

# Equipment Report: Understanding the modern unit load

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By [Amanda Loudin](#) July 1, 2025



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How to move unit loads efficiently, how to deliver an ROI, what approach to use, and how to manage it all in the ever-changing geopolitical landscape are issues that keep warehouse managers up at night.

Unit loads when done well are designed to be moved efficiently, reduce labor costs and minimize damage to goods, but there are so many options, and technology is moving so quickly, that finding a solution can feel overwhelming.

But figure it out you must, and you must do it cost effectively. “No matter what’s touching your boxes, there’s a cost associated with it,” says [Dan Keto](#), co-founder and president at [Easy Metrics](#). “All these new technologies are changing the way we move boxes through the supply chain to the end customer.

Instead of humans touching the boxes at an hourly rate, we have a piece of equipment doing the same thing. But there’s still a cost structure with it.”

It’s up to you to figure out what that cost structure is, and that requires a different calculation than human labor. Instead of running the numbers by the hour, you now need to figure out the capex or lease cost, the maintenance cost, and the labor cost, none of which is cheap.

“We’re seeing a good deal of experimentation,” says Keto, “trying to understand what the ROI is on these investments.”

[Ed Romaine](#), vice president of marketing and business development at [Integrated Systems Design](#) (ISD), puts it this way: “ROI never goes out of style. But it’s even more important today, with the tariffs, the confusion, not knowing when inventory might be available—you need every trick in the book to generate an ROI.”

The pressure to achieve ROI from unit loads also stems in part from the fact that labor will only continue to be a constraint.

“We’re seeing a collapse in labor availability,” says Keto. “The reverse immigration trend is going to substantially pull labor out of the market, and the younger generation doesn’t want this kind of work.”

Wages, then, will continue to rise. And even then, finding and keeping workers is a losing equation. Unit load must involve automation, and warehouses are starting to look more like manufacturing as a result.

“There’s a macro shift occurring to equipment first, humans second,” Keto says. “This trend will only accelerate as robotics flood the market and prices go down.”

The unit load, then, is looking much more automated—that’s the overarching trend in 2025. Within that big arch, however, are several smaller trends that will impact how you approach unit load going forward.

## New, improved software

Most of the focus on automated equipment is on the hardware, but it's the software that keeps it all afloat.

And that software is evolving at a rapid-fire pace, providing more robust data collection, features, and yes, the addition of AI and machine learning tools. Warehousing is a highly heterogeneous environment, so the software that powers the equipment must meet that moment, which it is.

[Doug Robertson](#), vice president and chief operating officer of [AS/R Systems](#), says that automation has never been plug and play, but rather, deliberate integration between business systems and automated equipment.

"The real evolution lies in recognition that effective automation must be modular, tailored and cross-functional," Robertson says. "This is key for clients modernizing their existing infrastructure."

[Karthik Subramanian](#), technical product director at [Dematic](#), calls the role of software the "brains behind the movement." He says it must be scalable and customizable to support today's load management equipment.

"If you're using shuttles, for instance, you need graphic management of the system," Subramanian says. "You need data visualization, which allows for configuration of the pallet solution."

This bleeds over into every type of unit load you're considering, especially mobile robotics. "You have to communicate effectively with mobile robots to ensure they are performing their tasks correctly and safely," says [Brian Keiger](#), chief commercial officer at [Conveyco Technologies](#).

Going forward, look for ever more sophisticated software behind the hardware. While a critical tool, you won't be able to optimize its features without human involvement—even if AI has entered the picture. In most cases it has, but its role is still one of augmentation, rather than running the show.

## Shuttle systems

Within the unit load arena, you have many choices on how to move your cases, pallets and boxes.

From traditional lift trucks to conveyors, robots, automated storage and retrieval systems (AS/RS) and more, the sky is the limit. But one option that's picking up steam and popularity is 3D shuttle systems, says Romaine. "Shuttle systems are hot," he explains. "They eliminate lift trucks, reduce labor and mitigate accidents, which is something everyone wants."

For this reason, Robertson says that at this year's ProMat show in March, four-way pallet shuttle systems were everywhere, too. "There are still only a handful in North America, but it's clear they are an emerging trend," he says. "They are super flexible and fit anywhere, and it's easy to retrofit them into existing buildings, even if they're low."

That said, higher is better, according to Robertson, because they allow for economies of scale. They also can help eliminate lift trucks, saving labor costs and mitigating safety issues. "We've seen four-way shuttles implemented in 50,000 square feet, making it look like a 150,000-square-foot operation," he says.

Shuttle systems bring a good deal to the table, too. “They are high density, and they can store far more than systems that require people to move into and out of the systems,” Romaine says. “And they optimize space better than other systems.”

Shuttles provide for a cost-effective way to store pallets and keep up with the throughput needed, too. This applies to many industries, including durable goods, cold storage and others.

Subramanian says that Dematic partners with shuttle system providers, adding value to the marketplace. “Shuttle systems are flexible and a cost-effective solution from a capital expenditure standpoint,” he says. “In the next few years, we’ll see a good deal more innovation with shuttles, especially as businesses find they need to store more safety stock.”

## Robots and more robots

No conversation about unit load is complete without shining a light on robotics, both autonomous mobile robots (AMRs) and automatic guided vehicles (AGVs). According to Romaine, conveyors may take on a smaller role moving forward. “They dissect the floor, and so companies are looking to reduce their reliance on them,” he says.

Taking their place, in many cases, is mobile robotics. “Everyone is evaluating this move,” says Romaine, “and some are switching entirely. There’s a big benefit in not having to permanently mount something to the floor.”

With their versatility, mobile robots can also work in multiple areas. From receiving to picking, and transferring products to shipping, AMRs

are stepping into the role of a chief player in unit load. As costs come down, expect widespread adoption.

## Safety rules

As mobile robots are poised to take an increasingly larger role in warehousing, you must address the elephant in the room, says Keiger: Safety. "It's what I preach all the time," he adds. "As mobile robots enjoy rapid deployment and scaling, you have to ensure and reassure that the units and users are doing the right things."

To get there, you must have an all-encompassing approach. From the minute you decide to purchase an AMR until the minute it's deployed on your floor, you must focus on change management, says Keiger. "People don't like to work with new technology," he explains. "But they must understand safety, collaboration and how robots can help them, not replace them."

That means understanding every element of robotics, from the hardware to the software, the complicated picture of standards, training, and how exactly the machines fit into your individual environment. The sensors are getting better every day, but you can't let your guard down.

"Safety is a mindset," says Keiger. "Training and education are the big factors, and you must do a risk assessment to understand what you're up against."

## Abnormal is the new normal

In 2020, the pandemic hit the world and turned the supply chain upside down. It's fair to argue that while the source of disruptions has changed, disruption is the new name of the game. Tariffs and geopolitics remain one of the big uncertainties of the moment, and companies must continue to navigate in this arena of unknowns.

Right now, the cost of goods remains highly uncertain, including the cost of materials handling equipment. "Where companies raise the price of goods, supply chain costs remain the same and aren't commensurate with the increases," says Keto. "The real impact is operational."

This can shake out in the form of goods surges, as businesses hold back on orders amidst tariff uncertainty, then go on buying sprees when prices look good. For a warehouse, there's no steady state in which to operate. All of which is to say that making the most of unit load approaches has never been more important.

"There's a bigger focus on profitability, and there's opportunity in replacing labor with automation," says Keto. "The datafication of warehousing will continue to increase, and that allows you to understand and improve your processes."