PLUS ONE ROBOTICS

Robots Work.
People Rule.

Impact > Rate: Why It Might Be Time to Ditch Traditional Warehouse Metrics

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Introduction

The modern warehouse is increasingly populated with smart robots featuring AI and computer vision. This is good news for an industry where annual turnover rates are estimated at 43%, (and greater than 100% at some sites). However, adding robots to what was a manual operation complicates the definition and measurement of success in terms of real-world performance. With the introduction of automation into the mix, traditional quantitative metrics designed around manual labor can no longer be distilled down to a 1:1 ratio; robots were never intended to be equal to people. The landscape has changed and it's time to take a new approach to measuring success by moving from metric to impact.

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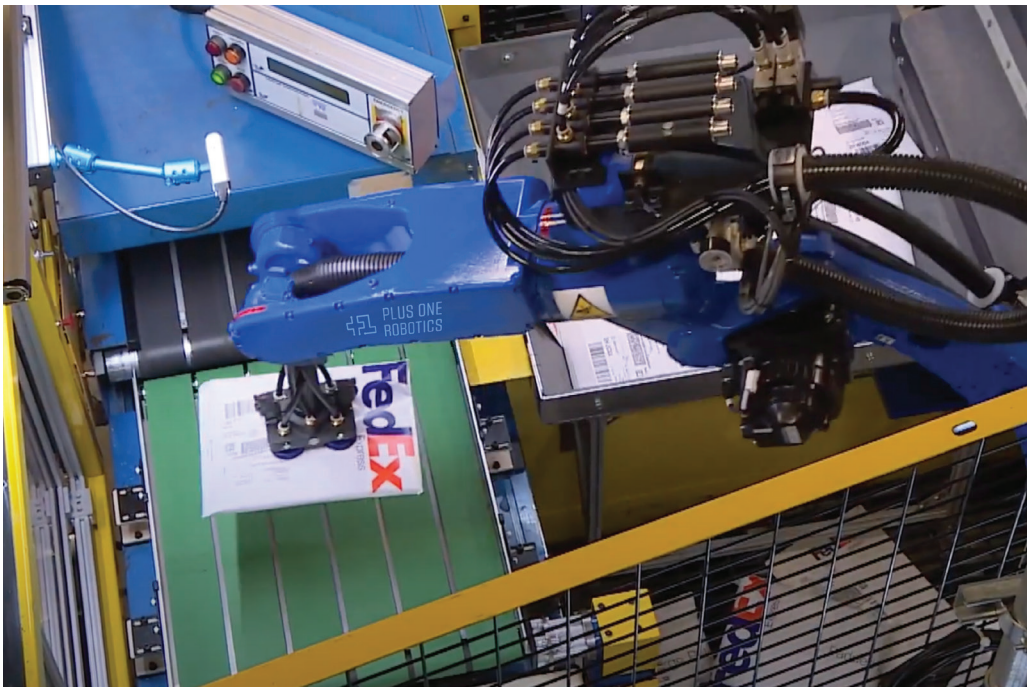


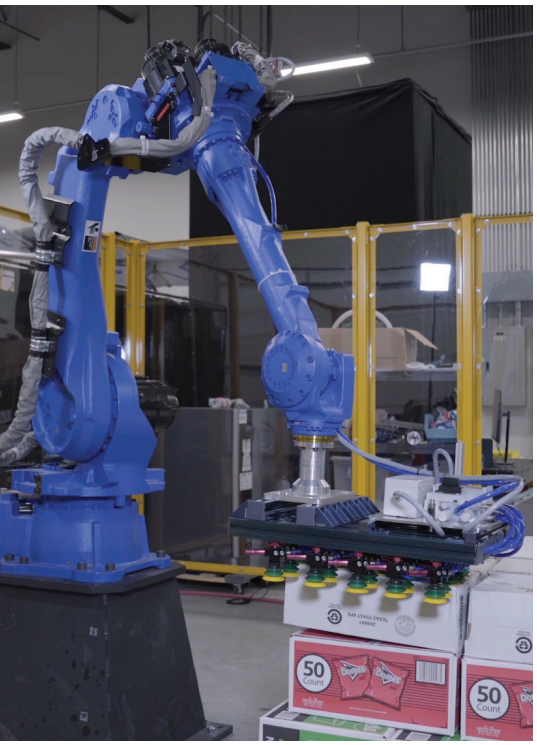
Traditional Warehouse Metrics Are Dead

In the case of depalletization, many of today's metrics are based on established standards for human labor where management measures throughput, safety and error rates; all of which are then painstakingly scrutinized for potential improvement. But, when it comes to automation, these standards don't adequately consider the constancy that a robot brings to the process — consistent and reliable throughput regardless of time or place.

