Compliant Assembly Robot Arm. SCARA robots are based on a 4-axis design, with two parallel rotary joints that provide compliance in plane.

Collaborative robot (cobot): Safely and effectively interacts with human workers while performing industrial tasks within a defined collaborative workspace (without the need for industrial fencing or a dedicated robot cell). The term 'cobot' is used as an abbreviation for the term collaborative robot.

Mobile robot: An autonomous or semi-autonomous robot that moves through a facility to transport materials, products, or components. In industrial and warehouse environments, mobile robots are commonly used for goods movement, line replenishment, order fulfillment, and internal logistics.

- **AGV:** An acronym for automated guided vehicle. AGVs transport materials along predefined routes, typically using guidance infrastructure such as magnetic tape, wires, reflectors, QR codes, or fixed paths.
- **AMR:** An acronym for autonomous mobile robot. AMRs navigate dynamically through a facility using sensors, cameras, maps, and onboard software. Unlike AGVs, AMRs can often adjust their route in real time to avoid obstacles.

Humanoid robots: Robots designed with a human-like form, enabling them to interact with and navigate environments built for people. Humanoid robots typically have two arms, which is a key differentiator from collaborative robots. Both wheeled and legged robots are classified as humanoid robots for the purposes of this report.

CONTENTS

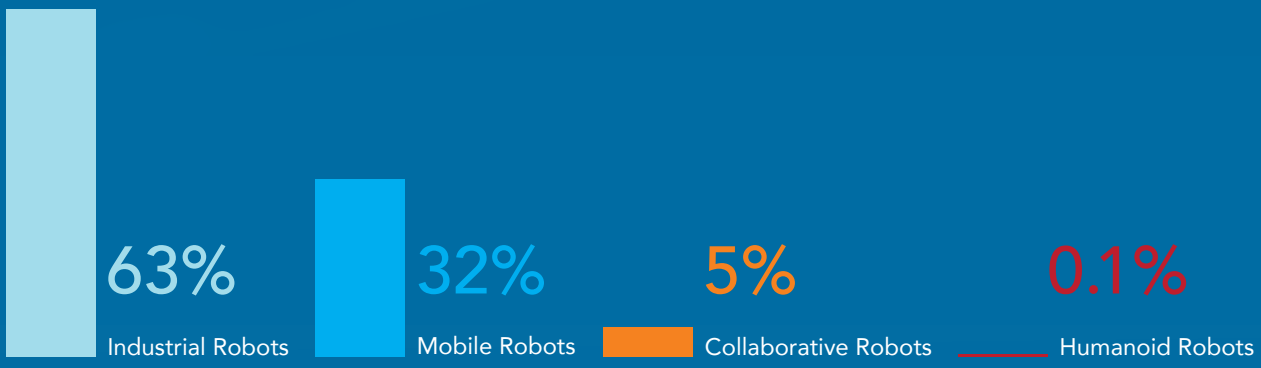
Executive Summary

U.S. ROBOTICS IN PACKAGING MARKET SIZE

The U.S. robotics market for packaging and processing is projected to nearly double by 2031, with mobile robots driving the next phase of growth.

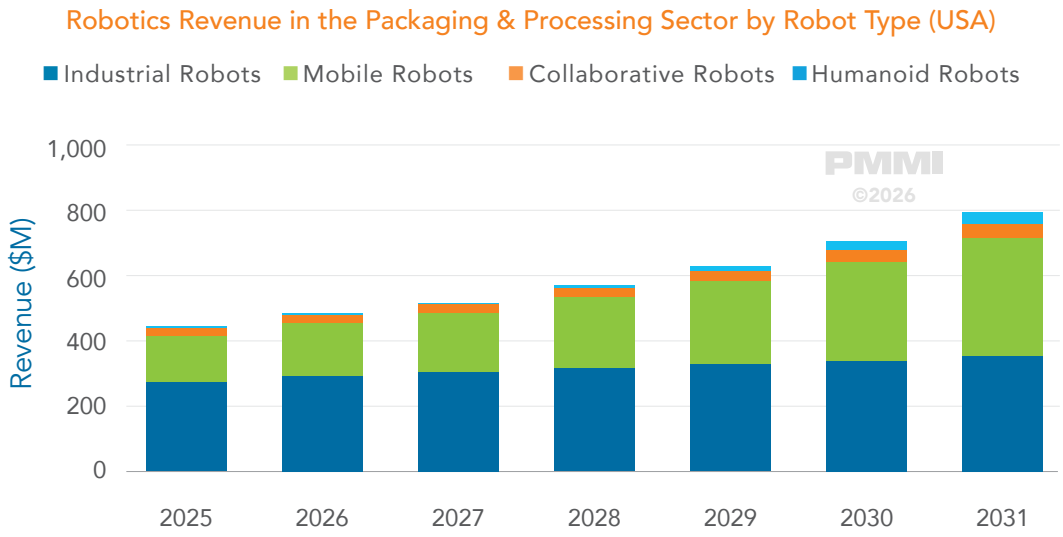
In 2025, robotics in packaging/processing industry worth more than	$440M
By 2031, the industry is predicted to reach approximately	$800M
Average annual growth rate of	10.3%

2025 Market share



Mobile Robots are the fastest growing robot type, and will become the most popular robot type by 2031, with a 45% market share.

Humanoid robot market share will also grow significantly from 0.1% to 5%.



Mobile robots will become the robot type with the largest market share by 2031

CURRENT USE OF ROBOTICS

Many End Users are utilizing robotics, but most deployments remain limited.

- 72% of End Users currently utilize robotics in their operations.
- This is expected to reach 95% by 2031.
- End Users stating they use robotics extensively (deployment across most operations) is projected to grow from 5% to 19% by 2031.

OEMs/Integrators are expanding their robotics offerings.

- 69% of OEMs/integrators currently have robotic offerings in their portfolio.
- This is expected to reach 86% by 2031.
- OEMs offering robotics as a core part of their portfolio, where robotics are utilized in almost all projects, will slightly increase from 20% to 23%.
- Broad deployment will rise from 12 to 34% by 2031.
- This indicates that OEMs will incorporate robotics as a potential solution, while continuing to rely on traditional automation in their overall offerings.

Articulated robots are the established workhorse, while mobile robots are positioned for faster future adoption.

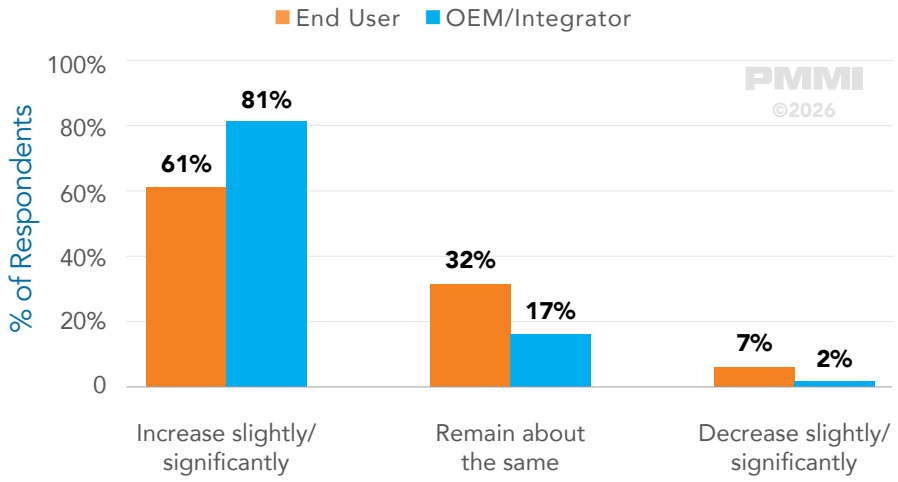
81% Of End Users surveyed use articulated robots in their operations due to effectiveness in pick-and-place operations.

33% Of End Users currently use mobile robots (5th most utilized robot type). Mobile robots are projected to overtake most industrial robot types due to their high growth rate.

10% Of End Users surveyed claim to use humanoid robots in their operations. These are likely to be limited to trial or pilot phases.

FUTURE USE OF ROBOTICS

Both End Users and OEMs/Integrators expect robotics investment to increase, signaling continued market momentum.



61% Of End Users expect to increase investment in robotics over the next year.

81% Of OEMs/integrators expect to increase investment in robotics over the next year.

Key Robotics Applications of Future Interest to Packaging and Processing Industry End Users:

1. Robotic arms for the loading of packaging machines with empty packaging materials and containers (cartons, cups, etc.)
2. Use of mobile robots to bring materials to the line
3. Mobile robots with cobot arms
4. Processing applications

DRIVERS OF ROBOTIC ADOPTION

End Users are adopting robotics to improve operational performance, not only to address labor shortages.

Top 3 Factors Driving End User Robot Adoption:

1. Increasing Throughput and Productivity
2. Lowering Costs
3. Improving Quality and Consistency

End Users prioritize reliability, service, ROI, and integration over robotics capability alone.

Top 3 Criteria for End Users Selecting an OEM

1. Reliability and Uptime Performance
2. Availability and Quality of Service & Support
3. Demonstrated ROI / Payback

KEY BARRIERS TO ADOPTING ROBOTIC PRODUCTS AND SOLUTIONS

For End Users not considering robotic solutions, the absence of a clearly defined use case is the primary barrier to adopting the technology.

Top 5 reasons provided by End Users when asked in an open question why they don't expect to be utilizing each robot type in 12 months' time.

Industrial Robot

1. Not needed/No applicable use case
2. High cost
3. Integration complexity
4. Lack of budget
5. Company not ready

Collaborative Robot

1. Not needed/No applicable use case
2. High cost
3. Company not ready
4. Too slow
5. Not a priority

Mobile Robot

1. Not needed/No applicable use case
2. High cost
3. Footprint not suitable
4. Other technologies more effective
5. Company not ready

Humanoid Robot

1. Not needed/No applicable use case
2. High cost
3. Technology not ready
4. Other technologies more effective
5. Not a priority

The largest barriers to adoption are practical execution issues, such as cost, integration, and support.

High Up-Front Cost

Integration with Existing Equipment or Systems

Maintenance & Service Support Concerns

POST INSTALLATION BENEFITS AND CHALLENGES

Robotics is delivering against most expected benefits, but sustained value depends on training, uptime, and support.

Benefits for End Users

1. Reduce repetitive tasks for employees
2. Reduce labor cost
3. Achieve consistent product handling
4. Increase speed and productivity
5. Achieve repeatable quality

Challenges Experienced by End Users

1. Internal technical skills gaps
2. Lack of operator training and readiness
3. Uptime and reliability
4. Quality of maintenance support
5. Speed of service response

- For End Users, ongoing customer training & technical support is critical. Operators, maintenance teams, and line managers must be confident to use and troubleshoot systems.
- Without sufficient training and responsive technical support, even well-integrated robotic solutions can face lower utilization, longer downtime, slower fault recovery, and reduced operator confidence.
- OEMs should treat customer training, documentation, service support, and post-installation knowledge transfer as core capabilities, rather than secondary support functions.

FUTURE DEVELOPMENTS IN ROBOTIC SOLUTIONS FOR THE PACKAGING AND PROCESSING INDUSTRY

Advances in integration, vision, and speed are making robotics more deployable across packaging and processing applications.

Easier integration reduces implementation risk, shortens commissioning timelines, and makes robotics more deployable in both brownfield and greenfield facilities.

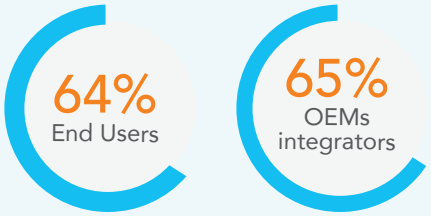
Intelligent vision capabilities are having a major impact by expanding the range of tasks robots can perform. Vision systems allow robots to identify, locate, orient, inspect, and handle products with greater flexibility.

Faster robots can improve productivity, reduce bottlenecks, and make automation viable in applications where previous generations of robots may not have been able to keep pace with line speeds.

Top 3 Technological Developments with the Greatest Impact on the Market in the Past 5 Years:

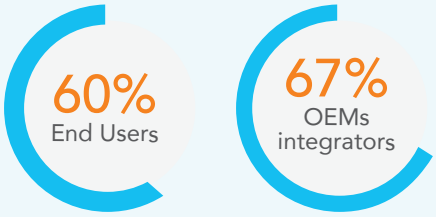
1

Improved integration



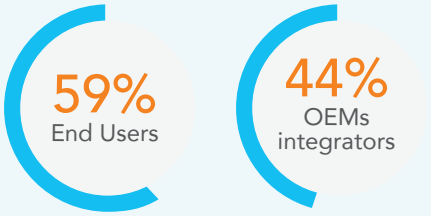
2

Intelligent vision capabilities



3

Increased operating speeds



DESIGN, INTEGRATION, AND SERVICE

The increasing complexity of robotic deployments is leading more End Users to turn to system integrators for integration and support.

Top 3 company types that End Users currently employ to integrate robotics with their production line

69%
Packaging/ Processing Machine OEMs

40%
System Integrators

36%
Internal Engineering Teams

This is likely to change over the 12 months, with the number of End Users expecting to use Packaging/Processing Machine OEMs falling by almost half.

Top 3 company types that End Users expect to employ to integrate robotics with their production line in the next 12 months

53%
System Integrators

42%
Internal Engineering Teams

42%
Robotics Manufacturer

IMPACTS OF LEGISLATION

New safety standards and cybersecurity legislation will increase compliance requirements, while improving confidence in connected robotics technology.

ISO10218 and ANSI/A3 R15.06

The 2025 revisions to ISO 10218[1] and ANSI/A3 R15.06[2] strengthen safety requirements for industrial and collaborative robots, improving clarity for End Users deploying cobots while creating additional short-term compliance, documentation, and validation demands for OEMs/integrators.

Cyber Resilience Act

For packaging OEMs that sell machines into the European market, The Cyber Resilience Act introduces mandatory cybersecurity obligations for connected hardware and software, increasing. compliance requirements for robotics vendors while supporting greater confidence in remote diagnostics, predictive maintenance, and software-enabled automation.

[1]*'ISO 10218-1:2025(en) Robotics – Safety requirements - Part 1: Industrial robots', International Organization for Standardization (ISO), February 2025, https://www.iso.org/obp/ui/en/#iso:std:iso:10218:-1:ed-3:v1:en*

[2]*Schirm, Alexandra, American National Standards Institute (ANSI), 'What Is ANSI/A3 R15.06-2025 / ANSI/A3 R15.06-3-2025?', ansi.org, December 12 2025, https://blog.ansi.org/ansi/ansi-a3-r15-06-2025-robot-safety/*

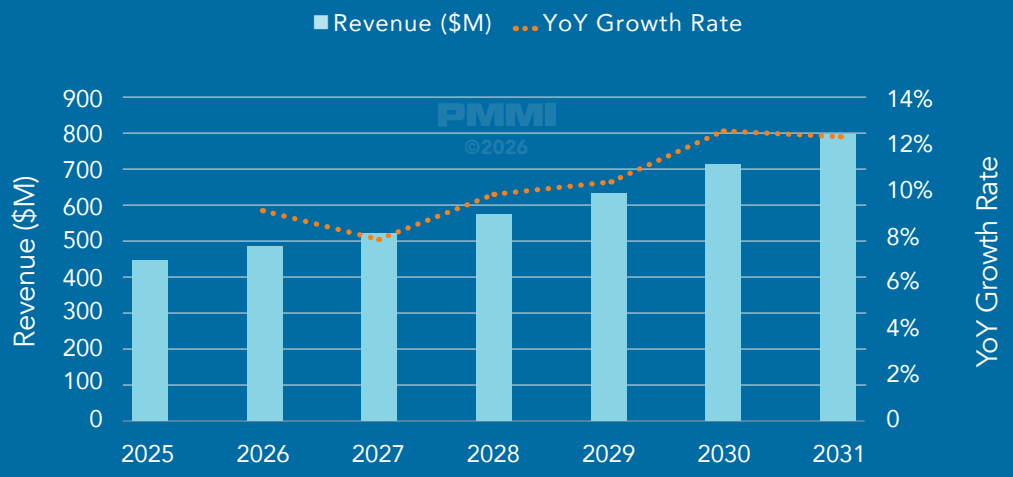
[3]*'Regulation (EU) 2024/2847 of the European Parliament and of the Council of 23 October 2024 on horizontal cybersecurity requirements for products with digital elements and amending Regulations (EU) No 168/2013 and (EU) 2019/1020 and Directive (EU) 2020/1828 (Cyber Resilience Act) (Text with EEA relevance)', EUR-LX, European Union, November 11 2024, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R2847*

1

U.S. Robotics in Packaging Market Size

The total robotics market in the U.S. packaging and processing industry was worth more than $440 million in 2025, according to research from Interact Analysis. The market is projected to grow to more than $480 million in 2026 and reach approximately $800 million by 2031, representing a compound annual growth rate (CAGR) of 10.3% from 2025 to 2031.

Figure 1. Total revenue for robotics in packaging & processing in the U.S. market



Data only includes revenue from robotics manufacturers. Revenue derived from robotics manufactured in-house by packaging machine OEMs are not included in this data.

The robotics market in the packaging & processing sector is projected to grow at an average rate of **10.3%** per year out to 2031

Revenue breakdown by robot type (2025)

63% Industrial Robots

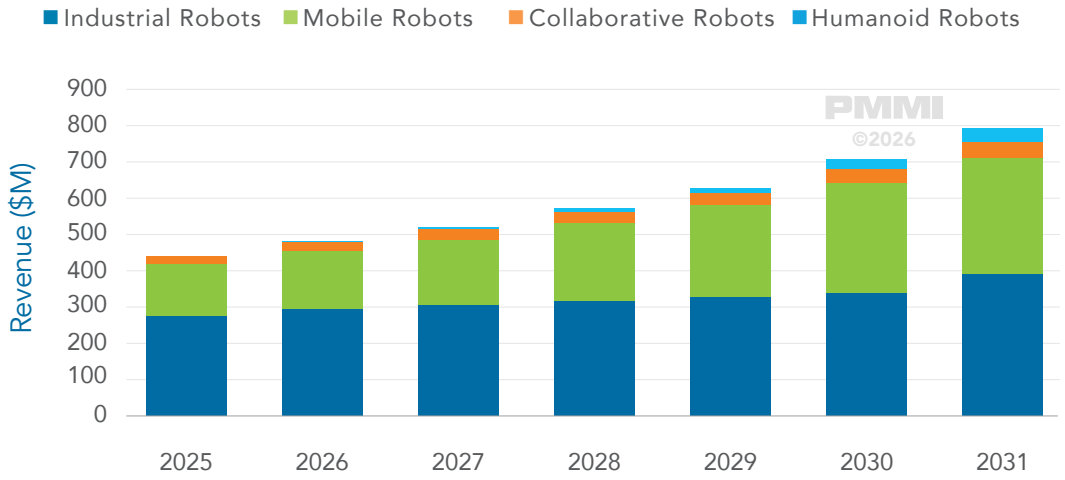
32% Mobile Robots

5% Collaborative Robots

0.1% Humanoid Robots

While industrial robots had the largest market share in 2025, the mobile robot segment is growing fast. Mobile robots are projected to become the largest robotics segment by revenue in the packaging and processing industry by 2031, accounting for 45% of total market revenue. Humanoid robots are also predicted to see significant growth, reaching 5% of the total market by 2031, as they gradually move beyond pilot programs and trial applications into real-world deployments. In contrast, collaborative robots are forecast to maintain a relatively stable market share of approximately 5% through 2031.

