

BOOST YOUR DISTRIBUTION CENTER'S CAPACITY DESPITE SUPPLY CHAIN CHALLENGES

Achieve More With Less



HONEYWELL FORGE

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BOOST YOUR DISTRIBUTION CENTER'S CAPACITY, DESPITE SUPPLY CHAIN CHALLENGES

Investment in automation equipment is on the rise as growing e-commerce demand and tightening service level agreements (SLAs) increase pressure on distribution centers (DCs) to ship more products faster than ever before. Average budgets for material handling systems and related technology jumped nearly 50% from 2021 to 2022,¹ with 57% of operations predicting an increase in spending between 2022–2024.²

Yet despite the growing priority placed on automation, many hardware vendors are quoting lead times of 52 weeks or more because of scarce components, shipping delays, trade sanctions and other concerns. Some have even shut down operations altogether for the foreseeable future³ as new bottlenecks increase uncertainty about when the supply chain will return to normal.⁴

This report will explore the unprecedented challenges facing DCs and introduce a software solution that enables you to increase capacity and improve DC efficiency — while setting you up for even greater competitive advantages when the supply chain recovers.



1 https://www.mmh.com/article/2022_warehouse_distribution_center_equipment_survey_go_time_for_investm

2 Ibid. "This year, 57% predict increased spending on materials handling systems over the next two to three years, compared to 53% last year."

3 <https://www.controlglobal.com/articles/2021/automation-supply-chain-lead-time-lunacy>

4 <https://www.cnn.com/2022/03/30/business/global-supply-chain/index.html>

FACING THE CHALLENGES OF THE POST-PANDEMIC DC

Significant changes in buyer behavior have rocked the distribution and warehouse sectors in the last few years. Although most of these trends were already underway before the pandemic, lockdowns accelerated their progress.



The most obvious shift by far was the explosive growth in e-commerce, which added an estimated \$218.53 billion in sales from 2020–2021.⁵ As a result, the same period saw greater than anticipated growth in micro-fulfillment and direct-to-consumer grocery distribution. Consumers now spend an average of \$6.7 billion online each month for groceries — up from \$3.1 billion pre-pandemic — and experts anticipate spending will exceed \$85 billion in 2022.⁶ These were disruptive changes to many DCs, which were designed and built primarily to handle case- and pallet-sized shipments destined for brick-and-mortar stores.

Customer delivery expectations are also on the rise, driven by the capabilities of top-tier operations that are increasingly making Saturday, Sunday and same-day deliveries everyday norms. This trend is upending the market by putting pressure on small- and mid-sized operations to keep up, prompting many operations to overwork their assets.

Expansion into new real estate, especially in major markets, is hampered by limited availability, rising rents and construction costs, plus competition for space from other industrial sectors.⁷ Rental cost increases of 3–5% per year are not uncommon for industrial real estate. In some high-demand areas, rent growth is 1–2% *per month*.⁸

Labor scarcity and brain drain are compounding all these challenges, driving a collective focus on workers, wearables, assistive devices and technological tools for a new generation of managers. These concerns are likely to continue, even as automation becomes more common. More than a half-million supply chain jobs were unfilled in mid-2021, and employers say it's 36% harder to find talent today than in 2018. The inability to fill these open positions could significantly hamper the supply chain industry, ultimately costing the U.S. economy \$1 trillion by 2030.⁹ Even with the additional automation these trends are driving, better labor planning has become critical to satisfying waves and peaks in consumer trends and demand.

With all of these challenges, it's no surprise that an estimated 57% of operations want to spend more on automation. In today's tight and uncertain supply chain environment, however, many can't get equipment fast enough.



And that reality means most DCs need to squeeze more out of the resources they have within current facilities.

⁵ <https://www.digitalcommerce360.com/article/coronavirus-impact-online-retail>

⁶ Ibid.