Plus, there's more to the story than just relying upon the volume of accurately handled packages as the primary measure of success. The speed at which a robot moves between pick and place might be visually striking, but the true litmus test goes beyond the robot's ability to pick up, transport, and place items with precision. This narrative takes a detour when the robot encounters an exception. Now, the speed and efficiency with which a human can intervene become significant in determining a traditional metric such as Picks per Hour (PPH).

And is speed always the end game? Robots should be applied to situations where they offer the most value, such as handling packages with the highest ergonomic risk to humans and where humans just don't want to do that kind of work. Here automation provides not only process consistency, but the ability to work longer hours, less risk of human injury, stress or the high likelihood of increased turnover. That said, the robot may be processing the total number of pallets over a longer number of hours at a lower than maximum throughput rate. But, does that diminish the robot's value?

So, how will we measure these and other variables, and use the resultant data to ensure that robots and workers as a team are performing at an optimal level, and that tasks are completed swiftly, accurately, safely, and cost-effectively? Simply put, automation has changed the game and it's time to look beyond single metrics and take an "end-to-end" outcome-driven approach to measuring warehouse efficiency. An approach that not only considers actual warehouse floor metrics, but also the often-overlooked cost of employee satisfaction, recruitment, safety, turnover, consistency, for example.

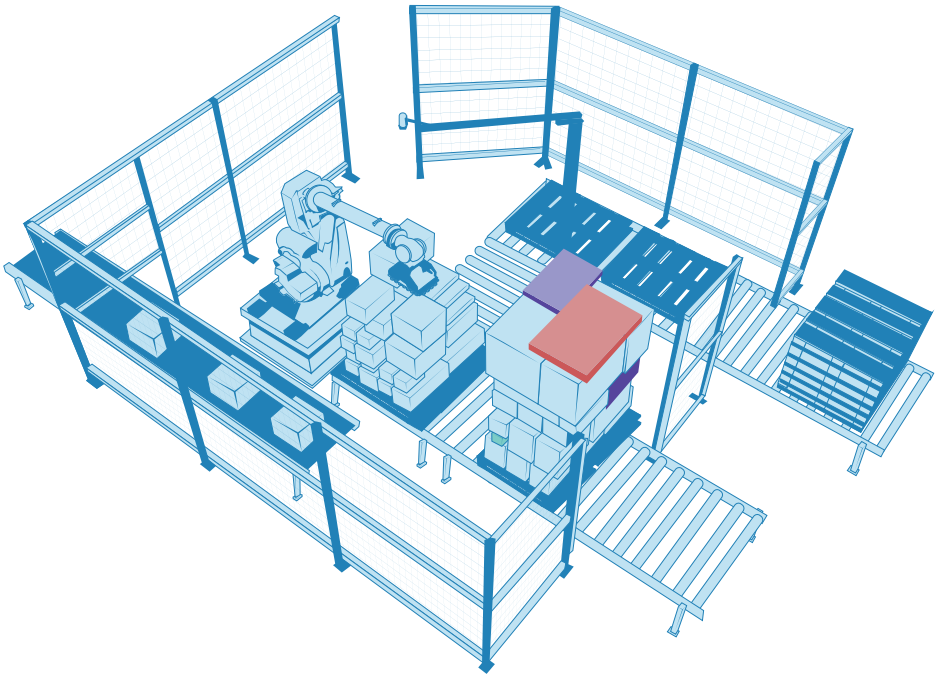


Beware: The Ideal Pallet Scenario

In the controlled environment of discrete manufacturing where a similar item is being handled day-in and day-out, it is easy to commit to a productivity measurement such as OEE (Overall Equipment Effectiveness) as the determination of success. For example, a robotic activity that is singular in nature moving identical parts individually from point 'A' to point 'B' along the same motion path and cycle rate.

However, if you're requesting a robotic system be designed to meet this steady and specific metric in a warehouse situation, it's a likely setup for disappointment. Distribution and sortation centers exist in a constant state of flux where exceptions and variability are the norm.