Figure 2. Robotics revenue in the packaging & processing sector by robot type



**Data only includes revenue from robotics manufacturers. Revenue derived from robotics manufactured in-house by packaging machine OEMs are not included in this data.*

> Mobile robots are set to become the most popular robot type in packaging and processing by 2031

MARKET SENTIMENT BY ROBOT TYPE

The following section examines market sentiment across the broader robotics market, beyond the packaging and processing sector. Sentiment varies considerably by robot type, with mobile robots and humanoid robots expected to see significant long-term growth, while expectations for industrial robots are more moderate.

Although revenue growth i n industrial robots and cobots was relatively small in 2025 compared with 2024, packaging and processing-related industries outperformed the broader manufacturing sector, according to research from Interact Analysis.

Industrial Robots and Cobots

In 2025, overall demand for robots in the wider manufacturing market remained sluggish, and market caution around investment decisions continued due to uncertainties surrounding trade tariffs. As a result, robot demand remained fragile throughout 2025. However, the food & beverage and pharmaceutical sectors demonstrated higher growth in robot sales compared with other major industries such as automotive.

Growth within the food & beverage sector was primarily driven by the increasing adoption of robots by small and medium-sized CPGs. Beyond the typical pick-and-place and palletizing applications along the packaging line, robots are also being utilized for testing and quality control tasks.

A more significant recovery in industrial robot demand is anticipated in 2026, driven by a gradual improvement in machinery investment across the wider market. From 2024 to 2029, the pharmaceutical sector is projected to experience significant growth in robot sales at an average annual growth rate of 5%, primarily fueled by opportunities in pharmaceutical production. By comparison, the food and beverage sector is projected to grow at an average annual rate of 3.5%.

Mobile Robots

While mobile robots have primarily been utilized in warehouses for CPG operations, we are now seeing them used more widely on plant floors, particularly for transporting pallets away from the production line, as companies continue to seek efficient ways of handling bulky or heavy items. Demand for mobile robots is largely driven by efforts to replace manually operated forklifts, as companies seek to cut labor costs and address operator shortages, while also enhancing safety and maintaining consistent operational accuracy. The overall U.S. mobile robot market is forecast to grow at a CAGR of 20% through 2031.

Plants with high turnover or difficulty recruiting skilled drivers have been the earliest adopters of the technology, while facilities prioritizing throughput and reliability view automation as a strategic investment. Rising labor costs and persistent labor shortages strengthen return on investment, while modular designs allow gradual fleet expansion, thereby reducing upfront capital expenditure and enabling flexible scaling. Vendors are also targeting new applications, such as trailer loading/unloading and cold-chain capable mobile forklifts, to unlock the next wave of growth opportunities.

Despite strong fundamentals, barriers still remain, including high upfront costs, complex integration with existing infrastructure, and regulatory compliance requirements.

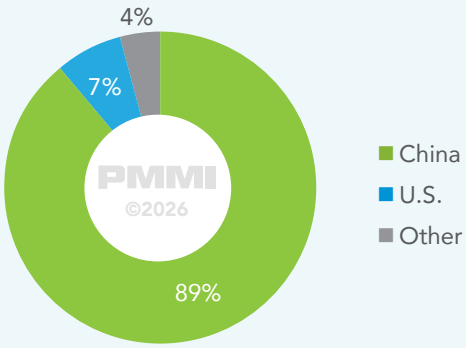
Humanoid Robots

Just 10% of shipped humanoid robots have been deployed for real-world applications, including proofs of concept (POCs) and pilots. There are currently very limited use cases for humanoid robots within the packaging and processing industry, with deployments primarily across other manufacturing, warehousing and logistics, service industries, and household applications.

The United States is the second largest market for humanoid robots at present, with China far in the lead. Growth in the U.S. is mostly driven by AI investment and high labor costs. In the short term, demand will be primarily fueled by small-scale deployments, subsidies, and strategic partnerships, as opposed to workforce-scale deployment. The overall U.S. humanoid robot market is forecast to grow at a CAGR of 111% from 2025 to 2031.

Mass commercialization of humanoid robots is constrained by immature core technologies and a lack of established industry regulations. The long-term growth forecast remains dependent on breakthroughs in embodied AI that enable autonomous and reliable task execution, as well as acceptable efficiency, return on investment, and clearer regulatory frameworks.

Figure 3. Humanoid robots 2025 revenue by region



China is currently responsible for the vast majority of global humanoid robots spend

2

Current Use of Robotics

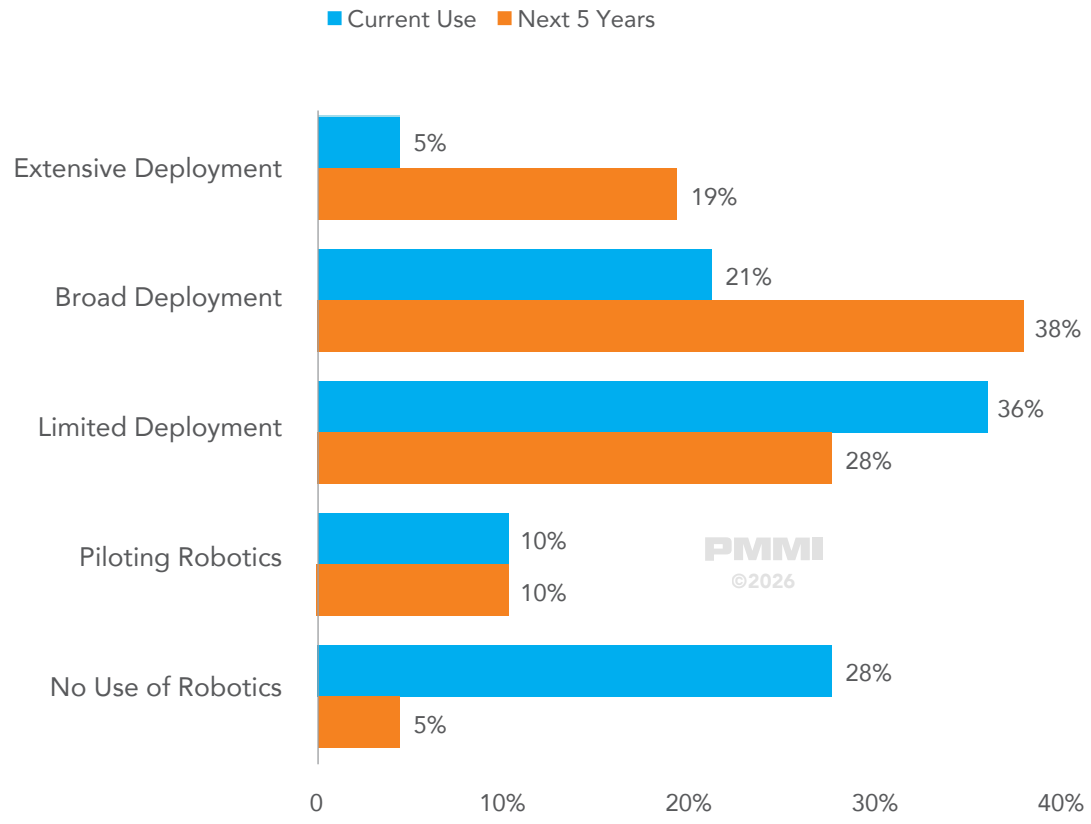
Both End Users and OEMs/integrators expect their use of, or involvement with, robotics to increase significantly between 2026 and 2031. Notably, 95% of CPGs surveyed expect to use robotics within their operations or offer robotics-enabled solutions by 2031, indicating that robotics will become a key part of future packaging and processing operations.

End Users

72% of End Users surveyed for this report currently utilize robotics in their operations. While this is lower than the 2022 PMMI Robotics and Cobots Report, which was 84%, this is likely due to the larger sample size in this edition, combined with a higher proportion of small and medium enterprises (SMEs) responding to the survey.

The most common response from End Users is that they currently have 'limited deployment' of robots (36%), while just 5% reported that deployment is extensive (across most operations), and 28% don't use robotic technology at all. This is expected to change significantly over the next five years, when almost all respondents expect to have some robot adoption. End Users with broad deployment of robots are projected to increase rapidly, overtaking limited deployment as the most common response. Companies with extensive robot deployment are also anticipated to expand, from 5% in 2026 to 19% in 2031.

Figure 4a. Utilization of robotics by End Users and expected change over 5 years



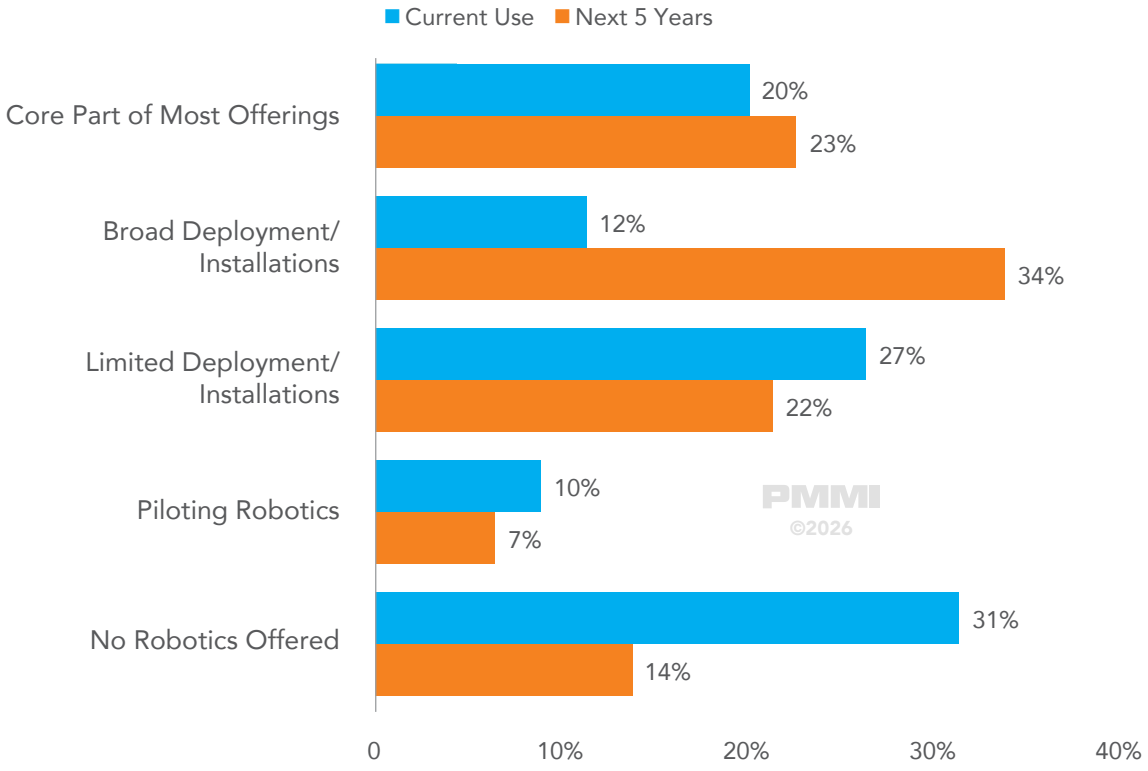
95% | Of End Users expect to have some use of robotics in their operations by 2031

OEMs/Integrators

OEMs follow a similar trend to End Users, with a significant increase in the proportion of OEMs expecting to offer robotics in the next 5 years. 31% of OEMs that do not currently provide robotic technology see doing so as an opportunity.

The proportion of OEMs offering robotics as a core aspect of their portfolio (where robotics are utilized in almost all projects) is expected to slightly increase to 23%. The growth of OEMs with broad deployment is forecasted to mirror End Users, expanding from 12% to 34% by 2031. This suggests that OEMs will incorporate robotics as a potential solution, while continuing to rely on traditional automation in their overall offering.

Figure 4a. Utilization of robotics by End Users and expected change over 5 years



86% | Of OEM/Integrators to incorporate robotics in their portfolios within the next 5 years

ROBOTIC USE BY TYPE

Articulated robots have the highest level of utilization within the processing and packaging industry, with 81% of End Users incorporating them into their operations. Due to their effectiveness in pick-and-place and palletizing/depalletizing operations, 21% of respondents make use of articulated robots in both warehousing and production lines.

Other than articulated robots, **delta robots** have the highest utilization within current operations, at 49%. Delta robots are best-suited to high-speed pick-and-place applications and are often deployed in facilities with limited footprint availability, as they take up considerably less space due to their placement above the conveyors.

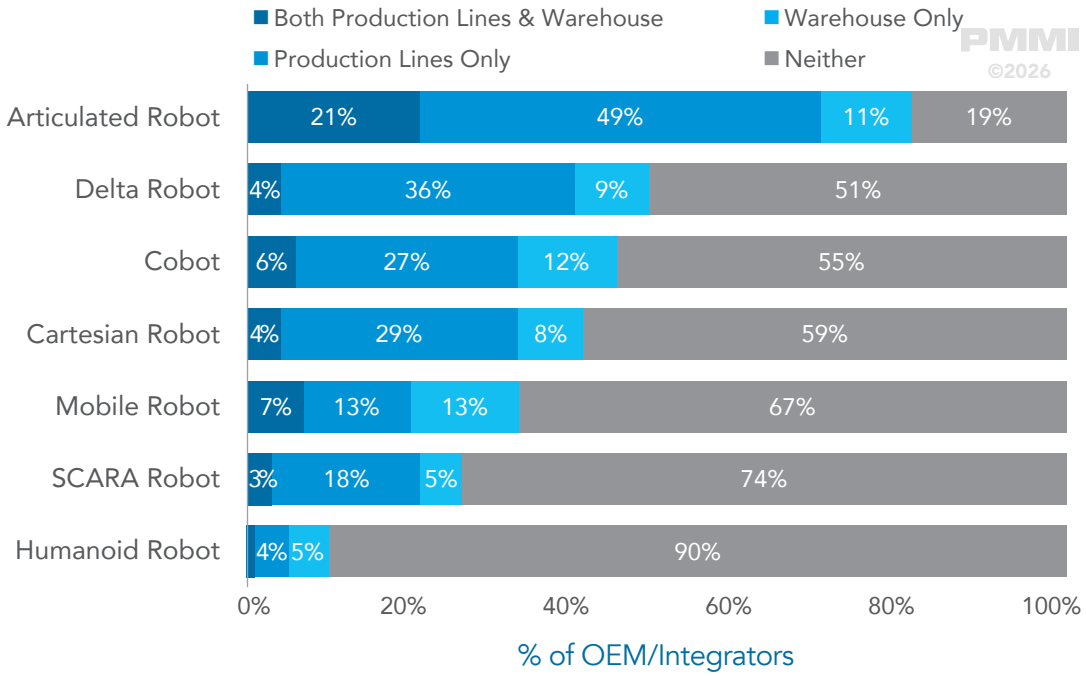
SCARA robots are the only industrial robot type to have a lower utilization rate than mobile robots. However, **mobile robots** are likely to overtake most other industrial robot types due to the high projected growth rate. Mobile robots are uniquely suited to have equal use across both production lines and warehouses, and 7% of End Users currently make use of them in both.

Interestingly, 10 respondents claim to be using **humanoid robots** in their operations. These deployments are likely to be limited to trial or pilot phases, as End Users explore potential future applications. One of the key advantages of humanoid robots is that they require little to no change in infrastructure or footprint, as they are designed to interact with production lines and warehouse environments in the same way as human workers.

> "It comes down to what is the best tool for the job. And I mean, there's different kinds of robots because there's different things they need to do."
>
> Integrator

> "If you go in any production line, you see people standing next to the conveyors, just doing random tasks that can be done by humanoids […] the flexibility of the humanoids [makes them] easy to deploy."
>
> Integrator

Figure 5a. Current deployment of robotics within End User operations



Question only asked to End Users who stated they are currently using robotics in some capacity (n=100)

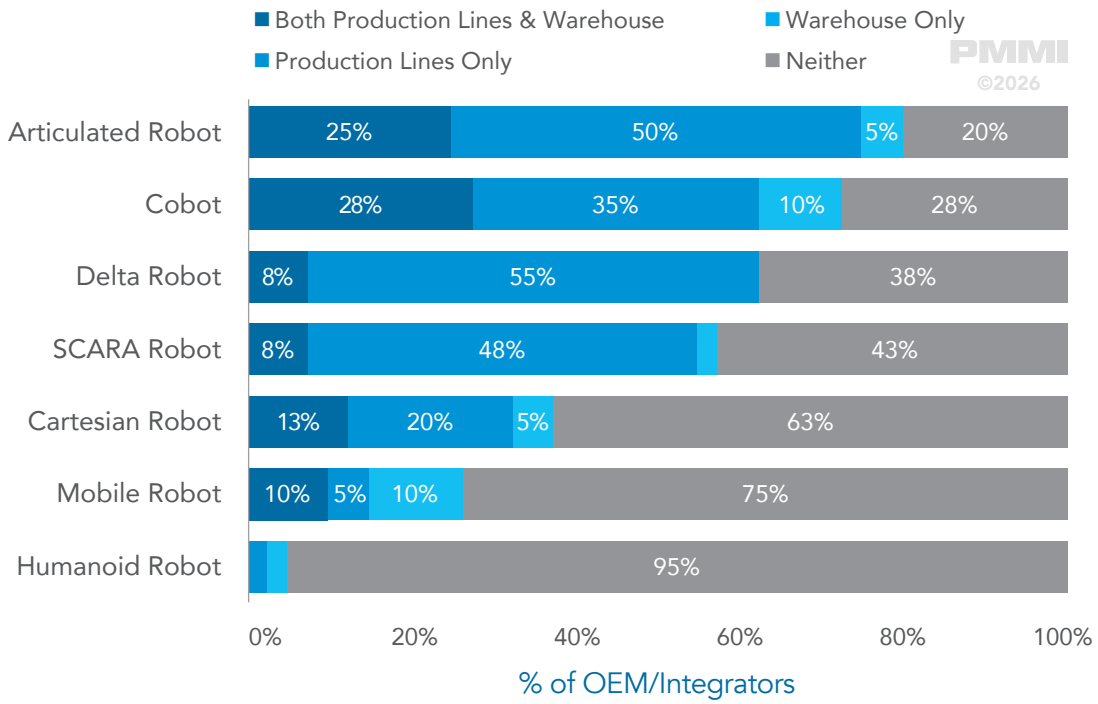
While **articulated robots** mirror End Users in being the most common offering for OEMs/ Integrators at 80%, **cobots** are close behind at 73%, despite only being third in deployment for End Users. This could be because cobots are considered easier to program than many other robot types, potentially making them the first entry point for OEMs looking to expand into robotics.