⁷ <https://rejournal.com/industrial-insider-a-2022-forecast-for-industrial-real-estate>

⁸ <https://www.globest.com/2021/12/07/2022-commercial-real-estate-vision/?sretur=20220508094351>

⁹ <https://www.cnn.com/2021/05/04/economy/manufacturing-jobs-economy/index>, as quoted in the 2022 MHI Annual Industry Report: <https://www.mhi.org/publications/report>

DOING MORE WITH LESS

Most DCs have hidden opportunities for efficiency; you probably have all the data you need to find them. The trouble is the answers are lurking in *huge* amounts of data, with more being generated every second. Although the information that really matters is often only a fraction of the data actually collected, no human could possibly sift through it all to pinpoint what's having the biggest impact on your key performance indicators (KPIs).

So where do you start looking? Common challenges faced by your operations and maintenance teams can help to point the way.

Your operations manager and their team, for example, probably feel that they're often being asked to make critical decisions with insufficient data. They could benefit significantly from insights like these:

- Real-time visibility into production KPIs, both within and across multiple sites
- Timely capacity information, enabling the team to determine if labor is on track to meet daily quotas, while enabling more accurate planning for the weeks and months ahead
- Accurate assessments of the impact of repetitive issues
- KPI-focused data that would allow an optimized balance between operational flow and labor, reducing the volatility of cost per case shipped

Although their needs are different — and sometimes at odds with the priorities of operations — maintenance managers and teams could also benefit from more accurate data. Here are some examples:

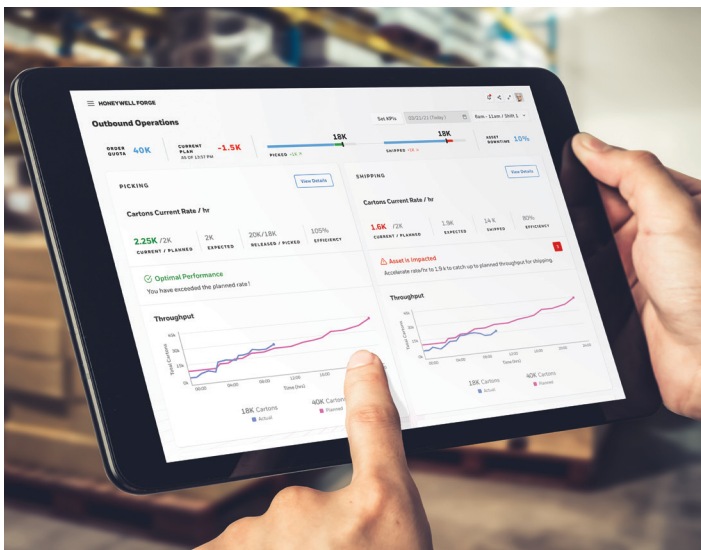
- Real-time asset health data, enabling better prioritization of jobs to be performed during limited planned downtime windows
- Historical data to help pinpoint the causes of recurring issues and capture tribal knowledge
- Predictive analytics to justify taking the system offline for maintenance, preventing unplanned downtime
- Indicators of root causes, reducing time spent resolving symptoms

Vast amounts of data would need to be tracked and analyzed to make these benefits a reality on an ongoing basis. This suggests a need for innovative software tools, capable of finding and leveraging hidden opportunities for both operations and maintenance teams.

Ideally, such tools would provide complete visibility across your entire operation, enabling you to strike a better balance between operational and maintenance needs. Operations could better minimize labor challenges and preserve your organization's cultural knowledge. Maintenance would be able to resolve bottlenecks and breakdowns faster — or better, predict equipment failures before they happen. And eliminating silos of operational technology (OT) data would enable both teams to interact with one another more seamlessly and efficiently.

Every operation is different, so the software should be flexible enough to track various types of performance data, so that each operation can pinpoint the data points that impact their most important KPIs. And since technology is constantly changing, the software should be easy to keep current without causing costly shutdowns.

Although these needs have existed for some time, no single software platform was able to provide such a system of record optimized specifically for warehouse operations. Honeywell Forge was created from the ground up to fill this gap, leveraging insights and best practices from critical operations with complex assets, including buildings, refining, manufacturing and aerospace.



INTRODUCING HONEYWELL FORGE CONNECTED WAREHOUSE

Honeywell Forge Connected Warehouse is an enterprise performance management (EPM) solution that combines data from islands of automation and separate software tools, supplemented by real-time data from non-invasive IoT sensors on critical equipment. This advanced software solution is designed to help warehouse and supply chain executives boost their resiliency to external and internal disruptions while also uncovering hidden efficiencies to enable a more reliable and competitive cost per case shipped. In this way, the platform helps DC operations make the most of the resources they have today and those they will add tomorrow.