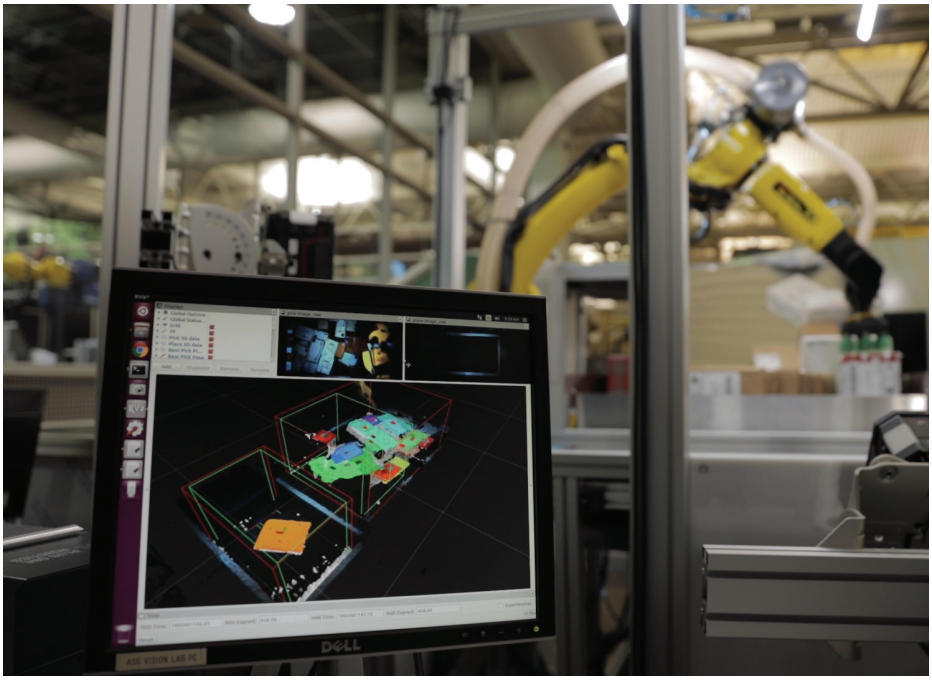
In depalletization, gone are the days of pallets primarily stacked with a single product. To meet demand across ecommerce, food and beverage, and distribution operations, it's about moving volume of mixed pallets filled with dissimilar products in different packaging, colors, shapes, dimensions and weights. The products to be handled in these situations exhibit a high degree of variability, necessitating that the robots and their end-effectors be adept at managing irregular items.



Calculating the value of a solution by merely considering PPH and other short-term performance metrics may seem straightforward, but risks oversimplification.

Think about mixed depalletization scenarios where there is significant unpredictability in package size and volume. Large, heavy boxes and irregularly shaped bags will take more time to handle than smaller, uniform ones, making it necessary to adjust PPH expectations for this variability. If your goal is to handle heavier or larger items, it might make sense to adjust your metric to tons/hour, total number of pallets processed, or dock turn times, but this still only represents part of the picture.

Drawing a parallel with the automotive industry, where consumers benefit from both city and highway fuel economy metrics, operations managers should adopt a similarly comprehensive understanding of equipment performance under various conditions. This approach prevents the optimization of systems for isolated scenarios based upon a couple of metrics that may not accurately represent day-to-day operations. Here again, it's a complex, multifaceted situation, and companies will only be successful in their automation journey by looking at the big picture.



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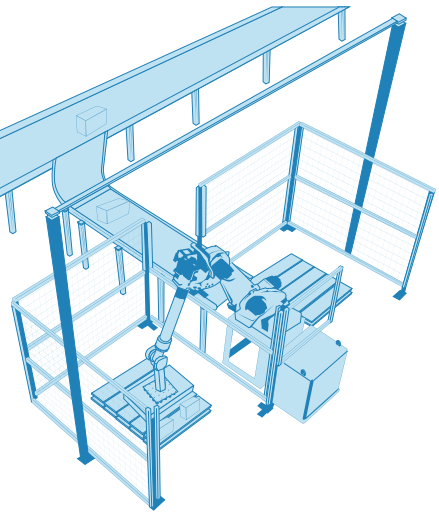

The Cost of Doing Things the Way They've Always Been Done

Warehouse processes do not live in a silo and, as such, the effectiveness of a solution cannot be determined by looking at a singular/narrow-scope metric. For example, your depalletization operation may be handily meeting its work standard of picks/hour. Everyone is happy, right? More material coming in means you have more material ready to quickly fulfill on the other side. Well, maybe.

What happens if a downstream human-centric process is not keeping rate with the robotic unloading process? This results in the need for additional floorspace to buffer the depalletized goods and a resultant bottleneck in moving goods out the door to their final destination. Throughput on the incoming side has to be balanced with the ability to process these goods on the outbound side. Do you want your robots to stand idle and take "lunch breaks" because the humans need to? How productive is this in the overall impact of your operation?