> People who are getting into robotics and automation for the first time, the two things that they like about the collaborative platform […] they like the idea that the collaborative [robot] can work alongside people. And there's a perception that collaborative robots are easier to program and operate."
>
> Integrator

A similar trend can be seen with **SCARA robots**. While only 26% of End Users utilize them, 58% offer SCARA robots as part of their portfolio. This is likely to be for similar reasons to cobots, as they are compact, comparatively simple to integrate, and well-suited to common packaging, loading, and light material handling applications. As a result, many OEMs may include SCARA robots as a flexible option within their automation portfolio, even if End User adoption remains more concentrated in specific use cases.

25% of OEMs/Integrators currently offer **mobile robots** as part of their packaging and processing solutions. As End Users increasingly request compatibility between packaging machinery and mobile robots, some OEMs are partnering with mobile robot vendors to provide more integrated solutions upfront.

Figure 5a. Current deployment of robotics within End User operations



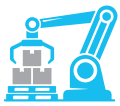
**Question only asked to OEMs/Integrators who stated they are currently using robotics in some capacity (n=41)*

The proportion of OEMs offering SCARA robots is markedly higher than End User utilization.

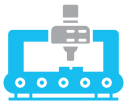
ROBOT DEPLOYMENT BY APPLICATION

The top three applications for industrial robots by both End Users and OEMS are

Pick-and-Place



Palletizing

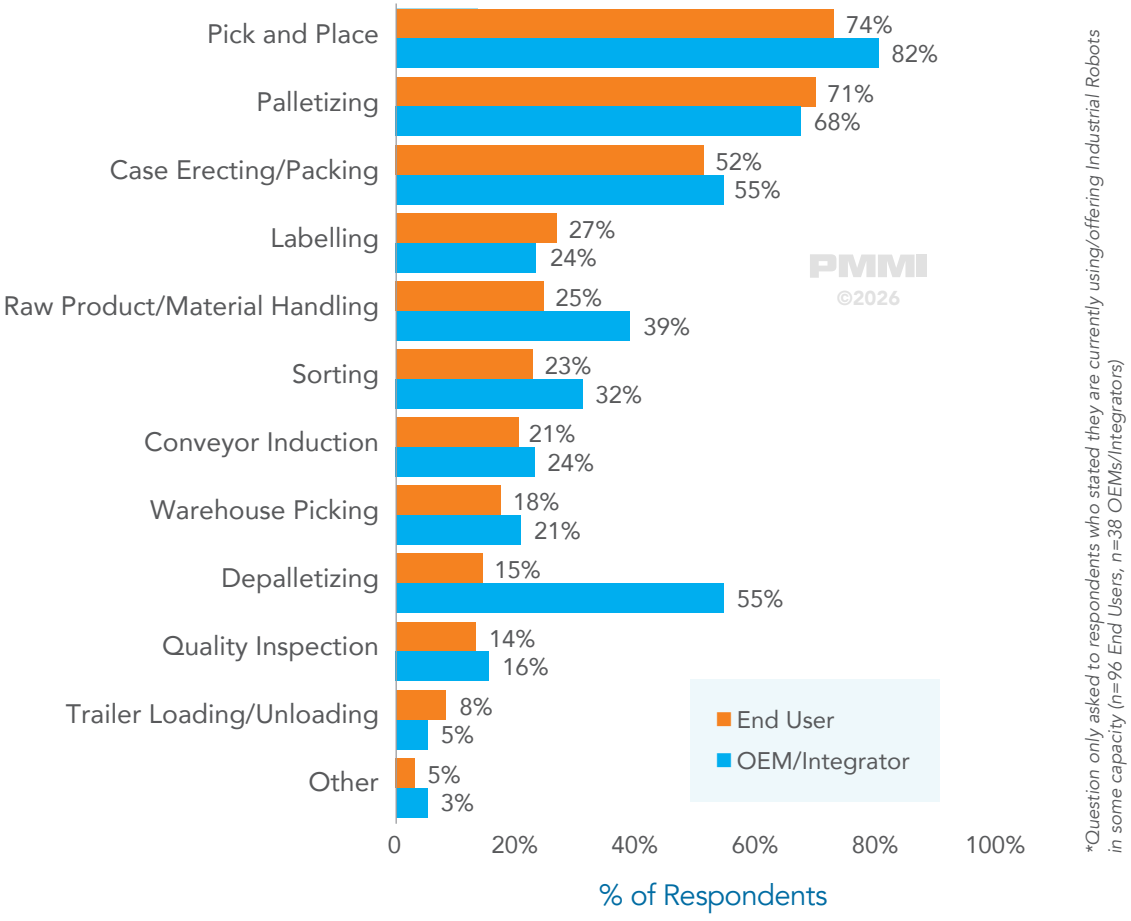


Case Erecting/Packing

Meanwhile, **depalletizing** has the largest disparity between OEMs and End Users, with it being offered by 55% of OEMs, despite only being deployed by 15% of End Users. This gap likely reflects the fact that depalletizing is a widely available and established robotic application within OEM portfolios, but adoption within the packaging and processing industry remains more selective due to site-specific constraints.

Warehouse applications remain considerably lower compared with production line applications. For example, less than 20% of End User operations have deployed robots in warehouse picking and trailer loading/unloading.

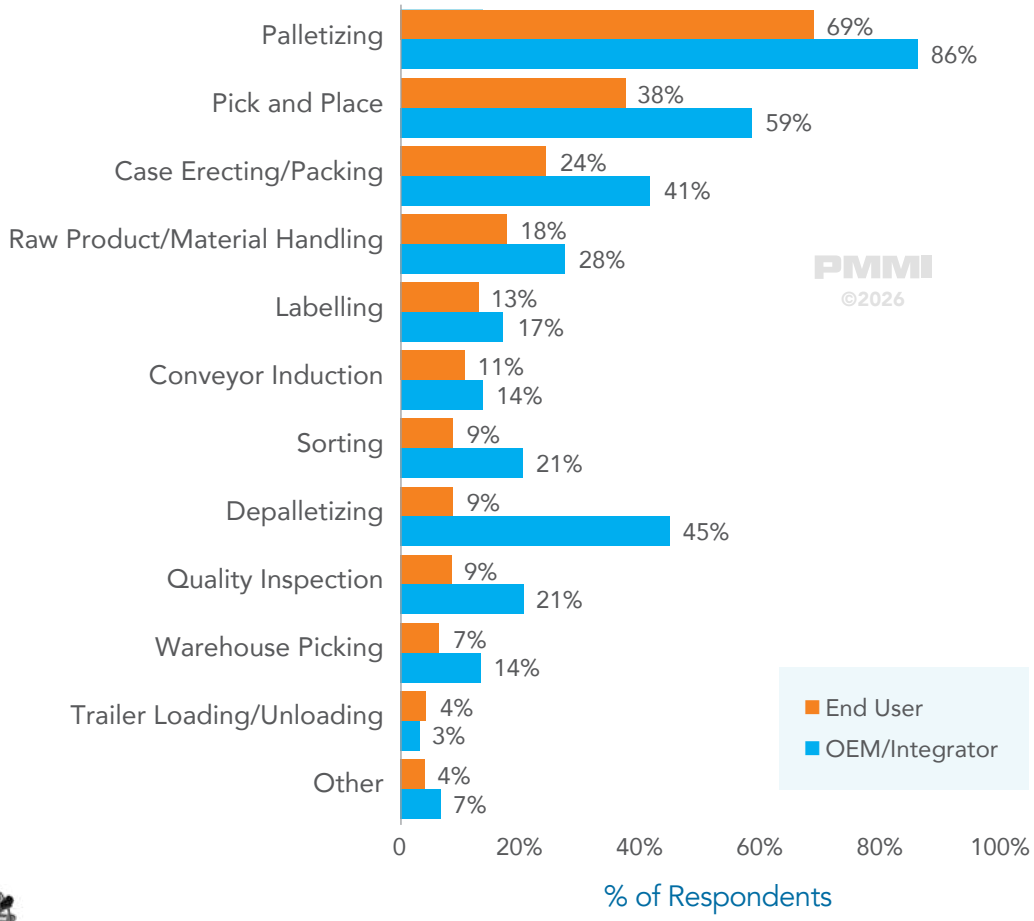
Figure 6a. Current applications of Industrial Robots offered by OEMs/Integrators compared with current utilization by End Users



Depalletizing has the largest disparity between End Users adopting the technology and OEMs offering it as part of their portfolio.

The most common applications for **cobots** broadly align with industrial robots as a whole. However, unlike industrial robots, **palletizing** is the most common application among both End Users and OEMS, as opposed to **pick-and-place**. This demonstrates the strengths and deployment characteristics of each robot type. Cobots are often adopted for lower-speed, space-constrained, end-of-line tasks where ease of deployment and safe operation near workers are important. In contrast, **industrial robots** are more commonly used for higher-speed, higher-throughput applications, such as pick-and-place production and packaging lines.

Figure 6b. Cobot applications offered by OEMs/Integrators compared with utilization by End Users



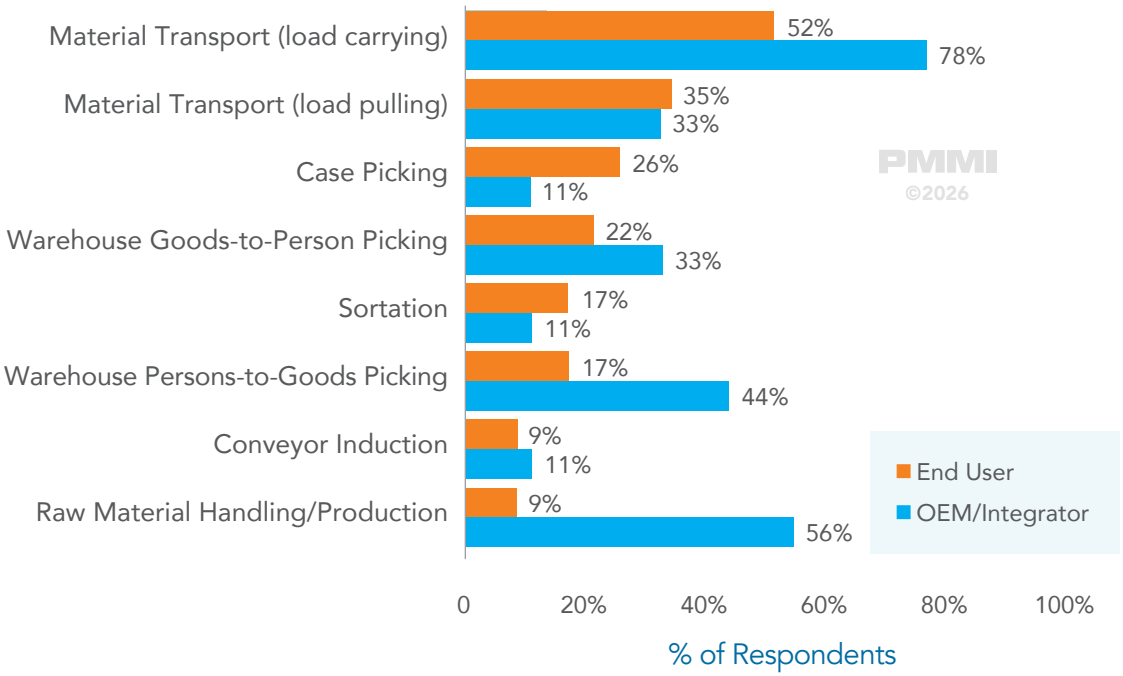
**Question only asked to respondents who stated they are currently using/offering Collaborative Robots in some capacity (n=45 End Users, n=29 OEMs/Integrators)*

Palletizing is the most common application for cobots for both OEMs and End Users.

Load-carrying and load-pulling material transport are the most common applications for mobile robots among End Users. Within packaging and processing, this is typically for pallet transport from the end of the production line to the racking in the intralogistics warehouse. One major disparity within mobile robot applications is raw material handling. Despite 56% of OEMs offering solutions, just 9% of End Users have deployed them. This indicates that, as of yet, End User adoption of mobile robots has been concentrated toward the end of the line applications, particularly within warehouse and secondary packaging operations. Looking to the future, mobile robots are likely to expand into processing and primary packaging, with our survey data suggesting OEMs are already positioning themselves to capitalize on this opportunity.

> We've also built systems to help with automatic storage of full pallet loads into racking and that also involves the mobile autonomous robots."
>
> Integrator

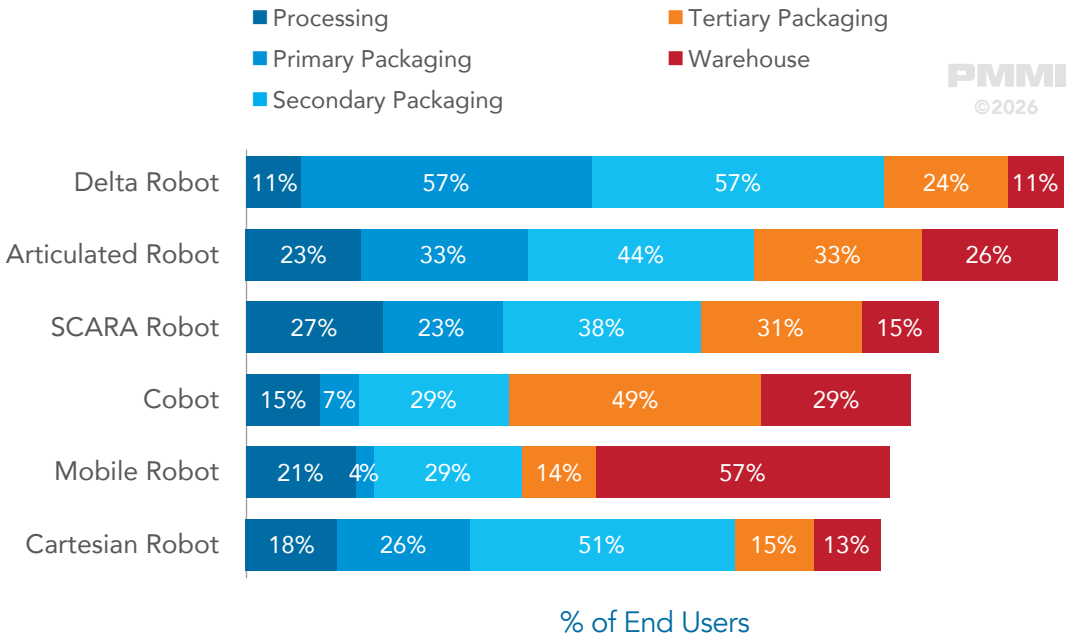
Figure 6c. Current available applications of Mobile Robots offered by OEMs/Integrators compared with current utilization by End Users



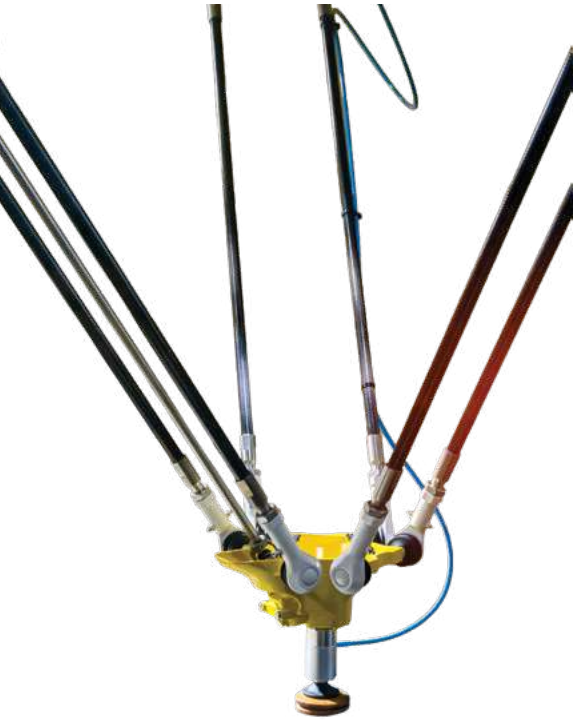
**Question only asked to respondents who stated they are currently using/offering Mobile Robots in some capacity (n=23 End Users, n=9 OEMs/Integrators)*

Material Transport is the most common application for mobile robots among End Users and OEMs.

Figure 7. The applications in which End Users are utilizing each robot type within current operations



**The percentage value indicates the proportion of respondents who selected this robot type as being utilized in the application. Percentage totals sum to over 100% due to respondents being able to select multiple applications per robot type. (n=46 Delta Robot, n=80 Articulated Robot, n=26 SCARA Robot, n=41 Cobot, n=28 Mobile Robot, n=39 Cartesian Robot)*



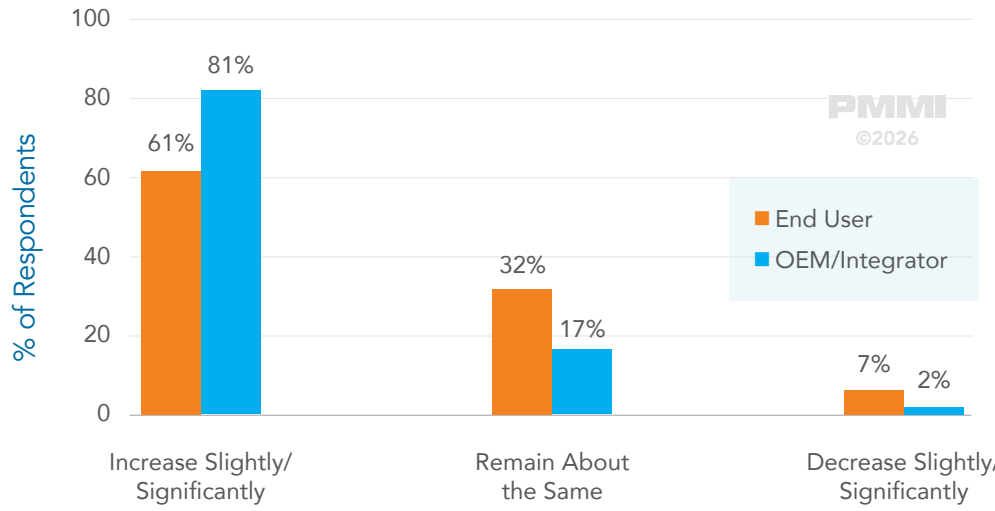
Delta robots are popular in primary and secondary packaging applications, while mobile robots are primarily used in warehousing.