The goal of Connected Warehouse is to drive portfolio-wide savings across multiple operations by providing consolidated performance metrics, actionable alerting and smart decision-making recommendations. In addition, it enables streamlined and continuous collaboration across operations and maintenance teams, allowing organizations

to anticipate and better prevent unplanned downtime while improving the utilization of their systems in near-real-time throughout the day.

HOW IT WORKS

The benefits of Connected Warehouse begin right away with the unification of data sources, such as control networks, machine sensors and edge systems. This unified dataset can then be analyzed via digital twins and machine-learning analytics models to detect impending issues and potential downtime, as well as performance improvement opportunities. As the software solution learns your operation, it can provide analytical insights that enable site operations personnel to make better, more informed decisions. It can also recommend corrective actions, providing details of the data behind those recommendations.

Connected Warehouse can be implemented quickly and easily. The platform is designed to integrate multiple different systems and assets, even if not from Honeywell. As a result, you can start right away with the equipment you have, identify the key areas for focus, and leverage your existing assets to create new capabilities — enabling increased economic outcomes. This is especially beneficial within the present environment of supply chain uncertainty because there is no need for an expensive “rip-and-replace” project or business downtime.

Connected Warehouse includes features for both Site Operations and Asset Performance Management (APM). APM enables proactive performance management and maintenance, allowing teams to get ahead of common maintenance challenges and help increase the utilization of assets in critical paths. Site Operations enables enterprise visibility, allowing operations managers to focus on performance, elevate insights, and manage their teams more efficiently.

BENEFITS OF APM

APM leverages condition-based maintenance insights for your entire operation, integrating them into a single control network that enables real-time monitoring of asset health and availability. Powerful predictive maintenance identifies potential failures before they shut you down, helping you to achieve the best outcomes — despite limited labor and frequent pressure to keep equipment running.

Long-term performance management optimizes equipment usage over time, using system information to identify ideal times for maintenance, rather than relying on an arbitrary time-based schedule. Machine-learning enables sensors to learn the unique quirks of your equipment, preserving valuable predictive expertise — cultural knowledge that's frequently lost in staff turnovers. Over time, this data is further supported by deep historical analyses and trends to identify root causes of equipment failure.



BENEFITS OF SITE OPERATIONS

The Site Operations component of Connected Warehouse is geared toward helping your DC meet daily shipment quotas without straining any part of your network. It provides end-to-end visibility of your warehouse operation, plus recommendations for solving delays, bottlenecks and breakdowns *as they occur* — not tomorrow or next week. This visibility alone substantially speeds troubleshooting by minimizing the amount of time team members need to move through the warehouse itself to locate and identify problems.

Operations teams can choose from a customizable set of KPIs for benchmarking, down to the asset level. At the same time, the software eliminates silos of performance and enables the minimization of operational errors. Intuitive dashboards enable you to see critical asset health and utilization at a glance and securely access detailed information about issues on-demand.

Another benefit is that Connected Warehouse is built on a web-based, software-as-a-service (SaaS) architecture. This structure enables fast implementation, allows the system to scale as needed with your operation, and ensures you always have the latest solution features and capabilities without shutting down systems for upgrades.

ENHANCING SITE SAFETY AND WORKING CONDITIONS

In addition to the benefits it provides to owners and managers, Connected Warehouse offers multiple advantages that help improve working conditions and safety.



For example, automated processes can help improve worker experiences in the warehouse. With Site Operations, area supervisors receive live data detailing how their days are going. This makes them more agile when managing capacity smoothing between different functional areas, especially if they're running behind.

By automatically collecting key information at its source, APM sensors and other data gathered by the system minimize the time workers need to spend in hard-to-reach places and hazardous areas. They also reduce the time needed for problem resolution on the warehouse floor, where high-decibel volumes make it difficult to communicate with other team members. Worse, maintenance teams often attempt to communicate with walkie-talkies in areas where they should be wearing ear protection.

Connected Warehouse software improves collaboration by allowing everyone to access the same information from their tablet or other mobile device. Notifications help with prioritization, which can either shorten exposure to the warehouse floor when making repairs or enable the team to take advantage of planned downtime, when the warehouse isn't in full operation.