Another way performance metrics can miss the mark is when they are incorrectly benchmarked as the standard during peak seasons. Management can expect to see demand spikes and a need for higher productivity levels during peak seasons, but this may not necessarily indicate greater overall efficiency as it may also come with increased errors or potential injury due to worker fatigue as seasonal human workers ebb and flow. Conversely, the metric might decrease during slower periods, which doesn't necessarily indicate lower worker efficiency, but rather a reduced volume of available work.

In either case, management should rethink the weight of singular metrics when applying them to robotic depalletization or other automated operations, since the metrics may fail to account for several other factors involved.

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It's Time for Outcome Driven Metrics

Time to get away from evaluating the success of your warehouse operations from a single metric. Your end goal is most likely not *entirely* about PPH, or even OEE. Neither of these are good standards against which to evaluate the collective impact of people and robots working within the variability of a warehouse environment, which is not the same as a discrete production environment. The end goal, more likely, is about being able to process and safely ship all orders within the shipping window. It does no good to have a high intake speed if you can't process it on the output side. Management needs to instead focus on the big picture by using outcome-based metrics such as actual volume moved, quality, customer satisfaction, employee engagement and satisfaction, capacity utilization and operational costs — taking a holistic view rather than one focused solely on productivity measurements of movement within a single operation.

AUTOMATION'S IMPACT

Warehouse Floor	Supply Chain Department	Company
Robot's operational uptime	Achieve consistent throughput or volume goals on all shifts	Increased revenue
Increase workplace satisfaction	Increased capacity with the same footprint	Market-share acquisition
Reduce employee turnover	Consistent volume predictions	Consistent overhead costs
Reduce onsite injury claims	Availability	Reduced turnover
More consistent output across varying loads		Customer satisfaction
More work minutes in a day		Additional volume capacity
		Reduced worker's comp claims

With this in mind, looking at a few real-life examples can illustrate why throughput may not be the end game.

The first two examples both focus on large retail distribution centers. Company One is unloading from pallets as tall as 6-feet high, filled with a huge variety of items. The biggest "ask" of the Plus One Robotics solution was to improve safety; eliminating the need for workers having to climb up ladders to unload the pallets.

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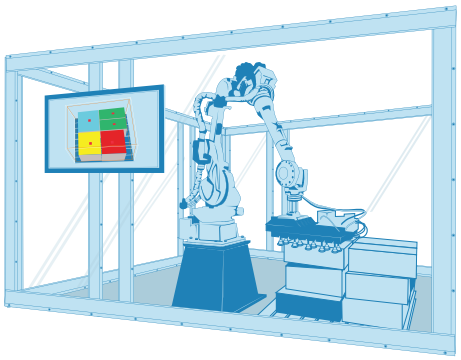

As an added benefit, the robot's AI enables it to recognize and pick up the items that have fallen off the pallets onto the floor. So, convenience, flexibility and safety become the important qualifiers.

For Company Two, the requirement was totally different. In this instance, the pallets are dynamically lifted so that the height of the box is suited to the height of the person for unloading. Safety becomes less of a focus while throughput and the ability to handle variability becomes more important. A person can do the task, but the robot can do the task better — meaning consistently and for longer periods of time with no breaks.

In the case of a national pet care chain, the key objective was improving worker ergonomics by having the robot lift 40-lb. bags of pet food off the pallets. And, although the pallets were low, having the robots handle this task eliminates the repetitive bending, picking, and twisting involved in this process. So, did PPH tell the whole story? No. Big picture, the company is not only improving workplace safety, but also likely improving output due to the consistent performance of the robot. "Steady does it" will win this race.

The bottom line is that in order to maximize the benefits of automation, it's time to broaden the scope of performance and impact beyond just speed and PPH. Understand what objectives will be most impactful to your overall operations and how the system will accommodate exceptions, which are absolutely going to be part of any depalletization process. Importantly, work with an experienced automation specialist who can guide you through all scenarios and ensure you're getting a robotic system that is going to deliver what you need to optimize your operations and not just "speed up" a single operation.

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About Plus One Robotics

The team at Plus One Robotics is comprised of industry veterans willing to discuss the realities of each individual scenario to provide customers with clear and authentic insight into what they expect from our equipment. Only by looking beyond headline numbers can we help you to understand how a system performs in real-world conditions, enabling you to make the most informed decision for your automation investment.