3

Future Use of Robotics

The outlook for robotics in processing and packaging is strong, with the majority of End Users (61%), and OEMs/Integrators (81%) expecting to increase investment over the next year.

Figure 8. Robotic investment outlook for End Users and OEMs/Integrators

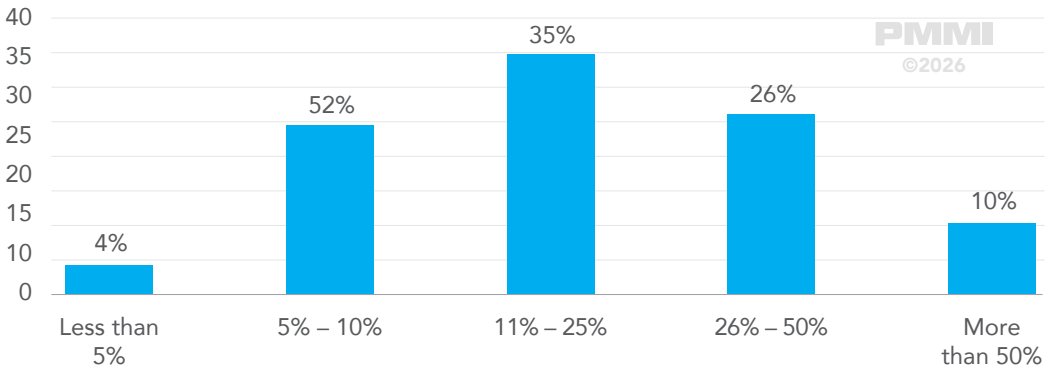


61% of End Users and 81% of OEMs/Integrators expect to increase their investment in robotics.

35% | Of End Users are expecting to increase their investment in robotics by 11-25%.

10% | have even stated this increase will be over a 50% increase in robotics investment.

Figure 9. The extent to which End Users expect to increase investment in robotics over the next 12 months



**Question only asked to End Users who selected "Increase significantly" or "Increase slightly" for 12-month outlook on robotics investment (n=69)*

71% | Of End Users expect to increase their investment by more than 10%.

Industrial robot adoption within End User operations is not expected to change substantially within 12 months as of May 2026. However, our survey indicates that **cobots** will experience a shift toward **production environments**. This relates to 'both production lines and warehouses' and to 'production lines only'. It indicates that, while cobots may initially have been adopted for more contained warehouse or end-of-line applications, End Users are beginning to look at deploying them closer to core production processes. The flexibility, ease of programming, and ability to work safely near operators cobots provide can support additional tasks.

The proportion of End Users utilizing **mobile robots** solely within **warehouses** is set to grow from 13% to 26% (Figures 5a and 10a) within 12 months' time of surveying (May 2026). This is probably due to more End Users adopting mobile robots for the first time, rather than a shift away from production-line applications. Warehouse environments are often a more accessible entry point for mobile robot deployment, as they typically have more standardized material flows, simpler layouts, fewer direct interactions with production equipment, and lower risk of disruption to core manufacturing processes.

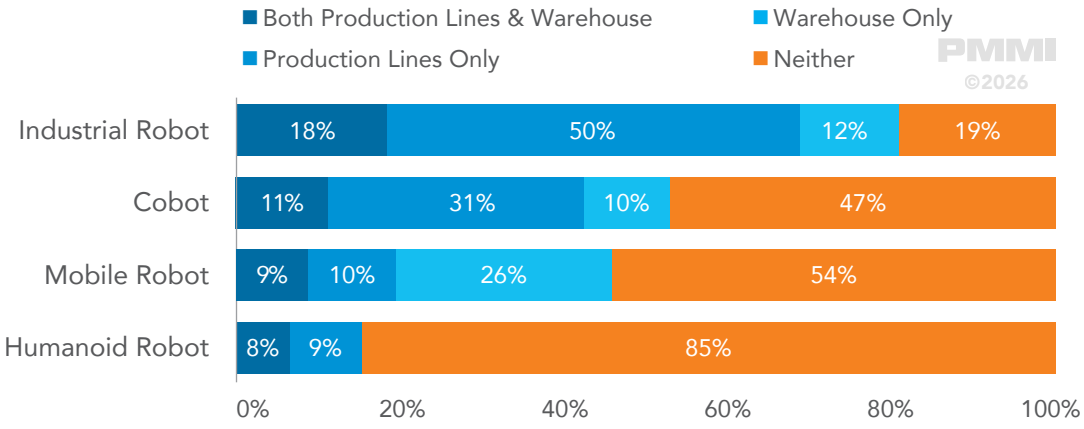
For **humanoid robots**, the survey indicates that the proportion of End Users utilizing the technology is expected to rise by 5 percentage points within the next year. This modest short-term growth reflects the perception of humanoid robots as an emerging technology; that is not yet ready for widespread deployment. This is exacerbated by ongoing questions surrounding reliability, cost, safety, payload capability, and the ability to deliver clear ROI in production environments.

> We don't offer the humanoid type of robots… The use-case hasn't been proven effective enough yet."
>
> OEM

Humanoids are, however, expected to experience rapid growth across the entire robotics industry over the next 5 years, with an average annual growth rate of 111%, suggesting that many of these concerns will temper in the coming years as the technology matures (Interact Analysis).

> With the kind of technological advancement that we see, and specifically, if we look at the advancement that's happening in China,, I see there could be a use for […] Humanoid robots in the future, I see some of its uses in the last mile option."
>
> CPG

Figure 10a. Expected use of robotics within End User operations in 12 months' time – by robot type and deployment area (n=125)



> Usage of humanoid robots is expected to rise by just 5% in the next 12 months

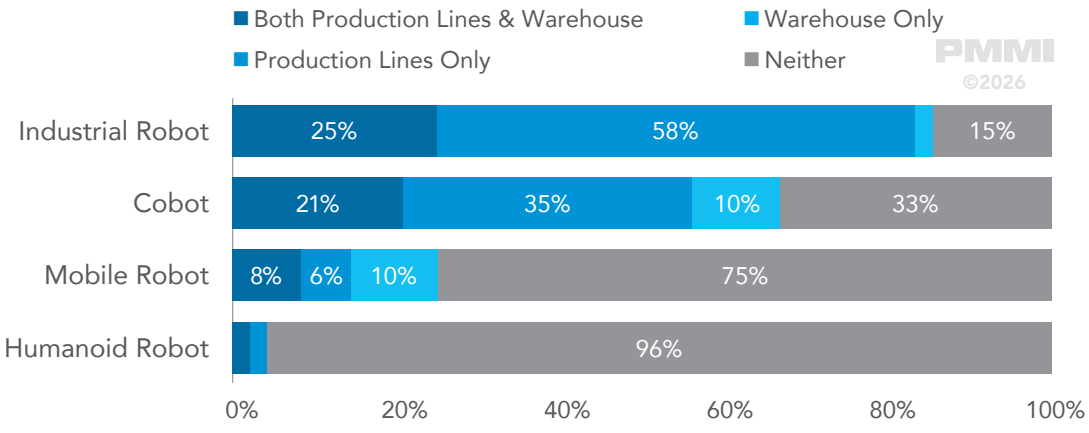
OEMS' FUTURE ROBOTICS PLANS

While the relative mix of applications within OEM robotics portfolios is expected to remain broadly similar over the next 12 months as of May 2026, the most notable change is the decline in the "neither" category for industrial robots to 15%, indicating the vast majority of OEM/Integrators expect industrial robots to be part of their portfolio within a year.
Interestingly, the survey data indicates that the proportion of OEMs/Integrators offering mobile robot products and solutions is expected to remain unchanged at 25% over the next 12 months (Figures 5b & 10b). This suggests that many OEMs/Integrators may not be fully capitalizing on the opportunity that partnerships with mobile robot vendors can provide. With End Users increasingly seeing mobile robots as an important part of future production lines and warehouse operations, OEMs without those capabilities risk failing to deliver fully integrated automation solutions aligned with evolving customer requirements.

> We're starting to look more at… some projects that involve transport and material handling, whether it's on a component level, bringing products to the line or taking the finished goods away from the line."
>
> CPG, *Pharmaceuticals Sector*

The proportion of OEMs/Integrators stating they include humanoid robots in their portfolio is not expected to change over the next 12 months. Given the high costs, technical uncertainty, and commercial risk currently associated with partnering with humanoid robot vendors, it is unlikely humanoid robots will become a meaningful part of many OEM and Integrator solution portfolios in the near term. With an emerging market, a large proportion of startups often fail to establish themselves and can fail, leaving customers or partners without support. Broader adoption will be reliant on the cost of the technology declining, reliability improving, and clear, proven use-cases being demonstrated within packaging, processing, and broader CPG operations.

Figure 10b. Expected offering of robotics within OEM/Integrator products and/or solutions in 12 months' time – by robot type and deployment area (n=48)



85% | Of OEMs expect to offer industrial robots in some capacity within the next year.

Key robotics applications of future interest to packaging and processing industry End Users

Multiple applications with limited current utilization were mentioned as being of key interest to End Users during interviews for this report:

1

Robotic arms for the loading of packaging machines with packaging materials (cartons, cups, etc.)

End Users expressed interest in using robotic arms to load packaging materials such as cartons, cups, trays, sleeves, labels, and other consumables into packaging machines. This application could help reduce repetitive manual handling, improve line consistency, and address labor shortages. However, current adoption remains limited as many existing lines have not been designed with robotic loading in mind. Human operators are often better suited to current line layouts, as they can flexibly cover multiple workstations. For greenfield sites, however, this application is of growing interest, as production lines can be designed with this application in mind, with robotic arms covering multiple workstations.

> Adding robotics to […] the loading of packaging materials into machines, it could be loading plastic cups, loading lids. […] So finding vendors that are integrating those sorts of solutions into the machine from the beginning. […] That's very interesting to us, and not many people are doing that."
>
> End User, *Food Industry*

2

Use of mobile robots to bring materials to the line

The use of mobile robots to transport raw materials to production or packaging lines is also an area of interest. While most current applications mostly favor taking pallets of finished goods away from the line, the appeal of using robots to deliver raw materials to production lines is strong. This is particularly true in facilities looking to reduce manual forklift use and support more flexible production layouts. However, current utilization remains limited, usually because of unsuitable plant footprints or operator workflows.

3

Mobile robots with cobot arms

End Users also showed an interest in mobile robots equipped with cobot arms, combining autonomous movement with the ability to pick, place, load, or unload items at different points across a facility. This potentially offers more flexible automation for tasks such as line replenishment, machine loading, or handling materials between workstations. However, it currently remains constrained by unsuitable footprints, and the added complexity of combining navigation, manipulation, and safety in dynamic production environments.

4

Processing applications

End Users are beginning to evaluate robotics further upstream in the production process, including ingredient handling, container loading, cleaning support, and general transfer of materials between processing steps. Adoption is currently limited because processing environments often involve stricter hygiene requirements, variable materials, more complex equipment interfaces, and more severe consequences if automation disrupts core production.

However, some OEMs are looking to expand their portfolio to cover these applications.

> It could be anything from helping to sort and position an item, [..]placing pork chops the right way into a packet […] or what we do a lot of is build multiple ingredients on top of each other like building a sandwich […] robotics can play a role in that."
>
> OEM, *Packaging Industry*

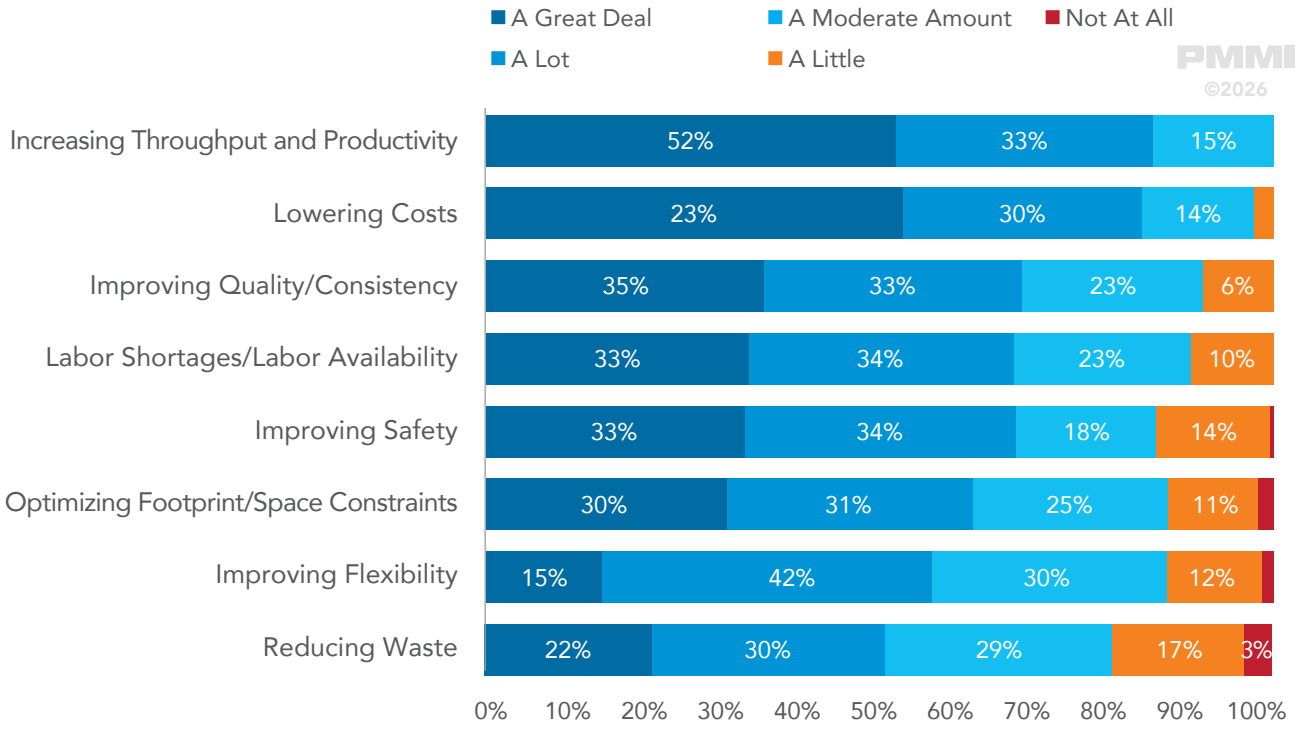
4

Drivers of Robotic Adoption

The primary factors driving End User adoption of robotics are increasing throughput and productivity and reducing costs. Other factors, such as improving quality and consistency, addressing labor shortages, and enhancing safety, are also key drivers. Reducing waste is rated as the least important factor by survey respondents.

> “Loading, packaging…. case erecting… so [End Users] started putting focus on this, because this is the next step of reducing cost, because they already have most of applications done by robotic palletizers and case packers.”
>
> Integrator

Figure 11a. The extent to which the following factors influence End Users' adoption of robotics *(n=125)*



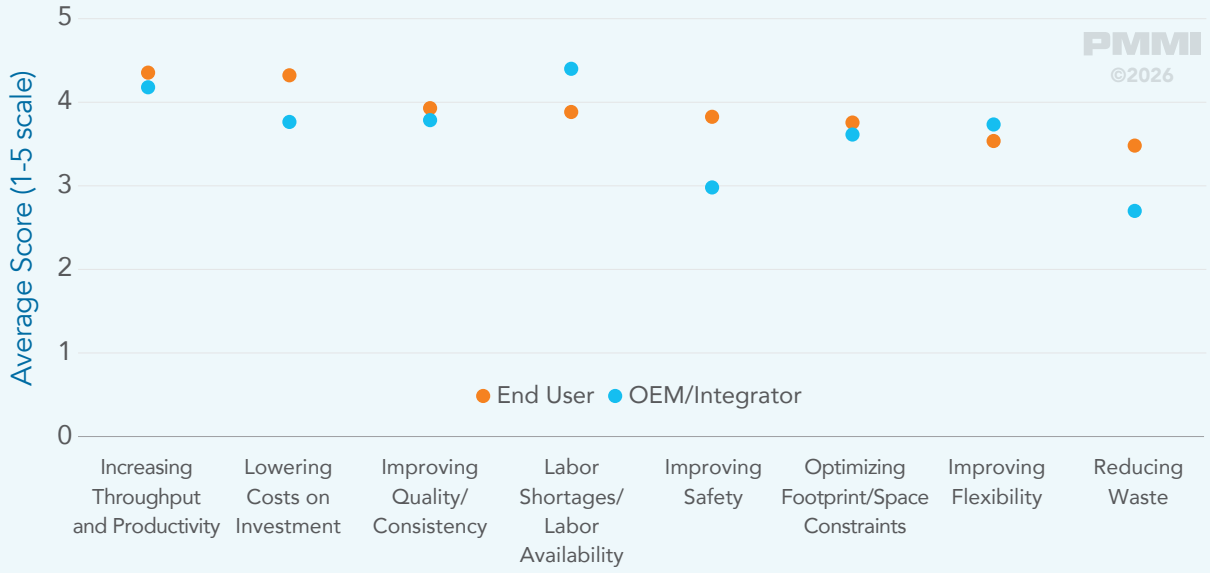
Increasing throughput and productivity is the most important factor driving adoption of robotics for End Users.

We compared End User ratings of the factors influencing their own robotics adoption with OEM/Integrator ratings of how much they believe those same factors influence their customers' decisions to implement robots. OEMs/Integrators recognize labor availability as an important adoption driver, but may overestimate its relative importance to customers. While OEMs/Integrators rated labor shortages/labor availability as the top factor influencing customer adoption, End Users placed equal or greater emphasis on productivity, ROI/cost reduction, and quality/consistency, suggesting that robotics adoption decisions are driven by a broader business case than labor availability alone.

In particular, End Users rated cost reduction/ROI, safety, and waste reduction higher than OEMs/Integrators expected, suggesting there is an opportunity for suppliers to better align their messaging with the full range of customer decision drivers.