By collecting data over time, the platform also enhances the efficiency of new or temporary workers, who are less likely to have historical knowledge that can provide insights into root causes or repeating issues.

UNLOCKING MORE CAPACITY IN YOUR DC

In today's competitive environment, even incremental increases in capacity can substantially improve a DC's bottom line. Here's how Connected Warehouse is helping DCs to achieve this goal in real-world implementations.

PREVENTING UNPLANNED DOWNTIME

The most obvious benefit is the reduction of unplanned downtime from asset faults. For example, one retail distribution center of approximately 300,000 square feet with about 45 motors being monitored as part of its critical path detected nine anomalies in less than 12 months after installing the software. These included issues with bearing lubrication, shaft failure, cracked v-belts, oiler failure, end roller alignment, gearbox alignment, belt position and stitching, and propagating holes in a slider belt pan. By detecting these issues before they caused considerable unplanned downtime and troubleshooting, the company avoided costs that could have reached between \$10,000 and \$30,000 per event¹⁰ if left undetected.



A predictive maintenance approach like this also offers advantages over traditional time-based maintenance. Although any maintenance performed is assumed to have a positive impact, systems can be harmed when they're not maintained at the right time or are over-maintained. In contrast, condition-based maintenance relies on actual asset data to schedule and prioritize maintenance. According to the [U.S. Department of Energy](https://www.energy.gov/sites/prod/files/2013/10/f3/omguide_complete.pdf), a successful predictive maintenance program can save 10–12% over regular time-based preventative maintenance.¹¹ And these were the results achieved at just one location — imagine the exponential throughput that could be realized across your entire portfolio of sites.

¹⁰ Based on estimated hours of downtime, idle labor and throughput loss.

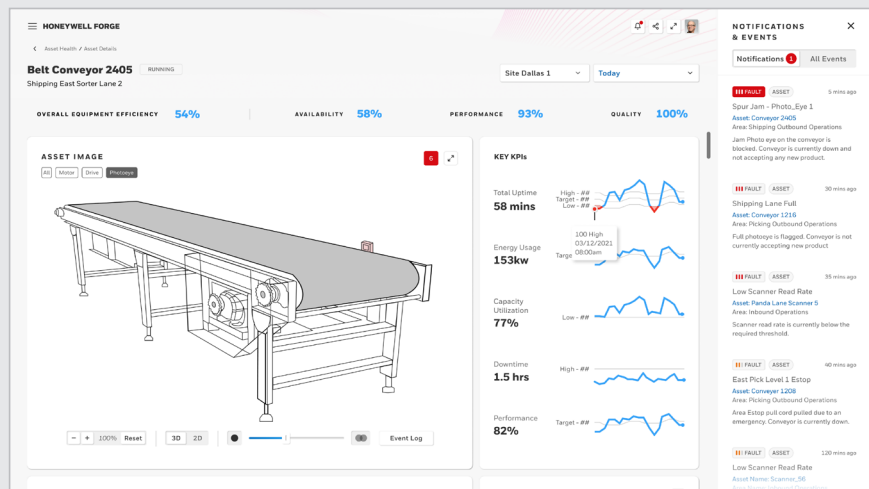
¹¹ https://www.energy.gov/sites/prod/files/2013/10/f3/omguide_complete.pdf, page 33.