> Eliminating carpal tunnel type injuries and workplace safety concerns from repetitive motion, that drove us to the collaborative robots, if you will, and so that that was kind of a big factor as we got into analyzing solutions from a safety standpoint."
>
> CPG, *Pharmaceutical Sector*

Figure 11b. Difference between OEM expectations and End User responses on robotics adoption drivers *(n=125 End Users, n=48 OEMs/Integrators)*



OEMs significantly over-estimated the importance of labor shortages in driving End User adoption

Criteria Used in Selecting Robotic Products and Solutions

End Users assess a range of criteria when selecting appropriate robotics products and solutions. Among these, reliability and uptime performance ranks as the most important factor, scoring considerably higher than other criteria, with 69% of End Users rating it as 'very important'.

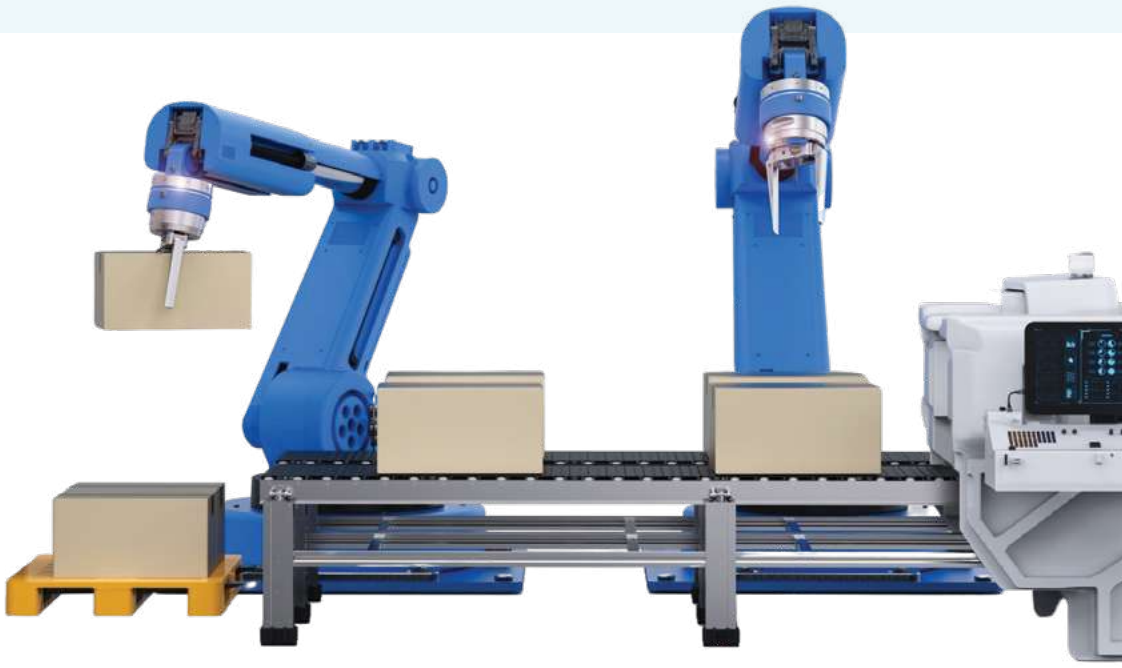
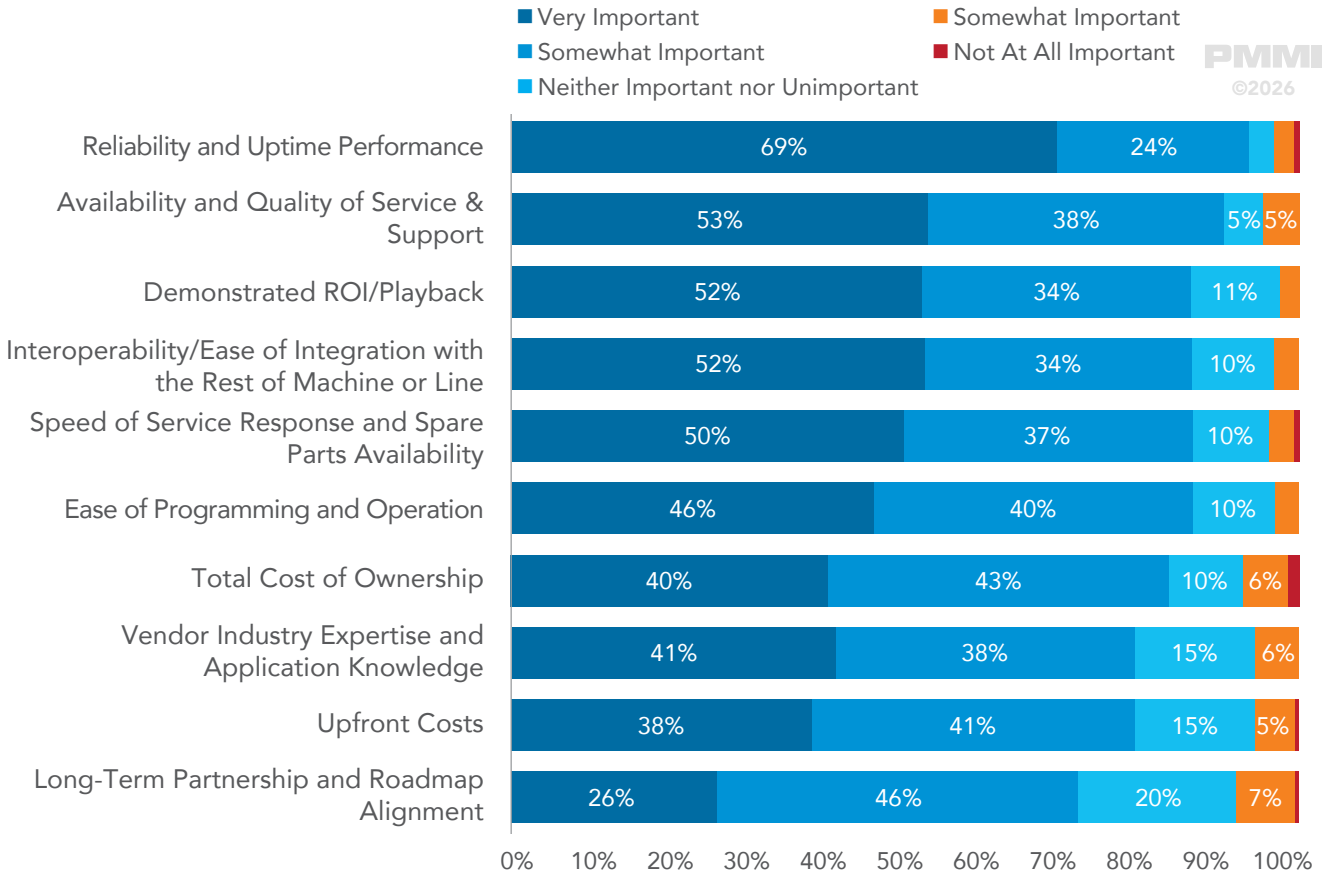


Figure 12a. The importance of various criteria in End Users' decision-making when selecting an OEM/Integrator *(n=125)*



Reliability/uptime performance is the most important criteria for End Users.

For End Users, robotics adoption is not only about automation capability, but it also maintains line performance and protects overall equipment effectiveness. Even if a robotic solution offers strong functionality or potential labor savings, it is unlikely to be adopted at scale unless it demonstrates dependable performance, strong uptime, ease of maintenance, and ease of integration with existing machinery and workflows.

Availability and quality of service and support are seen as key factors among End Users experiencing skills gaps in their workforces, as they rely on OEMs and Integrators to solve a wider range of maintenance issues.

> "I would say just an overall trend, you know, is that our customers rely on us as the OEM more than they used to."
>
> OEM, *Packaging Machinery*

A key takeaway is that all the factors we specify are deemed important, with all of them identified by at least 70% of End Users to be either 'somewhat important' or 'very important'.

OEMs' understanding of the selection criteria End Users apply when assessing robotic products and solutions appears to be considerably more accurate than their understanding of the broader drivers behind robotics adoption. This is likely to be because OEMs/Integrators are more directly involved in solution evaluation and purchasing processes, where technical specifications, cost, integration requirements, uptime expectations, and implementation risks are discussed in detail.

The main factor OEMs overestimate is upfront cost; while capital cost remains an important consideration, the price of robotics has decreased significantly over recent years. This means that upfront cost is no longer viewed as a key differentiator, compared with operational factors such as reliability, uptime, flexibility, ease of use, and integration with existing lines. End Users are increasingly evaluating robotics through the lens of total value and operational performance, rather than purchase price alone.

OEMs underestimated ease of integration with the rest of the machine or line most acutely. This is important because End Users are not simply evaluating the robot in isolation; they are assessing how effectively the solution can be integrated into existing workflows, production layouts, and surrounding equipment. For many CPGs, a robotic solution that is technically capable but difficult to integrate may create too much implementation risk, limiting its attractiveness despite strong standalone performance.

Figure 12b. The difference between OEM's predictions of their End Users' responses and End Users' actual responses as to the importance of each criterion when selecting OEMs for robotic deployments *(n=125 End Users, n=48 OEMs/Integrators)*

> OEMs generally have a good understanding of which criteria are important to End Users.

5

Key Barriers to Adopting Robotic Products and Solutions

Despite a majority of both End Users and OEMs/Integrators expecting to adopt robotic technologies in the 12 months from May 2026, there are still some who do not expect this to be the case. In an open-ended follow-up question, these respondents were asked to explain why they do not expect to utilize or offer robotics in the next year.

Across all robot types, the most common response was 'Not needed / No applicable use-case.' This suggests that, for many non-adopters, the primary barrier is not necessarily cost, technical capability, or lack of awareness, but rather the absence of a clearly defined application where robotics would deliver sufficient operational value.

In these cases, respondents may not see a clear fit between available robotic solutions and their specific production processes, facility layouts, product formats, throughput requirements, or investment priorities. OEMs/Integrators may need to provide clearer business cases for robotics, helping customers identify suitable applications, quantify operational benefits, and understand the potential return on investment more fully.

The third-highest reason for not adopting mobile robots is 'footprint not suitable'. In many existing CPG facilities, warehouse and production layouts were not originally designed for mobile robots. This makes integration more complex and can limit the achievable value. Therefore, mobile robot deployment may be easier in newer facilities, greenfield sites, or operations undergoing layout redesign, where material flows and robot pathways can be planned from the outset.

> I would say the brownfields in particular for things like AMRs and AGVs… That's much more difficult, usually due to just constraints of obstacles and the way the layout of the plant is."
>
> OEM, *Packaging Machinery*

Figure 13. Top 5 reasons provided by End Users when asked in an open question why they don't expect to be utilizing each robot type in 12 months' time

Industrial Robot

1. Not needed/No applicable use case
2. High cost
3. Integration complexity
4. Lack of budget
5. Company not ready

Collaborative Robot

1. Not needed/No applicable use case
2. High cost
3. Company not ready
4. Too slow
5. Not a priority

Mobile Robot

1. Not needed/No applicable use case
2. High cost
3. Footprint not suitable
4. Other technologies more effective
5. Company not ready

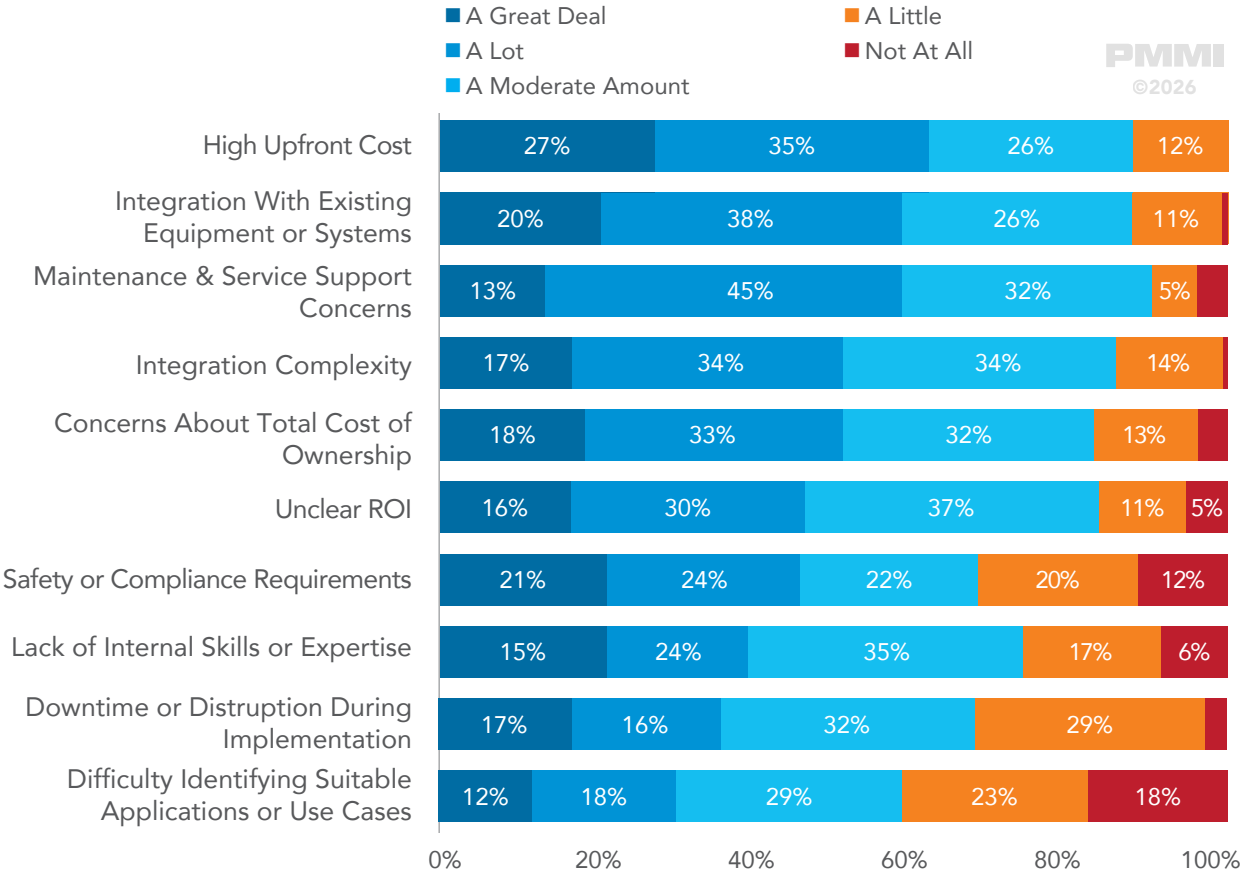
Humanoid Robot

1. Not needed/No applicable use case
2. High cost
3. Technology not ready
4. Other technologies more effective
5. Not a priority

Among End Users evaluating or implementing robotics, the top three barriers are: high upfront costs; integration with the existing equipment or systems; and maintenance and service support concerns.

Despite high upfront costs being rated as one of the less important factors for End Users comparing OEMs' solutions, it is ranked as the leading barrier to deploying robotics technology. This suggests cost plays different roles at various stages of the decision-making process. At the initial evaluation stage, high capital expenditure can prevent projects from moving forward or make it difficult to secure internal approval. However, once a robotics project has a clear business case and enters vendor or solution selection, End Users appear to prioritize operational factors such as reliability, uptime, ease of integration, and support over upfront price alone, as seen earlier.

Figure 14a. The extent to which the following factors act as barriers when End Users are evaluating or implementing robotics *(n=125)*



High up-front costs are the largest barrier to entry for End Users evaluating or implementing robots.

Safety and compliance requirements also remain a key barrier to adoption among packaging and processing End Users. Historically, cobot safety standards and practical implementation guidance were not always clear, which meant many End Users continued to deploy guarding to ensure safety compliance. While newer standards are helping to reduce concerns, safety considerations are still particularly acute where robots operate near high-traffic areas.

For mobile robots, safety concerns can also be linked to workforce acceptance. Although designed with safety features, employees may still be wary of robots operating in shared spaces alongside operators and forklifts. As a result, OEMs/Integrators with mobile robots in their portfolio may need to invest in creating additional training and communication to build confidence and ensure employees understand how to work safely around the technology.

> The interpretation of the safety standards has been a little bit subjective… the more that there's been established precedents and case studies, we're coming to more of a consensus of what is safe and what's not, and it becomes less of a discussion point on each application."

OEM, *Packaging Machinery*

How OEMs Perceive Barriers to Mobile Robot Adoption

OEMs and Integrators are generally aligned with End Users on several major robotics adoption concerns, including upfront cost and maintenance and service support. However, the comparison highlights several gaps between the barriers End Users report when evaluating or implementing robotics and the factors OEMs/Integrators believe End Users prioritize. End Users rated integration with existing equipment or systems and safety or compliance requirements higher than OEMs/Integrators, suggesting that these issues may carry more weight in adoption decisions than OEMs expect. This is especially relevant in brownfield environments, where production lines may include machinery from multiple vendors, legacy control systems, facility constraints, and limited tolerance for downtime. Even when a robotic solution is technically capable, End Users may hesitate if integration introduces too much complexity, requires significant line modification, or creates uncertainty around uptime and commissioning timelines.

> Anybody can buy a robot… but there's a lot that goes into the full integration that has to be understood and has to be done correctly."
>
> CPG

Conversely, OEMs/Integrators rated lack of internal skills or expertise higher than End Users did. This may reflect OEMs' greater visibility into the technical capabilities required after deployment, including maintenance, troubleshooting, programming, and lifecycle support. However, from an End User perspective, internal capability may be viewed as a manageable issue if the supplier can provide strong training, service support, remote diagnostics, and ongoing maintenance packages.

Figure 14b. Difference between OEM expectations and End User responses on barriers to robotics adoption *(n=125 End Users, n=48 OEMs/Integrators)*

> OEMs/Integrators view internal skills gaps as a larger customer decision factor than End Users do.

6

Post-Installation Benefits and Challenges

The top five benefits expected by End Users when implementing robots or cobots in the 2022 PMMI Robotics and Cobots Report were:

Reduce labor and repetitive tasks

Increase speed and productivity

Achieve repeatable and consistent product handling

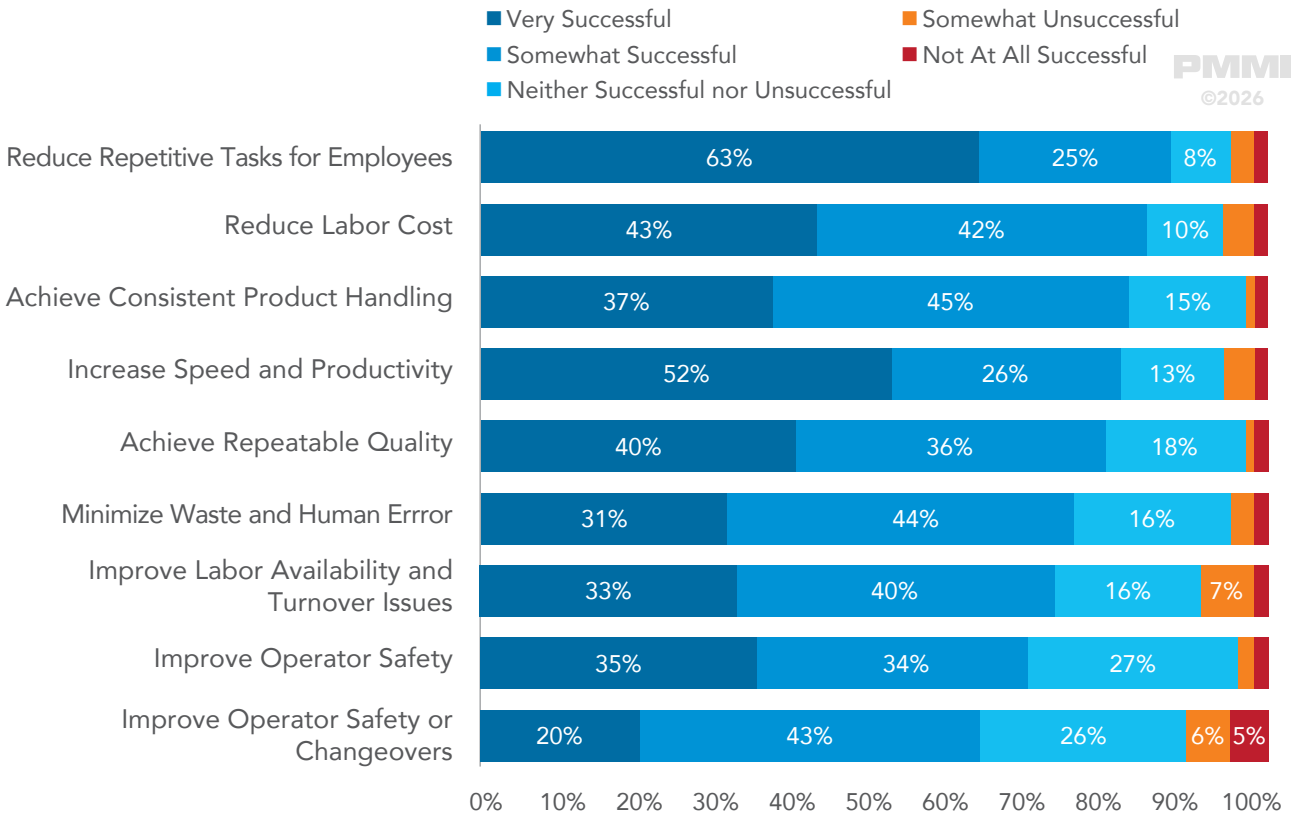
Improve operator safety

Minimize waste and human error

For 2026, we reassessed these five expected outcomes to understand how successful robotics implementations have been after installation. The results indicate that robotics has delivered positive results across most of the original expectations. Four of the five outcomes had more than 75% of End Users reporting that implementation had been either 'somewhat successful' or 'very successful', indicating robotic technologies are generally meeting expectations in areas such as labor/repetitive tasks reduction, productivity improvement, process consistency, and waste or error reduction.

However, improving operator safety was one outcome that did not reach this threshold, with 31% of respondents reporting either that there had been no change to operations or that implementation had been unsuccessful. This may reflect the fact that safety improvements are often less immediately visible or harder to quantify than productivity or labor-related benefits. In some cases, robots may reduce manual handling or repetitive tasks but still require guarding, operator interaction, or new safety procedures, meaning the perceived impact on safety is limited.

Figure 15. The extent to which implementing robotics has been successful in achieving the following outcomes *(n=125)*



Improved operator safety is one area that has generally not been perceived as successful.

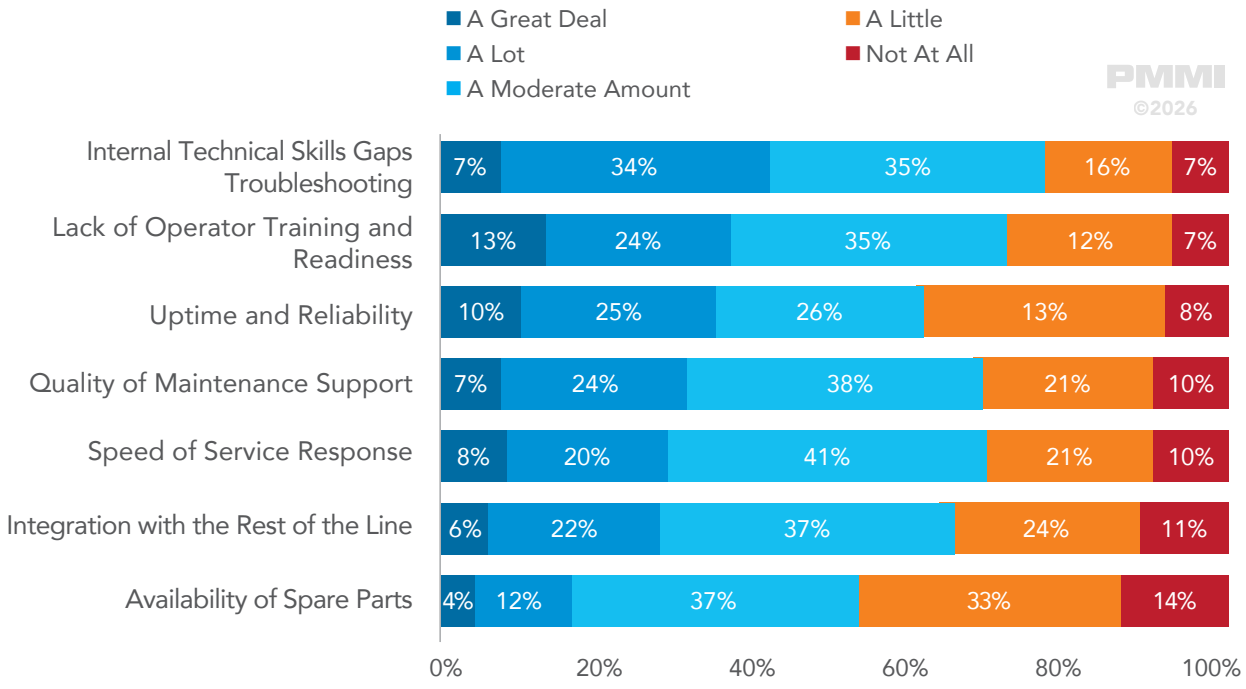
End Users identified internal skills gaps as the most significant operational challenge experienced after installing a robotic solution. This indicates that, while robotics technology is becoming more accessible, many CPG manufacturers still face difficulties building the in-house expertise required to operate, troubleshoot, and maintain robotic systems effectively.

Other key challenges identified by End Users include lack of operator training, uptime and reliability issues, and the quality of maintenance support. These factors are closely linked: insufficient training can limit operators' ability to respond to faults or changeovers, while limited internal expertise can increase reliance on external support. If maintenance support is slow or inconsistent, even relatively minor issues can lead to extended downtime and reduce confidence in the robotic solution.

Successful robotics adoption depends both on the initial installation and the strength of the support ecosystem around the technology. End Users have voiced their need for adequate training, responsive technical support, and better knowledge transfer from OEMs/Integrators to ensure robotic systems deliver sustained operational value after deployment.

> "The biggest barrier is keeping the robot running because the maintenance technical knowledge is weak to keep up with any change or unexpected stops… They are very afraid to implement any solution that's going to start to be out of their hands."
>
> Integrator

Figure 16. The extent to which the following were found to be operational challenges within End User operations after deploying robots *(n=125)*



Internal skills gaps are the most significant operational challenge according to End Users.

When asked in an open-ended question about what OEMs/Integrators could do to provide better support for robot deployment, End Users identified five key areas:

1 IMPROVE MAINTENANCE SUPPORT

> Faster help ticket response with the right technicians. We will have to do a call or two before getting the correct tech to assist with the described issue. Easier paths to pass along fault logs may minimize this time and allow for the correct tech to be available for the first call."

2 IMPROVE TRAINING

> I believe more thorough training of robotic operations would allow for confidence in operating, which would directly contribute to increased uptime."

3 IMPROVE EASE OF INTEGRATION

> Better case by case integration with legacy systems."

4 IMPROVE ROI AND BUSINESS CASE CLARITY

> Making need/application clear and compelling, and clearly lay out total cost of ownership and cradle-to-grave lifecycle of the equipment and technology."

5 IMPROVE SPARE PART AVAILABILITY

> The biggest issues we have had so far are in relation to availability and lead time of parts."

These responses broadly align with the primary factors highlighted in the previous graph, particularly surrounding integration, reliability, training, and service support. However, the open-ended responses also introduced an additional theme: the need for clearer ROI and clarity around business cases. This suggests End Users are not only looking for technically capable robotic solutions, but also for help understanding where robotics can create measurable value, how quickly they can expect a return on their investment, and what operational outcomes can realistically be achieved.

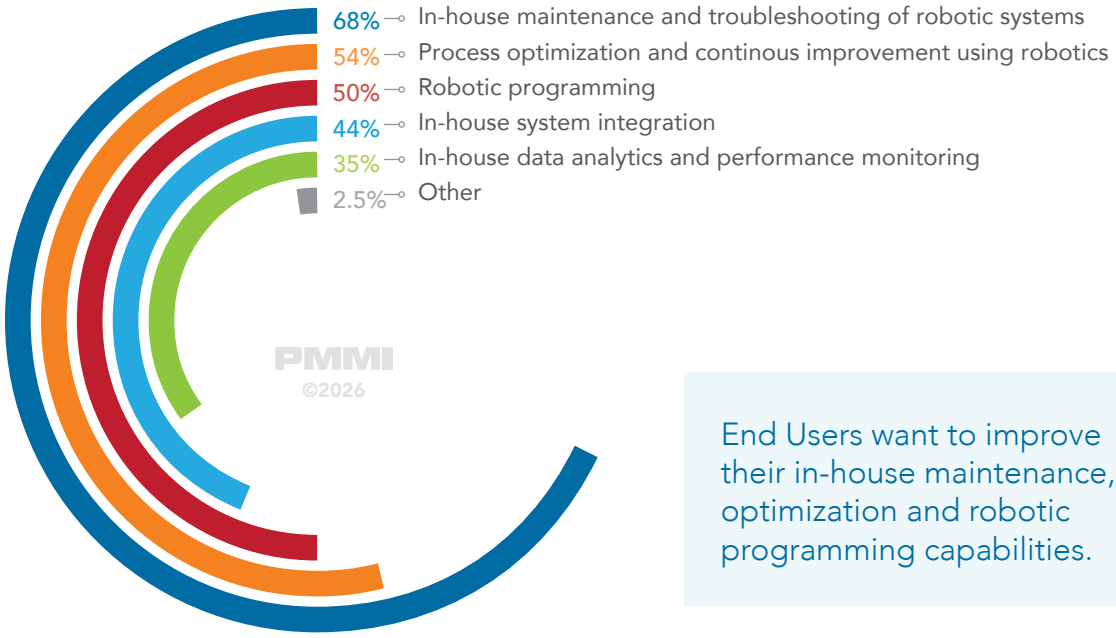
With a strong emphasis on communication and practical support, there is an opportunity for OEMs/Integrators to play a more consultative role in the adoption process. Beyond supplying equipment, they can help customers identify suitable applications, quantify expected savings or productivity gains, assess implementation risks, and build internal confidence in the investment case. Providing clearer business cases could be particularly important for those End Users that have not identified a sufficiently compelling use case to justify adopting robotic technology.

> That's an important part for us as well, that's why we reach out to our internal network to understand the experiences from other markets, so that we not only get the right vendors to work with, but at the same time we could use their business cases to start with, and then adapt it for our own process."
>
> CPG, *Food Industry*

End Users identified several workforce capabilities that need improvement to support the continued growth of robotics (reflecting findings in the previous section). They also recognize the need to strengthen in-house maintenance capabilities to reduce reliance on external OEMs/Integrators. As robotics becomes more widely deployed across production lines and within warehouses, internal teams will need to develop the capability to diagnose faults and resolve issues without turning to service providers in each instance.

Interestingly, a significant proportion of End Users also identified a need to develop stronger robotics programming skills. Historically, many End Users have relied on OEMs or Integrators to make programming changes, with internal teams carrying out basic adjustments. However, our findings suggest some End Users may be looking to bring more programming capability in-house, enabling them to make application changes and support more complex SKU or format changeovers.

Figure 17a. Workforce capabilities End Users need to develop to support the growth of robotics *(n=121)*



End Users want to improve their in-house maintenance, optimization and robotic programming capabilities.

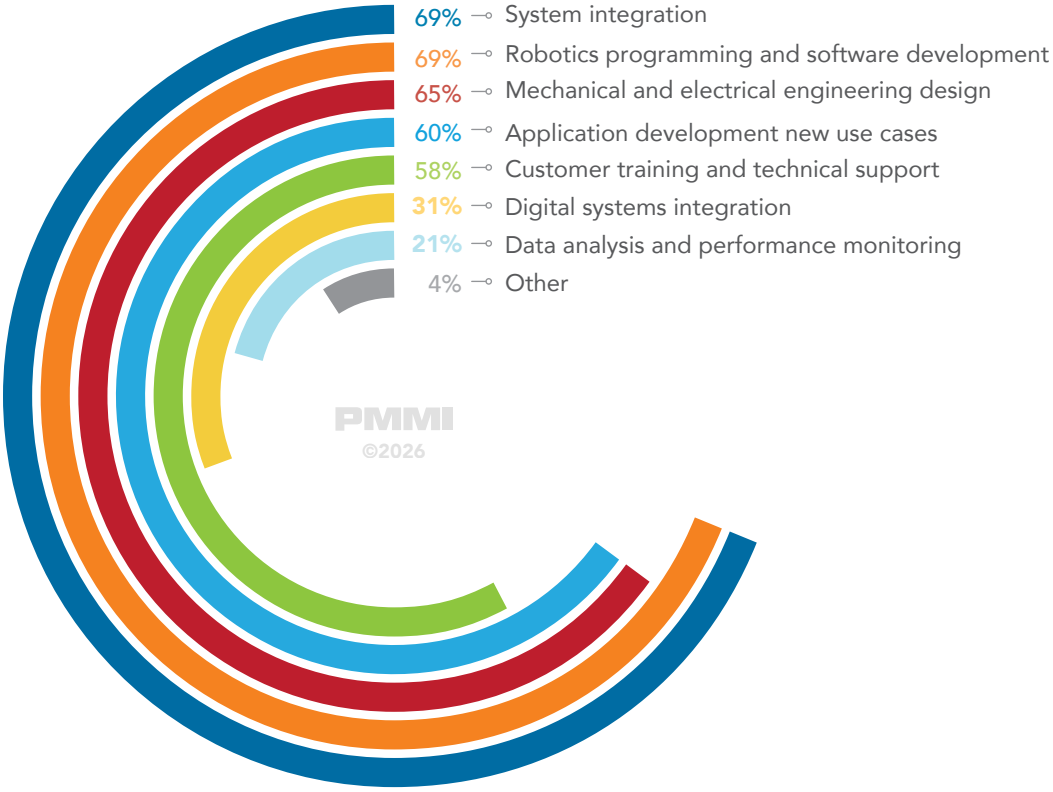
When OEMs/Integrators were asked the same question about workforce capabilities that need to be developed for successful robotic deployments, system integration, and robotics programming and software development came out on top. The emphasis on these capabilities reflects the increasing complexity of robotic deployments. End Users are looking for a solution that can operate reliably as part of a wider production or logistics ecosystem. As a result, OEM/Integrator workforce skills around integration and software will become a critical advantage in ensuring delivery of scalable, reliable, and flexible robotic solutions.

Customer training and technical support may be underrepresented in this graph, as End Users identified it as the second most impactful operator challenge. This suggests that while OEMs/Integrators recognize the importance of technical capabilities such as system integration, robotics programming, and software development, they may be placing less emphasis on the ongoing support required after installation.

For End Users, ongoing customer training & technical support is critical. Operators, maintenance teams, and line managers must be confident to use, troubleshoot, and optimize systems. Without sufficient training and responsive technical support, even well-integrated robotic solutions can face lower utilization, longer downtime, slower fault recovery, and reduced operator confidence. OEMs should treat customer training, documentation, service support, and post-installation knowledge transfer as core workforce capabilities, rather than secondary support functions.