CONDITION-BASED MONITORING IN ACTION

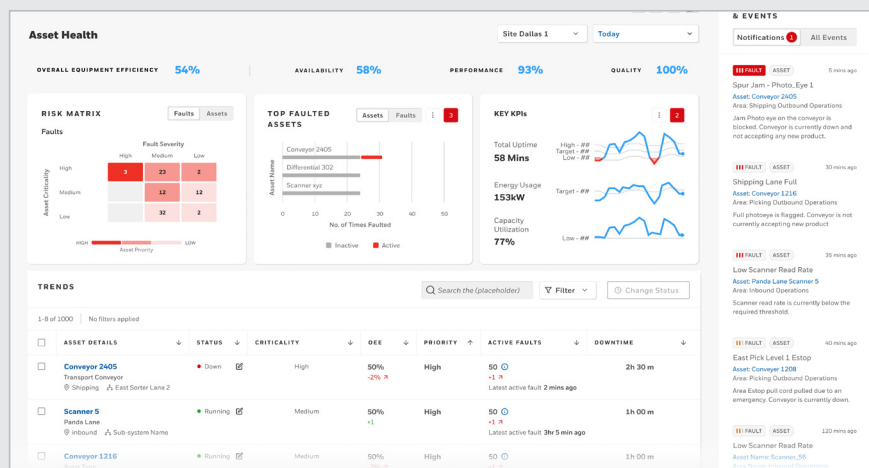
OVERCOMING EXPERIENCE GAPS

Skilled maintenance technicians doing regular walk-throughs for preventive maintenance can hear a bearing that needs lubrication, feel a motor that's out of alignment, or sense a component that's overheating. When they retire or change jobs, newer technicians need to keep the system going but very well might lack extensive knowledge, experience and history. An event log *might* exist. But how complete and accurate is it?

Connected Warehouse resolves this problem with condition-based monitoring, using sensors to “feel” and “hear” the system while capturing and retaining walk-through information to serve as a system of record. By using advanced analytics to find anomalies, the platform can alert and guide technicians with less experience or site familiarity.



Asset Detail



Asset Health

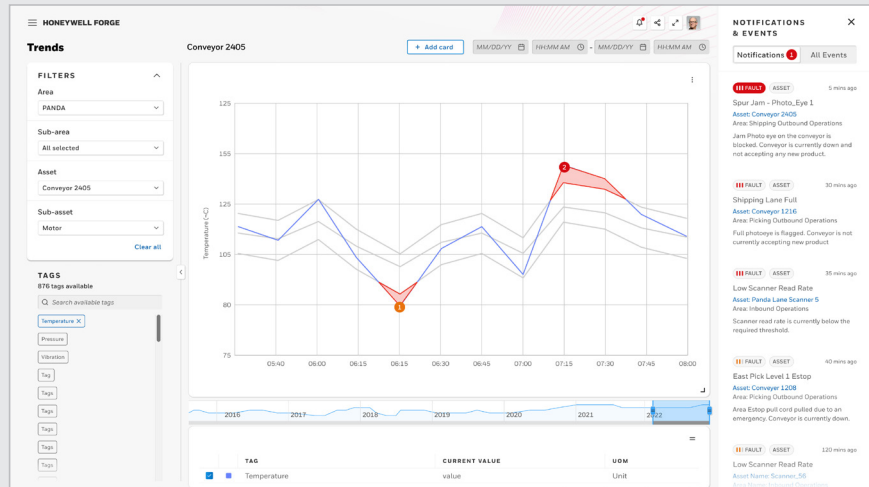
For example, at the same retail site previously mentioned, sensors detected excessive vibration outside the normal signature. On inspection, the maintenance team found a substantial hole in a slider pan and was able to replace it during a planned shutdown. By using condition monitoring, the issue was resolved with no unplanned downtime, potentially saving the site more than \$10,000.

REAL-TIME MONITORING

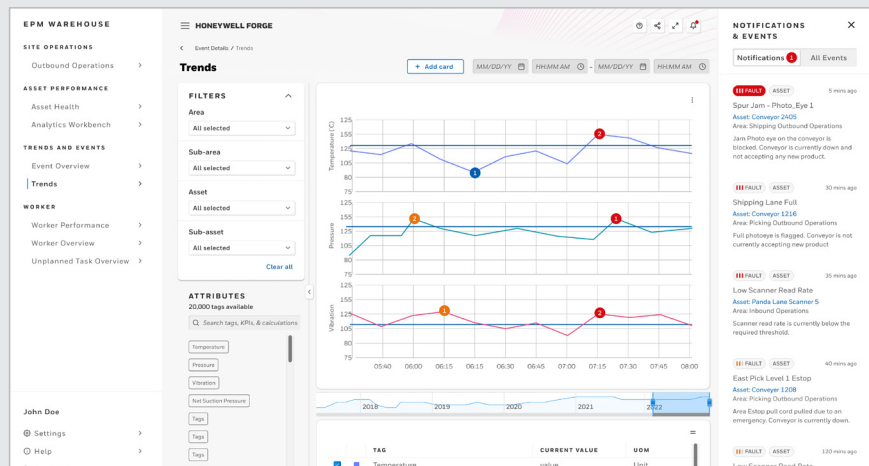
Failure causes are often detected too late because of underlying issues that go undetected. Shifting from time-based intervals to condition-based maintenance makes it more likely that root causes will be detected earlier, maximizing the effectiveness of maintenance teams, mitigating risks, and keeping systems running optimally.