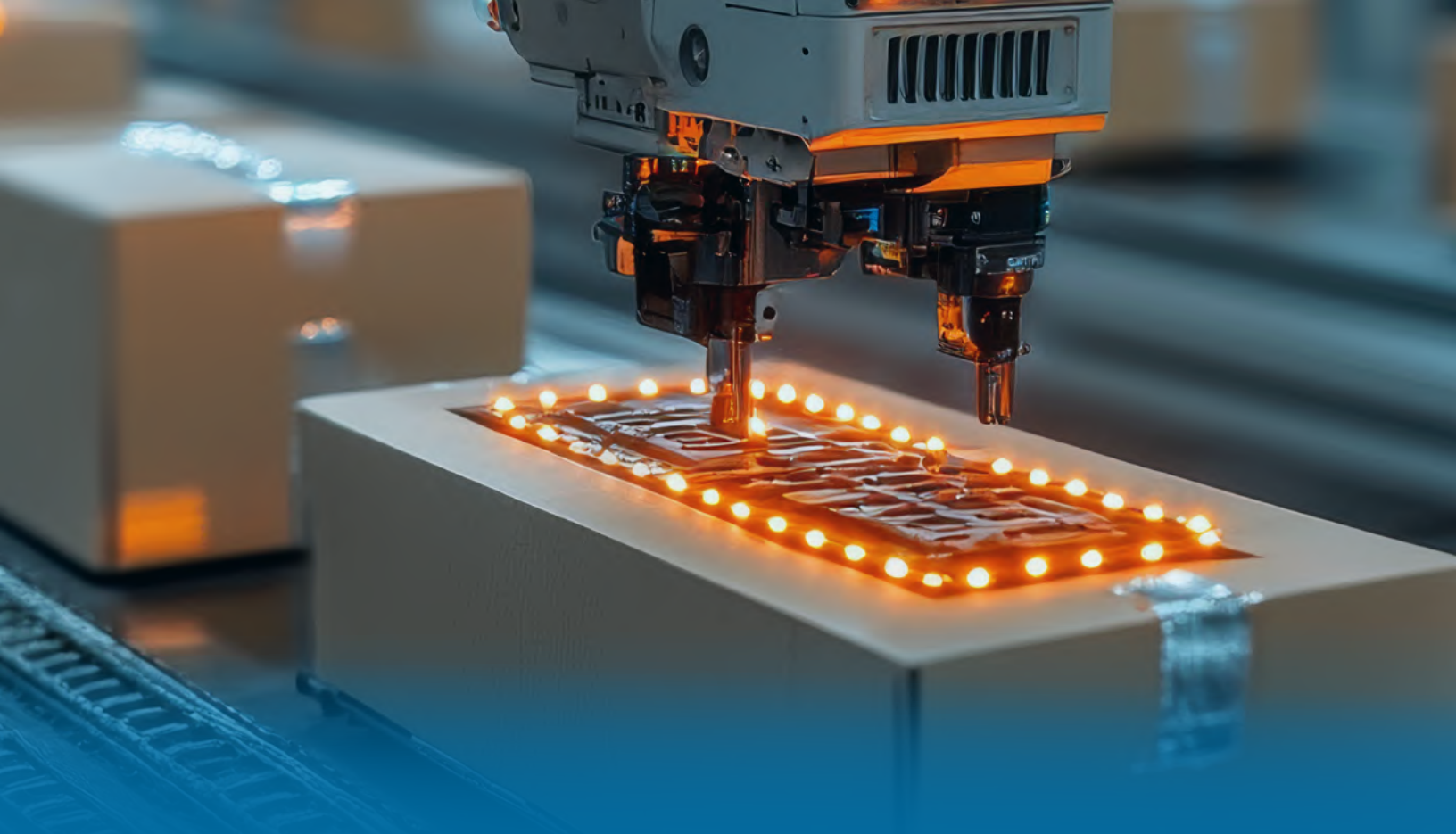
> I would definitely encourage the OEMs to show the machine operation more than just putting a PowerPoint presentation with bullet points."
> CPG

Figure 17b. The workforce capabilities OEMs/Integrators believe they need to develop further to support the growth of robotics *(n=48)*



% of OEM / Integrators

OEMs have identified the need for system integration, programming and software capabilities in particular to support robotics growth.

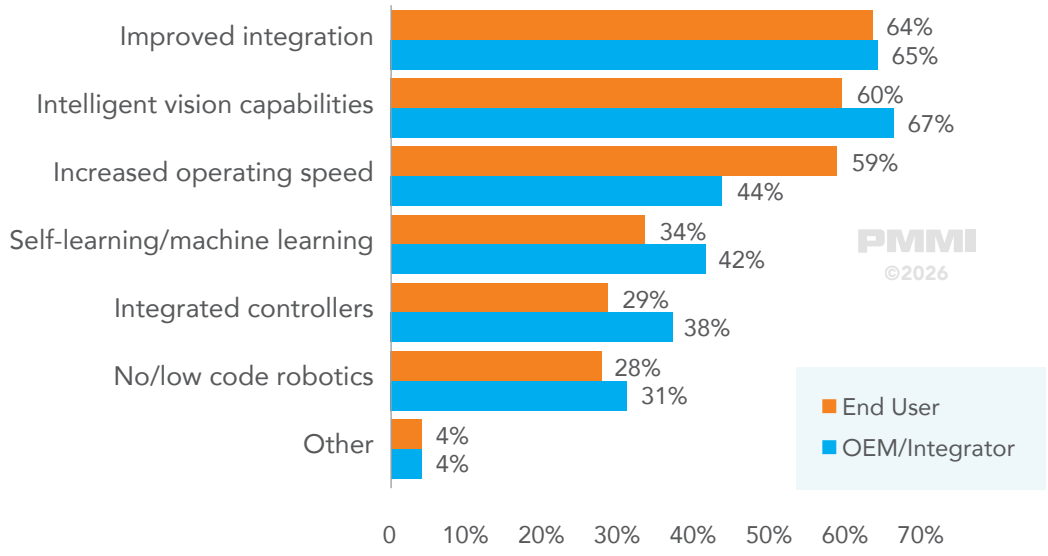


7

Future Developments in Robotic Solutions

Improved integration, intelligent vision capabilities, and increased operating speed are the key technological developments with the greatest impact on the robotics market for the processing and packaging industry, according to both End Users and OEMs/Integrators.

Figure 18. The top technology developments that have had the greatest impact on the market over the past 5 years *(n=122 End Users, n=48 OEM/Integrators)*



End Users and OEMs/Integrators are aligned on their top three technological developments.

Better integration

Better integration is particularly important, as End Users need robotic systems that can connect reliably with existing machinery, controls platforms, and wider line or warehouse workflows. Robotics adoption is increasingly being shaped by the ability to deliver complete, production-ready solutions rather than standalone robotic hardware. Easier integration reduces implementation risk, shortens commissioning timelines, and makes robotics more deployable in both brownfield and greenfield facilities.

Intelligent vision capabilities

Intelligent vision capabilities are also having a major impact by expanding the range of tasks robots can perform. Vision systems allow robots to identify, locate, orient, inspect, and handle products with greater flexibility. This enables more complex pick-and-place, sorting, quality inspection, depalletizing, and mixed-product handling applications. This is especially important in CPG environments, where product formats, packaging types, and SKU variation create challenges for traditional fixed automation.

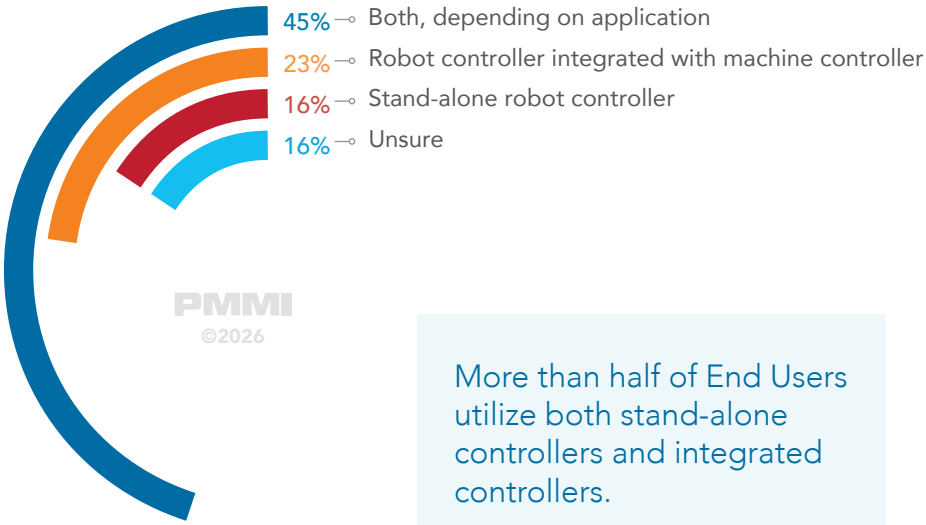
Increased operating speeds

Increased operating speeds enable robotic systems to meet the throughput requirements of high-volume packaging and processing lines. Faster robots can improve productivity, reduce bottlenecks, and make automation viable in applications where previous generations of robots may not have been able to keep pace with line speeds.

Integrated controllers

Integrated controllers allow robotic systems to be controlled directly through the machine controller, rather than relying on a separate controller. This can provide several advantages, particularly for applications that require a high degree of synchronization between the robot and the surrounding machine. By controlling the robot and machine through a shared platform, OEMs can achieve tighter coordination of motion and timing, which is especially valuable in complex packaging and processing applications where robots must work closely with other machine functions. However, integrated controllers may be less suited to OEMs/Integrators that primarily deliver highly customized solutions. Compared with using a standard robot controller, integrated control architectures can require more upfront engineering, programming, and validation work. This is particularly true when each project has different machine layouts, robot tasks, or customer specifications. As a result, the benefits are strongest when OEMs can standardize the solution across multiple machines or repeatable applications.

Figure 19. Current level of robotic controller integration in End User operations *(n=121)*



More than half of End Users utilize both stand-alone controllers and integrated controllers.

% of End Users

Despite machine learning ranking fourth by both End Users and OEMs/Integrators for impact over the past five years, AI is likely to have a much larger influence on the robotics market in the near future. Historically, the impact of machine learning in CPG robotics has been more targeted, often focused on specific applications such as vision inspection, predictive maintenance, or process monitoring. However, recent advances in AI have the potential to transform how robots perceive, adapt, learn, and make decisions in more variable production and warehouse environments.

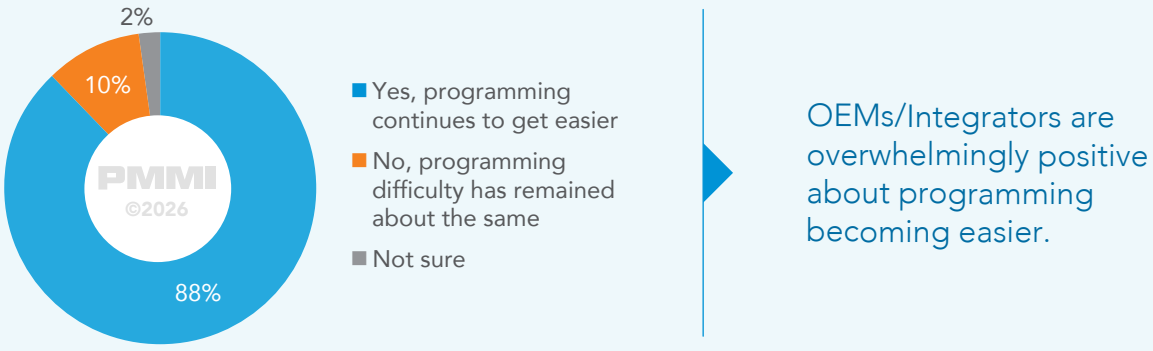
> AI... I think it's a game changer for robotics now, not only for programming, but troubleshooting and analytics, everything. I think AI is going to contribute a lot to simplification and, you know, the growing of the robotics."
>
> Integrator

For CPG operations, this could be particularly important because many applications involve high SKU variation, changing packaging formats, inconsistent material presentation, mixed-case handling, and dynamic line or warehouse conditions. AI-enabled robotics could help reduce the need for extensive manual programming, improve robot flexibility during changeovers, enhance vision-guided picking and inspection, and support more autonomous troubleshooting or optimization. While machine learning is not currently seen as the most impactful development historically, we expect AI to become a more significant enabler of future robotics adoption as solutions move from highly structured, repetitive tasks toward more flexible and adaptive applications.

88% of OEM/Integrator respondents stated that robotics programming has become easier. This represents an important development for the robotics market, as programming complexity has historically been one of the key barriers to wider adoption. This is particularly the case for OEMs, Integrators, and End Users with limited in-house robotics expertise.

> The low code environment [has] taken some of the fear out of implementing robotics, […] the advances in coding have made that process easier, also from our standpoint. So, it's getting so that we are able to develop code… [and] it's easier to redeploy that code and reuse it in different applications than it was before."
>
> OEM, *Packaging Machinery*

Figure 20. Has robotics programming become easier for OEMs/Integrators? *(n=48)*

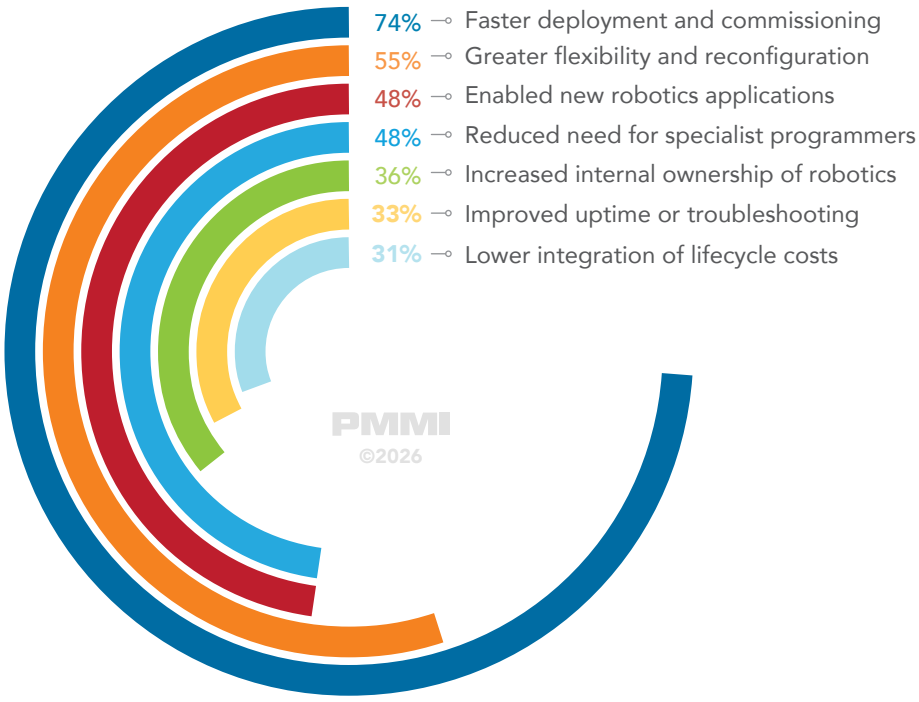


Improvements appear to be driven by more intuitive programming interfaces, drag-and-drop software, simulation tools, and better integration between robots, vision systems, and machine controls. In the case of cobots, simplified programming has been a particularly important factor in making robotic automation more accessible for lower-complexity applications and companies taking their first steps into robotics.

Easier programming can reduce engineering time, shorten commissioning cycles, simplify changeovers, and lower the level of specialist expertise required to deploy and maintain robotic systems. For OEMs/Integrators, this can make it easier to include robotics within their standard solution portfolios, while for End Users it may improve confidence that robotic systems can be adapted, supported, and optimized over time.

> The interfaces have gotten easier and more intuitive for us… we have dozens of controls engineers… If we have a project where they need to, they can pick it up very quickly, versus maybe having to go to weeks of specialized training just to program the robot."
>
> OEM, *Packaging Machinery*

Figure 21. Benefits for OEM/Integrator from robotics programming becoming easier *(n=42)*



% of OEM / Integrators

Easier programming has improved speed of development, increased flexibility and increased the range of applications OEMs and Integrators can offer.

8

Design, Integration, and Service

The company type that End Users most commonly employ to integrate robotics with their production lines is packaging and processing machine OEMs, with 69% of respondents stating they use them today. This is followed by system Integrators (40%), internal engineering teams (36%), and robotics manufacturers (32%).

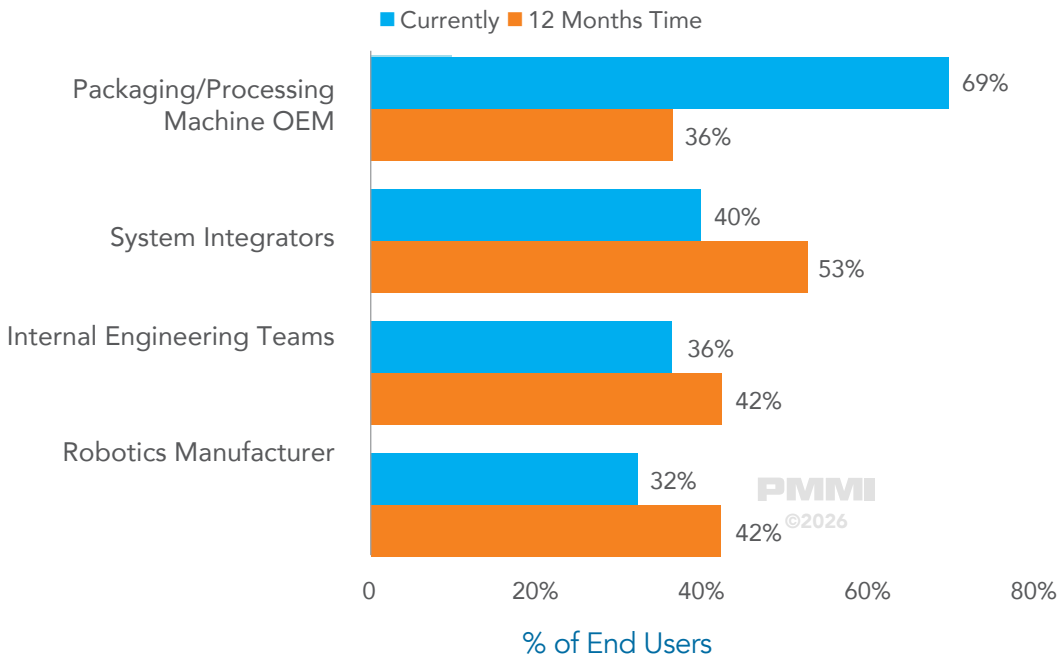
However, the survey data indicates that this is likely to change over the next 12 months. The number of respondents stating that they expect to continue using packaging and processing machine OEMs for robotics integration falls by almost half, to 36% of respondents. By contrast, all other company types see an increase in expected utilization, with system Integrators appearing likely to become the most used company type for robotic integration over the next year.

The shift away from packaging and processing machine OEMs is likely due to the increasing complexity of robotic deployments. As End Users move beyond individual machine-level applications and begin integrating robotics across wider production lines, they may require broader integration expertise than some machine OEMs can provide. For example, system integrators are currently better positioned to manage integration of mobile robots, and end-to-end solutions across the wider production ecosystem, which includes the warehouse. This shift may reflect End Users requiring a single integration partner capable of coordinating multiple automation technologies, software systems, and workflows across both production and warehouse environments.

This does not necessarily suggest that packaging and processing OEMs will become less important to robotics adoption. Rather, their role may require stronger collaboration with system integrators and mobile robot manufacturers. OEMs that can build stronger integration capabilities or form effective partnerships may be better positioned to retain their role in future robotics projects.

> We've done projects where we have somebody else providing the AMR system and it needs to work with our machine… we were just interfacing it. We are doing right now our first system where we are actually supplying the AMR system and doing the software and supplying the vehicles for a large project we're working on."
>
> OEM, *Packaging Machinery*

Figure 22a. The company types End Users currently use to integrate robotics onto their production line, and how this will change in 12 months' time *(n=118)*



End Users expect to rely more on system Integrators within the next 12 months.

The servicing of robotic solutions tells a similar story. Despite packaging machine OEMs being most commonly used to service robots, with 61% of responses, the survey data indicates this will decrease significantly to 44% in 12 months' time. Most other company types are expected to increase, with both system integrators and 3rd party maintenance providers expected to rise the most in usage (by 14 percentage points).

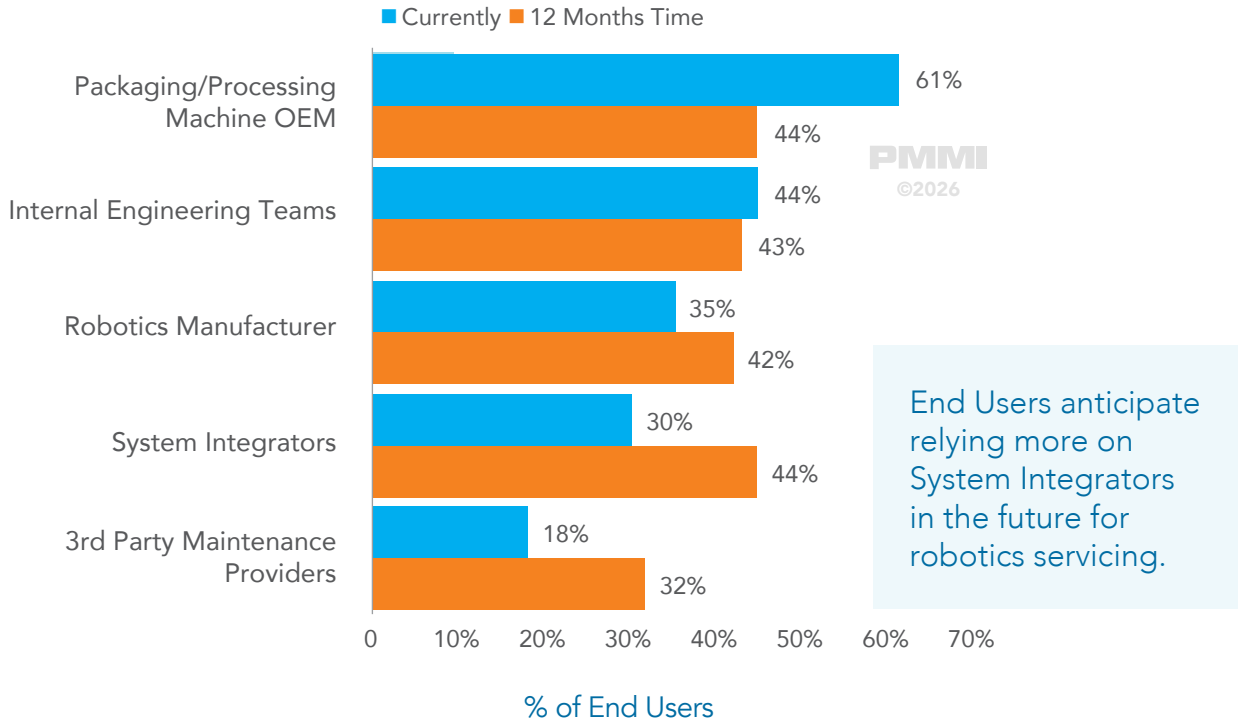
It is not clear exactly what is driving this shift away from machine OEMs for servicing, but it may be linked to the operational challenges outlined in the previous section (Figure 16). 31% of respondents stated that the quality of maintenance support was an operational challenge either 'a lot' or 'a great deal.' While this may not be a direct causal relationship, it suggests that service quality, responsiveness, or robotics-specific maintenance capability may be influencing End Users' future servicing preferences.

This shift may also reflect the importance End Users place on complete systems rather than individual machines. End Users are likely to place greater value on service providers that can support the performance of the full system. In this context, servicing is not just about maintaining an individual robot or packaging machine, but ensuring that the wider automated line continues to operate reliably and efficiently. This may benefit system integrators, which are often better positioned to understand and service the full end-to-end solution.

To retain a stronger role in robotics servicing, OEMs should look to improve the quality and responsiveness of their maintenance support. This could include deploying newer service technologies such as remote diagnostics, remote monitoring, and predictive maintenance tools, alongside ensuring fast response times. By improving visibility into system performance and resolving issues more quickly, OEMs can strengthen customer confidence and reduce the risk of End Users shifting servicing responsibility to system Integrators or other providers.

> "Predominantly our supplier evaluation is based on which suppliers who have also good after sale services out in the market. Again, we are not a very maintenance heavy company […] so that's why we want to look at options that we are comfortable to use in the future."
>
> CPG, *Food Industry*

Figure 22b. The company types End Users currently use to service the robotics on their production lines, and how this is likely to change in 12 months' time *(n=117)*



End Users anticipate relying more on System Integrators in the future for robotics servicing.

In terms of design, there has been one key shift from 2022 to 2026 when comparing survey responses between the two reports. The proportion of OEM respondents who purchase the robot from the robot manufacturer, but design end of arm tooling (EOAT) in-house has decreased (from 40% to 29%), while the proportion of respondents who do a combination of some design in-house and rely on the robot and EOAT supplier for some assistance has increased (from 14% to 29%).

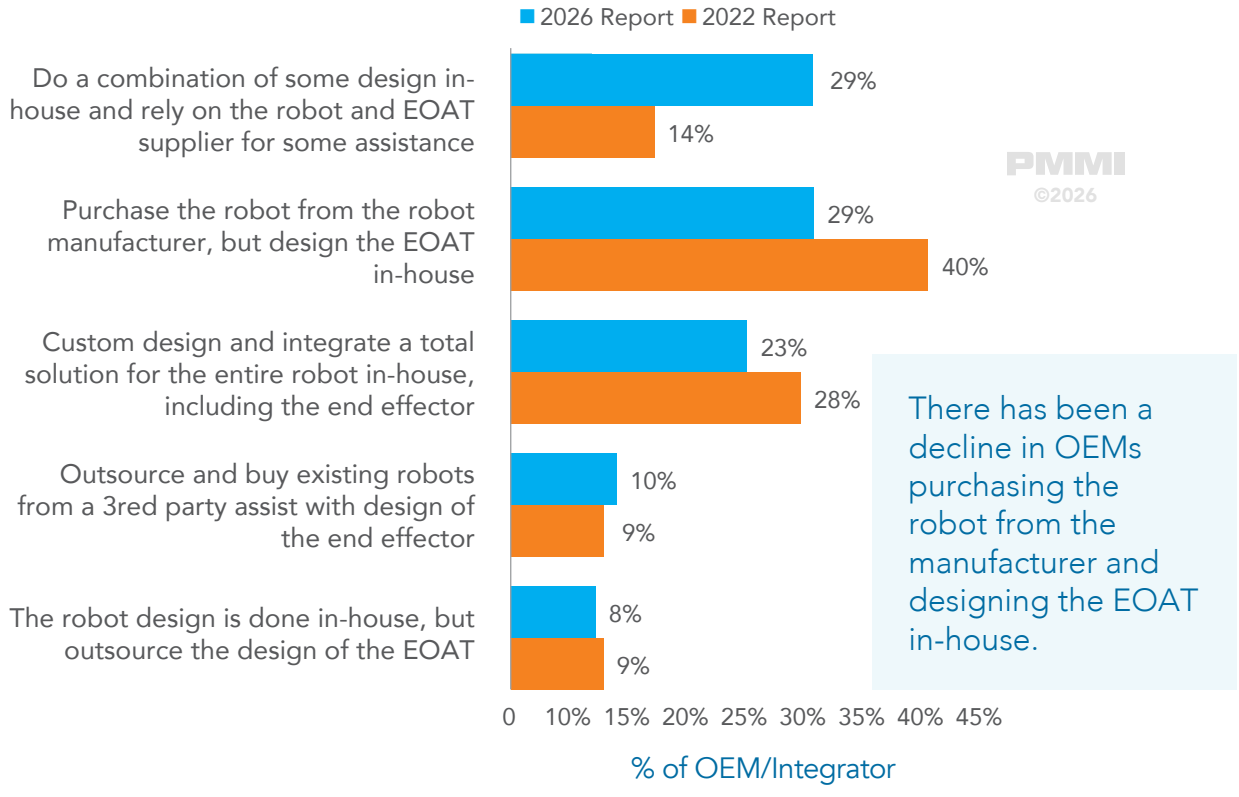
This indicates a growing proportion of OEMs taking greater ownership of robotic system design, rather than relying solely on off-the-shelf robots supplied by manufacturers. One interviewee suggested that, for their organization, this shift was partly driven by the longer lead times experienced during the Covid-19 pandemic, encouraging them to develop more in-house capability and reduce reliance on external suppliers.

> We've actually started manufacturing our own for the last five years or so. And it really started during Covid [when] lead time and availability of the [technology] we were purchasing became hard to get."
>
> OEM, *Packaging Machinery*

Designing more of a robotic solution in-house can provide several benefits. It gives OEMs greater flexibility to tailor the robot or EOAT to the specific requirements of the machine or application, rather than being constrained by standard robot designs. It can also speed up customization, as changes can be made internally without requiring extensive discussions or development cycles with the robot manufacturer.

However, while some robot types and system components are increasingly being designed in-house by OEMs, more complex robot types are likely to remain primarily manufactured by specialist robot vendors. This is particularly true for articulated robots, mobile robots, and humanoid robots.

Figure 23. The robot design strategies employed by OEMs/Integrators in 2022 and 2026 (comparing PMMI reports in each year) *(n=48)*



For robotic solutions software, 23% of OEMs/Integrators develop proprietary solutions for End Users. This indicates a notable proportion of OEMs and Integrators are choosing to differentiate their robotics offering through internally developed software capabilities, rather than relying completely on standard robot manufacturer software or platforms.

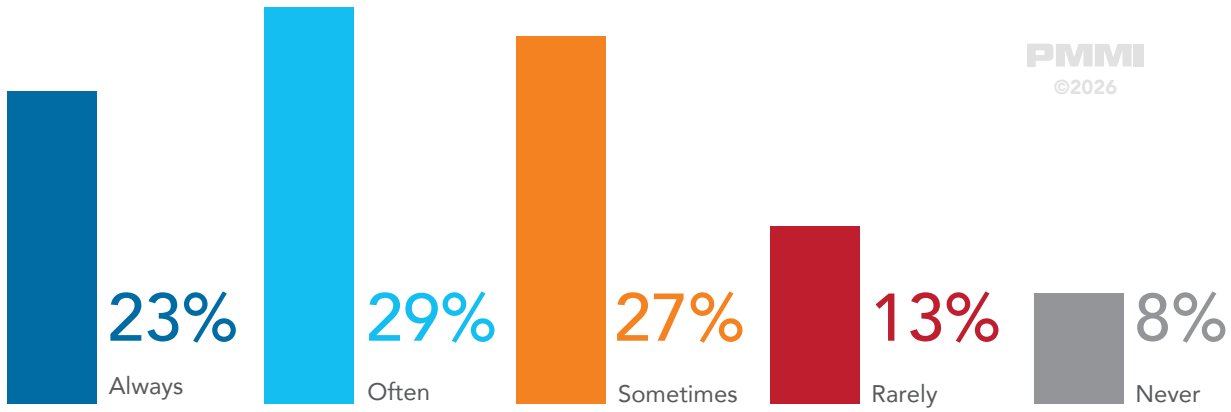
Developing proprietary software can be a significant advantage, as it allows OEMs/Integrators to tailor the robotic solution more closely to the specific needs of the machine and End User. This can support better integration with existing equipment, more intuitive operator interfaces, and smoother communication between the robot, machine controller, production line, and rest of the machine.

Proprietary software can also create a stronger competitive position for OEMs/Integrators. By embedding their own software into robotic solutions, they can reduce commissioning time, improve serviceability, and may also increase customer stickiness, as End Users become more reliant on the OEM/Integrator's software environment. As the representative of one OEM explained,

> We've been staffing up to get more programmers to be able to develop a front end that's going to be very user friendly."

However, this approach also requires ongoing investment in software development and cybersecurity. Additionally, some End Users may prefer to standardize robotics software. For example, when members of their team have prior experience with other platforms.

Figure 24. How often OEMs/Integrators are using proprietary/custom software created specifically for End Users' robotics applications *(n=48)*



OEMs are increasingly involved in developing proprietary software that can be customized to meet End Users' operational needs.

9

Legislation Impacts

ISO10218 and ANSI/A3 R15.06

The 2025 revisions to ISO 10218 (International Organization for Standardization)4 and ANSI/A3 R15.06 (American National Standard for Industrial Robots and Robot Systems; and A3 Association for Advancing Automation)5 update the safety framework for industrial and collaborative robot applications. These standards place greater emphasis on application-level risk assessment, functional safety, manual operation, and clearer guidance for collaborative robots. Their impact on the robotics market is likely to be positive over the long term, as they provide greater clarity for End Users deploying cobots near human operators. However, they may also increase short-term compliance requirements for OEMs/Integrators, creating a need for stronger documentation, validation, and safety-by-design support.

Cyber Resilience Act

For packaging OEMs that sell machines into the European market, the EU Cyber Resilience Act (CRA)6 will be particularly relevant. The CRA introduces mandatory cybersecurity requirements for hardware and software products with digital elements placed on the EU market. For the robotics industry, this is highly relevant because modern robots increasingly include connected controllers, HMIs, sensors, vision systems, remote access tools, and software platforms. The regulation will require manufacturers to address cybersecurity across the product lifecycle. This could increase compliance costs for robotics vendors and machine builders, but it may also strengthen customer confidence in remote diagnostics, predictive maintenance, and software-enabled automation.

[4]'ISO 10218-1:2025(en) Robotics – Safety requirements - Part 1: Industrial robots', International Organization for Standardization (ISO), February 2025, ***https://www.iso.org/obp/ui/en/#iso:std:iso:10218:-1:ed-3:v1:en***

[5]Schirm, Alexandra, American National Standards Institute (ASNI), 'What Is ANSI/A3 R15.06-2025 / ANSI/A3 R15.06-3-2025?', ansi.org, December 12 2025, ***https://blog.ansi.org/ansi/ansi-a3-r15-06-2025-robot-safety/***

[6]'Regulation (EU) 2024/2847 of the European Parliament and of the Council of 23 October 2024 on horizontal cybersecurity requirements for products with digital elements and amending Regulations (EU) No 168/2013 and (EU) 2019/1020 and Directive (EU) 2020/1828 (Cyber Resilience Act) (Text with EEA relevance)', EUR-LX, European Union, November 11 2024, ***https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX-%3A32024R2847***

10

Key Takeaways and Implications

KEY TAKEAWAYS AND IMPLICATIONS

The U.S. robotics market in packaging and processing is set for strong growth	The market was worth more than $440 million in 2025, and is projected to reach approximately $800 million by 2031, representing an average annual growth rate of 10.3%. 95% of End Users expect to be using robotics in their operations by 2031.
Mobile robots represent one of the strongest future growth opportunities	While industrial robots currently hold the largest market share, the mobile robot segment is fast growing, and will overtake industrial robots to become the largest robot type by revenue by 2031, with a 45% market share.
Humanoid robots remain in the early stages, despite high long-term growth forecasts	Current use of humanoid robots is largely limited to trials or pilots, with real-world applications still constrained by cost, reliability, immature technology, and limited use cases. However, revenue from humanoid robots within processing and packaging is forecast to grow from 0.1% in 2025 to 5% in 2031.
Investment intentions are positive across both End Users and OEMs/Integrators	In the next 12 months, 61% of End Users and 81% of OEMs/Integrators expect to increase investment in robotics, with 36% of End Users expecting to increase investment by more than 25%.
The main adoption drivers are business performance-focused	End Users identify increasing throughput and productivity, lowering costs/ROI, and improving quality and consistency as the leading factors behind adoption of robotic technology.
The largest barriers are cost, integration, and support	While "no applicable use case" was the most common response for non-adoption, High upfront cost is the leading barrier for End Users actively evaluating or implementing robotics, followed by integration with existing equipment or systems and maintenance/service support concerns.
Cost plays different roles at different stages of adoption	High capital expenditure can prevent robotics projects from progressing at the initial evaluation stage, but once a business case for robotics is established, End Users tend to prioritize operational factors such as reliability, uptime, integration, and support as opposed to cost.
Reliability and uptime are the most important criteria when selecting a robotics solution	Once End Users decide to move forward with a robotics project, they place the greatest emphasis on reliability and uptime performance, followed by service and support quality, demonstrated ROI/payback, and ease of integration.
Post-installation results are generally positive, but support gaps remain	Robotics has largely delivered against expected benefits such as reducing repetitive tasks, lowering labor costs, increasing productivity, and improving consistency. However, End Users continue to identify internal skills gaps, operator training, uptime, reliability, and maintenance support as ongoing challenges.

Legislation will increase compliance requirements, but may improve confidence

The 2025 revisions to ISO 10218 and ANSI/A3 R15.06 create clearer safety expectations for industrial and collaborative robots, while the EU Cyber Resilience Act will introduce cybersecurity obligations for connected robotics hardware and software sold into Europe.

TAKEAWAYS FOR OEMS

- Many End Users report experiencing post-installation challenges in respect to internal skills gaps, maintenance support, training, and reliability, demonstrating a need for OEMS to provide improved post-installation support for their robotic solutions.
- OEMs typically underestimate the importance of ease of integration for End Users. If a system is too complex to integrate into existing workflows, End Users may be unwilling to take the risk, regardless of the technical capabilities. OEMS should therefore look to improve the integration ease of their solutions in order to meet End User demands.
- Partnering with mobile robot vendors to deliver integrated solutions may provide a clear competitive advantage, particularly as End Users look to deploy robotics more broadly across both production and intralogistics environments.
- OEMs should recognize that interest is growing in applications relating to processing operations, loading, and material transport to and from production lines, representing a key area for future development.
- Improving training and the quality of maintenance support should be a core priority. End Users consistently highlight these areas as requiring improvement, and failure to address them may lead to a shift toward alternative providers, such as system integrators, for ongoing service and support.

TAKEAWAYS FOR END USERS

- With many End Users reporting challenges with internal skills gaps and a lack of training, End Users will find success in working with OEMs to train their staff and ensure they have the maintenance and operational skills necessary to adopt robotic solutions.
- Integration is one of the largest implementation barriers to robotics within packaging and processing. End Users should assess their facility readiness and consider compatibility with existing machinery when evaluating robotic solutions.
- End Users should design future facilities and line upgrades with robotics in mind, making integration easier, unlocking more advanced use cases, and preparing their facilities for the future.

11

Glossary

AI – Artificial Intelligence

AGV – Automated Guided Vehicle

AMR – Autonomous Mobile Robot

CPG – Consumer Packaged Goods Company

CRA – Cyber Resilience Act

EOAT – End of Arm Tooling

KPI – Key Performance Indicator

OEM – Original Equipment Manufacturer

POC – Proof of Concept

ROI – Return on Investment

SaaS – Service-as-a-Software

SCARA – Selective Compliance Assembly Robot Arm

SKU – Stock Keeping Unit

SME – Small and Medium-sized Enterprise

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