At the same customer site mentioned earlier, an anomaly was detected that sent a notification to a technician. Upon inspection, a drive belt was found to be deteriorating and was replaced. After the replacement, a new anomaly occurred and a higher-frequency vibration signature remained elevated. This signature was identified to be a misaligned gearbox, which was determined to be the root cause of drive belt failures during production.

As a result, the issue was corrected with no long-term damage, mitigating the risk of reactive downtime and potential damages — which could have cost the company \$30,000 or more.



Trends Screen 1



Trends Screen 1

PREDICTIVE MAINTENANCE

A traditional time-based maintenance approach tends to err on the side of caution and recommend service windows based simply on a workday schedule. The trouble with this approach is that it's generally difficult to validate or quantify the benefits without performance KPIs from the system. Condition-based maintenance reduces costs and enables more efficient prioritization by servicing assets at the optimal time.

In the same customer example, advanced pattern recognition noticed a developing anomaly, indicating a bearing with excessive vibration. An alert was triggered for maintenance to be performed. Technicians greased the idler shaft bearing, all transition bearings, and inspected all PTO timing belt pulleys. This resolved the issue and returned vibration levels to an optimal baseline.

OPTIMIZING EQUIPMENT AND LABOR UTILIZATION

Clogged conveyor lanes are a common problem which reduce the efficiency of sortation equipment. When multiple lanes fill up, the sorter's recirculation rate also climbs. Instead of going directly to their designated dock doors, items waste valuable time in a holding pattern, circling around the system until backlogs are cleared out. Many full lanes also suggest that a site doesn't have enough labor unloading product from the conveyors to trucks at the dock.

This is an operational issue which can be solved in several different ways:

- Assign more workers to dock doors that are getting full
- Add automation at dock doors, such as truck loaders
- Assign better-trained people at the peak times to minimize or prevent bottlenecks



Site Operations can assist with issues like these by providing live data on lane performance, including how much product is supposed to be going to every lane. Based on how efficiently the system is functioning, the software will provide recommendations to the operations manager to ensure the correct number of workers are allocated to each lane.

How much capacity could this unlock?

A typical shipping sorter for one Honeywell client is rated around 180 cartons per minute (CPM), and ships around 100,000–150,000 cartons per workday. During the workday, high recirculation rates often don't get addressed until the sorter repeatedly goes into anti-gridlock mode. This high recirculation rate is often caused by full sort lanes. If a site has a 20% recirculation rate, that means 30 cartons are not reaching their destination every minute. If, for example, the sorter runs like this for a two-hour spread throughout the day, the excess recirculation results in lost capacity of 3,600 cartons.

At some sites, these cartons go to a trouble lane or “jackpot” after recirculating three times, overflowing the trouble lane area and requiring more associates to fix the issue. Even though minimal effort is required to troubleshoot these cartons — since they're in jackpot because of recirculating too long, rather than some other issue — if it takes 30 seconds for an associate to check each carton, the site could also lose as much as 1,800 minutes or 30 hours of labor.

Connected Warehouse can improve all of this by potentially increasing capacity up to 3,600 cartons or 2–3% of warehouse capacity and 30 labor hours — as much as \$900 in labor savings *per day*.¹²

¹² Based on data from client-provided document “Capacity increase points”.

LEVERAGE THE POWER OF SEAMLESS INTEGRATION

Honeywell Forge Connected Warehouse is part of Honeywell's integrated suite of solutions for distribution and fulfillment (D&F) operations. No matter where your operation is in its automation journey, Honeywell can help you find the next logical step toward tighter integration, enhanced efficiency and stronger profits.



For more details on how your unique operation could benefit from Connected Warehouse or other warehouse solutions, contact a Honeywell representative today.

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